

Aging, Gender, and Self: Dimensionality and Measurement Invariance Analysis on Self-Construal

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The dimensionality of self-construal, and the consistency of this dimensionality across age and gender, was examined using confirmatory factor and measurement invariance analyses. Across young and older adults, across men and women, and across White Americans and Hispanic Americans, a four-factor solution, including vertical and horizontal interdependence and vertical and horizontal independence, fitted the data better than a two-factor solution with vertical and horizontal dimensions posited as single factors. These results support the hypothesized individual-level multidimensionality of self-construal and suggest that it is structurally similar to the dimensionality of individualism–collectivism at the cultural level. Latent mean comparisons revealed that elders valued uniqueness, on average, more than young adults and that both genders strive equally for achievement, albeit through different means. Implications for cross-level (i.e., cultural vs. individual) and multidimensional understandings of the self are discussed.

Self-construal has its roots in Erikson's (1950) identity theory (Markus & Kitayama, 1991). Identity development involves reconciling others' perceptions of oneself with one's own self-perception (Erikson, 1968). In Erikson's definition, identity develops as a collaborative project between self and context—as a balance between individual desires and socially ascribed roles. As an aspect of identity, self-construal is the extent to which an individual views her- or himself as independent from and related to others.

The balance between individual desires and social roles has been investigated within cross-cultural psychology using theories about individualism and collectivism (Voronov & Singer, 2002). Similarly, two dimensions of self-construal have been proposed: the independent self and the interdependent self (Markus & Kitayama, 1991; see also Singelis, 1994). The independent self is seen as separate from others and often in competition with them. The independent self perceives others primarily as a reference for comparison. The interdependent self, on the other hand, construes

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others as an indispensable or even fundamental component of a larger self-system. Connectedness, social harmony, and being in appropriate social relationships represent the primarily goals of the interdependent self.

In daily life, both the independent and interdependent selves are often employed. Using the independent self, we strive to distinguish ourselves from others and to modify the environment. Using the interdependent self, we pursue connectedness with others and adapt to our social context. These conceptualizations of the independent and interdependent selves have links to earlier psychological theory, in the forms of “social comparison” (Festinger, 1954) and “social integration” (Kuypers & Bengtson, 1973), respectively. The simultaneous use of the independent and interdependent selves allows us to interact with an increasingly global society in an organized and continuous way (Oyserman & Markus, 1993). The importance of using both types of self-construal has been emphasized by an increasing number of authors (Brewer, 2004; Cross & Gore, 2004; Tangney & Leary, 2003).

Self-construal has received little attention from Western psychologists because it has been mistakenly “understood as cultural and historical products” that operate only at the cultural level of analysis (Vignoles, Chrysoschoou, & Breakwell, 2004, p. 113). Matsumoto (2003), however, has distinguished between individual-level and consensual-level culture, with individualism and collectivism primarily representing consensual-level culture and independence and interdependence primarily representing individual-level culture. Consistent with this conceptualization, studies have found relationships between self-construal and other individual-level psychological constructs such as self-esteem and identity (Tangney & Leary, 2003). However, further research is needed to understand the individual-level operationalization of these constructs, in particular whether independence and interdependence can be conceptualized according to dimensions similar to those used to characterize individualism and collectivism.

Triandis and Gelfand (1998) have proposed two dimensions of individualism and two dimensions of collectivism, where each cultural orientation takes both vertical and horizontal forms. Vertical individualism and collectivism refer to the ways in which individuals at different social strata or levels of respect (e.g., supervisor vs. supervisee) are treated. On the other hand, horizontal individualism and collectivism refer to how individuals are expected to relate to others at their own social stratum (e.g., classmates). Although the conceptual scheme proposed by Triandis and Gelfand (1998) builds on cross-cultural theory and has generated some consistent research results (e.g., Gouveia, Clemente, & Espinosa, 2003), little research has explored the dimensionality of self-construal in a similar way. Although Singelis, Triandis, Bhawuk, and Gelfand (1995) have suggested that both individualism–collectivism and self-construal may consist of horizontal and vertical dimensions, and although they have demonstrated the viability of a four-factor solution for individualism–collectivism, the dimensionality of self-construal has not been subjected to a rigorous empirical test. To further advance the conceptualization and measurement and application of self-construal (as has been done with individualism–collectivism), it is necessary to empirically examine its dimensionality.

Further, endorsement of independence and interdependence has been theorized to differ between genders (Bem, 1981; Eagly, 1987) and across the life course (Tangney & Leary, 2003). However, there is little empirical support for these assumptions. Examinations of the extent to which the dimensionality of self-construal is consistent across age and gender would provide evidence regarding the extent to which the

structure of the independent and interdependent self-construals varies across the life course and between genders. Moreover, provided that similar structure were to emerge across age groups and between genders, the hypothesized age and gender differences in mean levels of endorsement of each of the self-construal dimensions could be examined. The current study was designed to address these two issues. We discuss several issues pertaining to self-construal in more detail below, focusing in turn on individual-level cultural constructs, dimensionality, age, and gender.

Level of Analysis and Dimensionality in Individual-Level Cultural Constructs: Individualism–collectivism and Self-Construal

Although individualism–collectivism and self-construal have received a great deal of attention within cross-cultural theory and research (Hofstede, 1980; Kagitçibasi & Berry, 1989; Triandis, 2001), these constructs have been criticized both theoretically and methodologically. Theoretically, individualism and collectivism have been criticized for perpetuating stereotypes rather than informing cross-cultural theory and research (McLoyd, 2004; Oyserman, Coon, & Kimmelmeier, 2002) and for conceptualizing these two “cultural syndromes” as mutually exclusive rather than as independent dimensions of cultural identity (Coon & Kimmelmeier, 2001). A similar criticism has been levied toward self-construal (Matsumoto, 1999). Methodologically, individualism–collectivism measures have been criticized for assessing cultural syndromes at the macro-cultural level rather than at the individual level (Matsumoto, 2003; Matsumoto, Kudoh, & Takeuchi, 1996).

Because the individualism–collectivism framework originated in the realm of cross-cultural psychology, researchers tend to treat these concepts similarly at both the individual (psychological) and cultural levels of analysis (Westerhof, Dittmann-Kohli, & Katzko, 2000). One consequence of blurring levels of analysis is that the complexity of cultural orientations at the individual level may be overlooked or obscured if one considers only the cultural level of analysis. Recently, there has been an increasing theoretical understanding that the concepts of individualism and collectivism may manifest themselves differently at the macro-cultural level than at the individual level (Matsumoto, Weissman, Preston, Brown, & Kupperbusch, 1997; Realo, Allik, & Vadi, 1997). Westerhof et al. (2000) argue that individualism and collectivism manifest as self-construal at the individual level and as cultural values and norms at the macro-cultural level. In assessing individual-level cultural identity, it is important to use only individual-level constructs such as self-construal and individual-level individualism–collectivism (Matsumoto, 2003). It should be noted that self-construal refers *only* to individual-level cultural identity and cannot be used at the cultural level of analysis (Matsumoto, 2003). However, many studies purporting to assess individualism and collectivism at the individual level may still have included macro-cultural-level items. For example, macro-cultural value-orientation items (e.g., “Competition is the law of nature”) and individual self-concept items (e.g., “It annoys me when other people perform better than I do”) were both included in the individual level analysis conducted by Gouveia et al. (2003). Singelis (1994) developed a self-construal scale with the intention of measuring individual-level self-construal. Although Singelis’ self-construal scale has received increasing attention, it has not been widely used to study individual-level cultural identity.

The dimensionality of cultural identity at both the cultural and individual levels has been a subject of contention for some time (see, e.g., Gouveia et al., 2003;

Schwartz, Zamboanga, Rodriguez, & Wang, 2007; Triandis & Gelfand, 1998). Individualism and collectivism were once treated as opposing value systems (e.g., Triandis, 2001) despite empirical evidence to the contrary (Coon & Kemmelmeier, 2001). Similarly, individuals have been categorized as either endorsing an interdependent self or an independent self (e.g., Kim, Kim, Kam, & Shin, 2003), despite Singelis' (1994) grouping of items assessing independence and items assessing interdependence into non-overlapping sets.

The contrast between independent and interdependent self-construal at the individual level can be understood using, but not equated to, the contrast between collectivism and individualism at the macro-cultural level. Translating the four-process theory of individualism and collectivism (Singelis et al., 1995; Triandis & Gelfand, 1998) to the individual level, the independent and interdependent self-construal may each be further differentiated into horizontal and vertical dimensions. We propose to label horizontal independence as *uniqueness* from others; vertical independence as *achievement* along the social hierarchy (e.g., "climbing the corporate ladder"); horizontal interdependence as *cooperativeness* and harmony with others; and vertical interdependence as *responsibility*, a commitment to fulfill one's role within a social hierarchy.

Aging and Gender Differences in Self-Construal

Theories of the self have paid close attention to ways in which the self may operate at different points during the life course (e.g., Erikson, 1980). Different aspects of identity may take precedence at each phase of the life course; for example, differentiation may be most important in adolescence and emerging adulthood as the person seeks to define her- or himself as something in particular (Marcia, 1966; Schwartz, 2001). In contrast, during later life, an interdependent self-construal—who one is in relation to others—may be particularly equipped to provide a sense of continuity between past, present, and future (Frazier, Hooker, Johnson, & Kaus, 2000; Frazier, Johnson, Gonzalez, & Kafka, 2002). As they age, individuals might be seen as gradually nurturing their interdependent selves and integrating their independent and interdependent selves. Empirical investigations have begun to provide support for this hypothesis (Lynch, 2004; Zeigler, 2004). As a result, young adults might be expected to be oriented primarily toward uniqueness, achievement, and other aspects of independence (Côté, 2000), whereas older adults might be expected to be oriented primarily toward responsibility, cooperation, and other aspects of interdependence (Bengston & Lovejoy, 1973).

Regarding gender, earlier empirical work (Eagly, 1987; Kashima, Yamaguchi, Kim, Chio, Gelfand, & Yuki, 1995; Wood, 1987) has suggested that women tend to be more relational than men. This pattern can be understood through a rationale that combines social role theory (Eagly, 1987) and gender schema theory (Bem, 1981). According to social role theory, women's regular social roles, such as caregiving, require them to be responsible, cooperative, and sensitive to others' needs and to balance different aspects of their lives (e.g., career and family). In contrast, men often believe that they must stand out as unique and play the role of achiever and "breadwinner" (Vogel, Wester, Heesacker, & Madon, 2003). According to gender schema theory, early in life, people begin to schematically process information about the world and about themselves according to cultural definitions, including gender roles (Sugihara & Katsurada, 2002). Therefore, in our view, through this schematic process, individuals internalize culturally sex-typed attributes

(e.g., interdependence and/or independence) into their gender-role identity, which can be considered as a part of self-construal. Elaborating on earlier theories, Cross and Madson (1997) suggested that, in Western cultural contexts, men tend to construct and maintain an independent self-construal, whereas women are thought to construct and maintain an interdependent self-construal. Cross and Madson (1997) further demonstrated how these gender differences in self-construals may affect people's cognition, motivation, emotion, and social behavior.

However, more recent studies have challenged the earlier findings that women are more interdependent and less independent than men. Ryckman and Houston (2003) found that, although female university students placed greater importance on aspects of interdependence such as benevolence, universalism, security, and subordination of self to others than male students, women and men did not differ on aspects of independence such as hedonism, power, self-direction, and stimulation. Further, contrary to conventional wisdom, women endorsed a greater emphasis on achievement than men, a finding consistent with results from the Trends in Mathematics and Science Study (Martin, Mullis, Gonzalez, & Chrostowski, 2004; Mullis, Martin, Gonzalez, & Chrostowski, 2004), in which girls outperformed boys in math and science in 19 of the 34 countries sampled in 2003. These inconclusive or counter-theoretical patterns of gender differences suggest the need to clarify the role of gender in self-construal (particularly the achievement dimension)—especially given the changes in women's career opportunities and social roles since the 1970s (Giele & Holst, 2004; Ryckman & Houston, 2003). We predicted that, even if gender differences in the levels of self-construal existed in previous generations, such differences should be attenuated (or reversed) with the increasing advocacy for gender-egalitarianism in schools and society.

Hypotheses

Six hypotheses were examined in the present study. The first four are stated here:

1. A four-factor solution (vertical independence and interdependence as well as horizontal independence and interdependence) will fit the self-construal data better than one or two factor solutions. The independence factors will be face valid as reflecting uniqueness and achievement, and the interdependence factors will be face valid as reflecting responsibility and cooperation.
2. The structure of the four-factor solution will be configurally and metrically invariant across age group and gender.
3. With measurement error controlled (i.e., at the latent level of analysis), older participants will have higher mean scores on responsibility and cooperation, and lower mean scores on uniqueness and achievement, than young adults.
4. With measurement error controlled (i.e., at the latent level of analysis), women will have higher mean scores on responsibility and cooperation, and lower mean scores on uniqueness, than men. Given the mixed findings regarding achievement, we did not advance a specific hypothesis for this dimension.

One noteworthy important limitation of this study warrants attention here. Because of the convenience sampling methods used to recruit participants, the ethnic breakdown of the younger and older age groups differed significantly, $\chi^2(4) = 90.41$, $p < .0001$. Most of the young adults in the present study were Hispanic, whereas most of the older adults were non-Hispanic White. To help untangle possible

confounds between aging and ethnicity effects, we used a statistical method, the MIMIC (Multiple Indicator and Multiple Causes; See Bollen, 1989) model, which can handle these sorts of confounds. The MIMIC approach is recommended to determine each grouping variable's importance when several grouping variables are used in a single study, even if these grouping variables are highly correlated in the sample. A brief description of the MIMIC model is provided in the analytic strategy section below. For technical details of the MIMIC model's advantages, readers are referred to Muthén (1989). Nonetheless, we acknowledge that age group and ethnicity are highly confounded in the present sample. Although we use the MIMIC strategy, which allows us to estimate the effects of ethnicity and then (separately) estimate the effects of age group, to address this problem, we recognize that even the most sophisticated statistical techniques cannot fully compensate for the confounding of age group and ethnicity. The present results should therefore be considered in light of this limitation, and further replication will be necessary with samples where age group and ethnicity are less confounded.

Although ethnicity was not the focus of this study, the following two hypotheses were advanced related to ethnicity:

1. The four-factor solution will be configurally and metrically invariant between the Hispanic and White ethnic groups.
2. With measurement error controlled (i.e., at the latent level of analysis), Hispanics will have higher mean scores on the interdependent dimensions and lower mean scores on the independent dimensions than White Americans (cf. Sabogal, Marin, Otero-Sabogal, Marin, & Perez-Stable, 1987).

Method

Participants

Participants were 168 English-speaking community-living individuals, 84 younger (ages 18–32 years, $M = 22.56$) and 84 older (ages 60–93 years, $M = 73.11$). Most young adult participants were undergraduate students at a largely Hispanic-serving university who received extra credit for their participation. Of the young-adult participants, 16 were employed full-time, 48 were employed part-time, and 20 were not employed, also 62 were full-time students and 18 were part-time students. In terms of ethnicity, 5 young participants were Asian/Pacific Islander, 6 were Black, 54 were Hispanic, 16 were White, and 3 were classified as “other.”

Most of the older participants were recruited from the morning-exercise class at a local mall and received verbal thanks from the experimenter (but no other form of compensation) for their participation. Of the older participants, 6 were employed full-time, 6 were employed part-time, and 79 were retired (some retired older participants were also employed part-time). None of the older participants were students. Six older participants were Hispanic, 77 were White, and 1 was “other.”

To ensure that the elderly participants were physically and cognitively capable of participating in the study, all participants were evaluated using the last 25 items of the Shipley–Hartford Vocabulary Test (Shipley, 1940) and a 10-point scale assessing self-reported health (1 = *poor*, 10 = *excellent*). Older participants' vocabulary scores ($M = 18.85$, $SD = 3.87$) were significantly higher than those of young participants

($M = 15.33$, $SD = 3.13$), $t = 6.47$, $p < .0001$, $d = 1.01$. Because increasing age has been associated with higher scores on this vocabulary test, a difference of this size may be interpreted as indicating roughly equivalent cognitive ability (Harnish, Beatty, Nixon, & Parsons, 1994).

Half of the participants in each age group were men, and half were women. Of the 84 men in the sample, 32 were Hispanic, 46 were White, 3 were Black, one was Asian/Pacific Islander, and 2 were "other." For women, the distribution by ethnicity was: 28 Hispanic, 47 White, 3 Black, 4 Asian/Pacific Islander, and 2 "other."

A separate sample of 351 college students was used to replicate the factor structure obtained with the first sample and to examine the extent to which the dimensionality of self-construal was parallel to the dimensionality of individualism–collectivism. Replication of previous findings, along with parallels between the dimensionality of individualism–collectivism and self-construal, would provide increased confidence in the results for self-construal.

The mean age for participants in this second sample was 21.0 years ($SD = 5.0$). The majority of the sample (43.3%) were first-year students; 23.6% were second-year students, 21.4% were third-year students, 7.6% were fourth-year students, 2.6% were graduate students, and 1% did not provide data on year in school. Of the students, 104 (29.6%) were men and 245 (69.8%) were women (2 participants did not provide data on gender). With regard to ethnicity, 19 students (5.4%) reported their ethnicity as Asian, 195 (55.6%) as Hispanic, 67 (19.1%) as Black, and 61 (17.4%) as White. One student did not report her or his ethnicity.

Measures

Self-construal. Participants in both samples completed Singelis' (1994) Self-Construal Scale as a part of a larger study. In the first sample, there were no missing self-construal data. In the second sample, only 5 participants had missing data on any of the items. Of these 5 participants, none had more than three items with missing responses.

The Self-Construal Scale consists of 24 items, with a 5-point Likert scale used to respond to each item (1 = *does not describe me at all*; 5 = *describes me very well*). Twelve items assess interdependence (e.g., "It is important for me to maintain harmony within my group"). The other 12 items assess independence (e.g., "I enjoy being unique and different from others in many respects"). Evidence has been presented on the validity and reliability of the Self-Construal Scale as a measure of interdependent and independent self-construal (Singelis, 1994). With regard to internal consistency reliability, Singelis reported Cronbach's alpha coefficients of approximately .70 for independent items and .74 for interdependent items in a sample of Asian and Caucasian American college students (Singelis, 1994). Alpha coefficients for the present samples are reported in the results section. With regard to construct validity, Singelis (1994) found support for the hypothesis that Asian Americans would score higher in interdependence ($M = 4.91$) and lower in independence ($M = 4.55$) than would Caucasian Americans (Interdependence: $M = 4.37$; Independence: $M = 5.14$). These findings were consistent with Markus and Kitayama's (1991) characterization of Asian Americans as more interdependent and of Caucasian Americans as more independent.

Individualism and collectivism. The replication sample of 351 participants also completed a 16-item version of the Singelis et al. (1995) measure, as adapted by

Triandis and Gelfand (1998). The version of this measure used in the replication sample consists of four items assessing vertical individualism ($\alpha = .76$), four items assessing horizontal individualism ($\alpha = .76$), four items assessing vertical collectivism ($\alpha = .74$), and four items assessing horizontal collectivism ($\alpha = .66$).

Results

Dimensionality Analysis

Analytic strategy. One of the purposes of the present study was to examine the extent to which Triandis and colleagues' four-process theory of individualism/collectivism (i.e., including both vertical and horizontal dimensions of independence and of interdependence) also applies to self-construal. Dimensionality analyses and measurement invariance analyses were conducted in Mplus version 3 (Muthén & Muthén, 2004). Confirmatory factor analyses were conducted to compare one-factor, two-factor, and four-factor models, corresponding to unidimensional, bidimensional, and multidimensional conceptions of self-construal. The one-factor model represents the one-dimensional approach to cultural identity adopted by many researchers (see Markus & Kitayama, 1991; Oyserman et al., 2002, for more extensive discussions). The two-factor model represents the originally postulated dimensionality of the Self-Construal Scale (Singelis, 1994) and is consistent with a bidimensional model of cultural identity (Schwartz et al., 2007). The four-factor model is consistent with more recent conceptions of individualism–collectivism (Singelis et al., 1995; Triandis & Gelfand, 1998), in which each dimension is divided into horizontal and vertical dimensions. Prior to conducting the dimensionality analysis, the three authors assigned independence and interdependence items to horizontal or vertical clusters using content analysis. The authors discussed each item until there was full consensus on the placement of the item. Items on the Uniqueness scale were judged to reflect a view of individuality being paramount; items for Achievement were judged to reflect valuing individual rewards and standing out from others; items for Cooperation were judged to reflect a view of self as part of a greater whole, with shared goals; and items for Responsibility were judged to reflect fulfilling duties to others.

Because only nested models can be compared against one another using a chi-square difference test (Fincham & Linfield, 1997), in models with fewer factors (i.e., 1 or 2 versus 4), we constrained the correlation(s) between certain pairs of factors to 1 (shown with curved arrows between ovals in Figure 1). Specifically, for the one-factor model, all six correlations among the four factors (i.e., uniqueness, achievement, responsibility, and cooperation) were set to 1, so that a one-factor structure was estimated. Similarly, in the two-factor model, two associations (i.e., between uniqueness and achievement, as indices of independence, and between responsibility and cooperation, as indices of interdependence) were fixed to 1. In the four-factor model, all associations among the four factors were free to vary. Constraining factors to be perfectly correlated, rather than attaching the indicators to a smaller number of factors, allowed us to preserve the means and variances of the factors themselves (van der Sluis, Dolan, & Stoel, 2005). This is important, given that factor means and variances are an integral component of the MIMIC analytic strategy.

Statistical simulation studies have found that incremental fit indices, such as the comparative fit index (CFI) and the non-normed fit index (NNFI), can be artificially

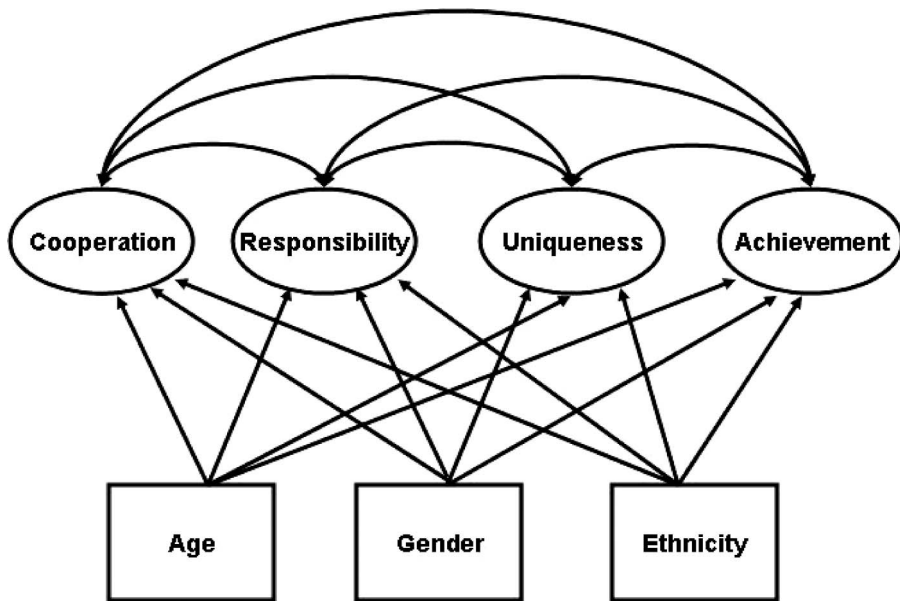


FIGURE 1 General measurement model and MIMIC model structure used in dimensionality and measurement invariance analyses.

lowered in confirmatory factor analyses where factor pattern coefficients are relatively modest (e.g., Beauducel & Wittmann, 2005; Marsh, Balla, & McDonald, 1988). As a result, because many of the factor pattern coefficients in our study were modest, we did not use the CFI or NNFI in evaluating the fit of our models to the data. Rather, we used the normed chi-square (χ^2/df) and the root mean square error of approximation (*RMSEA*), where χ^2/df values below 3 and *RMSEA* values below 0.08 represent adequate fit (Kline, 2006; Quintana & Maxwell, 1999).

To decide how to collapse data across age and gender, we examined the proportion of variance accounted for by each between-groups effect. This procedure is similar to analysis of variance (ANOVA) and, for each grouping variable, partitions the total variance into variability between groups and variability within groups. The results show that the average intraclass correlation coefficients¹ were higher than 5% for age ($ICC = 0.065$) but trivial for gender ($ICC = 0.010$), which suggests that the CFA should be conducted separately within each age group, collapsing across gender (Muthén, 1991, 1994).

Results. Model fit indices are presented in Table 1. Of the models estimated, the four-factor model showed the most favorable fit to the data for both young and older participants in the primary sample, $\chi^2/df = 1.57$ for young and 1.40 for older; *RMSEA* = 0.08 for young and 0.07 for older.

Comparisons between the one-, two-, and four-factor models produced significant chi-square differences, indicating that adding additional factors improved the model fit significantly.

Moving from a one-factor model to a two-factor model improved the model fit significantly, $\Delta\chi^2(4) = 38.45$ (young) and 68.23 (older), $p < .0001$. Moreover, the

TABLE 1 Indices of Model Fit and Fit Comparisons in the Samples of the Young, the Old, and Student Participants

Statistics	Number of factors in each sample						
	Younger			Older			Replication Four
	One	Two	Four	One	Two	Four	
$\chi^2(df)$	444 (252)	406 (248)	387 (246)	431 (252)	363 (248)	344 (246)	631 (246)
χ^2/df	1.76	1.63	1.57	1.71	1.46	1.40	2.57 [†]
<i>RMSEA</i>	0.095	0.087	0.084	0.092	0.074	0.069	0.067
$\Delta\chi^2(df)$	–	38.4 (1)***	18.2 (2)*	–	68.2 (1)***	18.9 (2)***	–

Note: * $p < .05$; ** $p < .01$; *** $p < .001$. [†]Satorra–Bentler chi-square.

four-factor model provided a significantly better fit to the data than did the two-factor model, $\Delta\chi^2(2) = 18.20$ (young) and 18.86 (older), $p < .001$. As a result, we concluded that, consistent with Hypothesis 1, the four-factor model provided the best fit to the first sample. Scores on the four subscales empirically identified in this study have moderate Cronbach's alpha coefficients (Cooperation = .52; Responsibility = .50; Uniqueness = .68; Achievement = .54).

The four-factor structure indicated in this CFA was replicated using the second sample. In the analysis with the second sample, to deal with the univariate non-normality of most items (skewness ranged from -3.4 to 0.08 , $SE = 1.3$; kurtosis ranged from -1.3 to 12.4 , $SE = 0.26$) the Muthén's Maximum Likelihood (MLM) estimation was used to report the Satorra–Bentler chi-square, which is robust to non-normality (Satorra & Bentler, 2001). Consistent with the results of the first CFA and with Hypothesis 1, the four-factor model showed an acceptable fit to the data, Satorra–Bentler corrected $\chi^2/df = 2.57$; $RMSEA = 0.07$. Table 2 presents the standardized factor loadings for the Singelis (1994) items in the four-factor model for each of the two samples.

Next, the dimensionality of the Singelis et al. (1995) individualism and collectivism items was examined in the second sample. We used the scoring algorithm created by Triandis and Gelfand (1998) to assign items to factors. Table 3 displays the factor loadings for these items. The four-factor model showed an acceptable fit ($\chi^2/df = 1.96$; $RMSEA = 0.05$).

Measurement Invariance Analysis on Self-Construal

Analytic strategy: Stability of factor structure. The next step was to investigate whether the structure of self-construal that we retained holds across genders and age groups. Although there are a number of different recommendations for measurement invariance analysis (see Vandenberg & Lance, 2000, for a review), we followed Hoyle and Smith's (1994) recommendations. According to these authors, one aim of measurement invariance analysis is to examine the stability of a factor structure across groups. For this purpose, the minimum degree of measurement invariance is (a) same factor structure in each group (configural invariance) and (b) same loading pattern and at least one equal loading in each group (metric invariance). These two criteria warrant that the items together represent the same factor structure across groups. Several more stringent requirements can be included in invariance analyses, including equality of item intercepts, latent means, error variances and covariances,

TABLE 2 Standardized Factor Loadings and Item Descriptions for Confirmatory Factor Analysis of Singelis (1994) Items in Three Samples

	Factor loadings		
	Younger	Older	Replication
<i>Independence scale</i>			
<i>Uniqueness:</i> reflects a view of individuality being paramount			
I would rather say "no" than risk being misunderstood	.444	.370	-.008
I am the same person at home that I am at school or work	.450	.499	.729
Being able to take care of myself is a primary concern for me	.543	.418	.279
I act the same way no matter who I am with	.552	.559	.714
I feel comfortable using someone else's first name soon after I meet them, even if they are much older than I am	.307	.264	.181
I prefer to be direct and forthright in dealing with people I have just met	.640	.351	.352
I value being in good health above everything else	.557	.655	.209
<i>Achievement:</i> reflects valuing individual rewards, standing out from others			
Speaking up during a class or meeting is not a problem for me	.141	.505	.455
Having a lively imagination is important to me	.403	.342	.461
I am comfortable with being singled out for honors and awards	.171	.737	.476
I enjoy being unique and different from others in many respects	.676	.290	.482
My personal identity, independent of others, is very important to me	.632	.609	.475
<i>Interdependence scale</i>			
<i>Cooperation:</i> reflects view of self as part of a greater whole, with shared goals			
It is important for me to maintain harmony within my group	.387	.758	.295
I respect people who are modest about themselves	.026	.578	.274
I will sacrifice my self-interest for the benefit of the group I am in	.254	.535	.538
I often have the feeling that my relationships with others are more important than my own accomplishments	.320	.287	.336
I should take my parents' advice into consideration when making educational or career plans	.330	.350	.271
Even when I strongly disagree with members of my group, I avoid an argument	.027	.359	.327

(continued)

TABLE 2 (Continued)

	Factor loadings		
	Younger	Older	Replication
<i>Responsibility</i> : reflects fulfilling duties to others			
I have respect for the authority figures with whom I interact	.477	.701	.319
My happiness depends on the happiness of those around me	.389	.387	.431
I would offer my seat on a bus to my professor	.276	.468	.355
It is important for me to respect decisions made by the groups I belong to	.534	.492	.466
I will stay in a group if they need me, even if I am not happy with the group	.196	.183	.424
If my brother or sister fails, I feel responsible	.310	.079	.280

Note: These items were taken from Theodore M. Singelis (1994) *Personality and Social Psychology Bulletin*, 20(5), 580–591. Copyright 1994 by Sage Publications. Reprinted with permission of Sage Publications.

and factor variances and covariances. These additional constraints were not evaluated in the present study.

In this study, the factor structure stability was evaluated with MGCFA (Multiple Group Confirmatory Factor Analysis) within each grouping variable, collapsing across other grouping variables (i.e., 84 young vs. 84 older or 84 male vs. 84 female). The MGCFA was conducted in two steps, the first for configural invariance and the second for metric invariance. On Step 1, we examined configural invariance by establishing a baseline model in which all groups (e.g., men vs. women) are required to have the same factor structure, but the magnitudes of all estimated parameters are allowed to vary. If the fit of the baseline model was satisfactory, we would proceed to Step 2 to test the hypothesis of equivalence in factor loadings by comparing two nested models, the baseline model and a full metric invariance model in which all loadings are constrained to be equal among groups. A significant chi-square difference between the two nested models would indicate that the assumption of full metric invariance should be rejected. In such cases, partial metric invariance is examined by sequentially relaxing constraints on loadings that are found to differ across groups.

In both analyses, the same items are used for scaling (i.e., setting one factor loading per latent variable to 1.0) across all models and groups. Because of the approximately normal distributions of the items in the first sample, ML (Maximum Likelihood) estimation was used.

SPSS for Windows release 12.0 was used to calculate reliability estimates. Because Whites and Hispanics are the two largest ethnic groups in this sample, representing 153 of the 168 participants assessed, only these two groups were included in the MIMIC analysis, in which ethnicity was included as a grouping variable. The CFA examining the dimensionality of self-construal used the full sample.

Results: Stability of factor structure. Because the both the two- and four-factor models provided acceptable fit to the data in the first sample, we conducted

TABLE 3 Standardized Factor Loadings and Item Descriptions for Confirmatory Factor Analysis of Singelis et al. (1995) Items^a

Factor and item	Factor loadings
<i>Individualism</i>	
<i>Horizontal (Uniqueness)</i>	
I'd rather depend on myself than on others	.546
I rely on myself most of the time; I rarely rely on others	.822
I often do "my own thing"	.488
My own personal identity, independent of others, is very important to me*	.395
<i>Vertical (Achievement)</i>	
It is important that I do my job better than others	.510
Winning is everything	.761
Competition is the law of nature	.789
When another person does better than I do, I get tense and aroused	.728
<i>Collectivism</i>	
<i>Horizontal (Cooperation)</i>	
If a coworker gets a prize, I would feel proud	.671
The well-being of my coworkers is important to me	.607
To me, pleasure is spending time with others	.567
I feel good when I collaborate with others	.629
<i>Vertical (Responsibility)</i>	
Parents and children must stay together as much as possible	.659
It is my duty to take care of my family, even when I have to sacrifice what I want	.594
Family members should stick together, no matter what sacrifices are required	.651
It is important to me that I respect the decisions made by groups I belong to*	.338

Notes: ^aThis analysis was conducted on the second (replication) sample. *Denotes items that also appear on the Singelis (1994) scale. These items were taken from Harry C. Triandis and Michele J. Gelfand (1994) *Journal of Personality and Social Psychology*, 74(1), 118–128. Copyright 1994 by the American Psychological Association. Reprinted with permission of the American Psychological Association.

subsequent analyses using both of these models. Superiority of the four-factor model in subsequent models would provide increased confidence that this model, rather than the two-factor model, should be retained. Results of MGCFA between age, gender, and ethnic groups for equivalence on factor structure and factor loadings are shown in Table 4, where enboldened numbers represent partial invariance and unenboldened numbers represent full invariance. All three baseline (i.e., unconstrained) models provide reasonable fit, suggesting configural invariance across age group, gender, and ethnicity.

For age group, the constrained and unconstrained models did not differ significantly; two-factor: $\Delta\chi^2(22) = 23.92$, $p < .35$, four-factor: $\Delta\chi^2(20) = 23.24$, $p < .09$. These results demonstrated full metric invariance between age groups for both models, consistent with Hypothesis 2.

TABLE 4 Results of Multigroup Confirmatory Factor Analysis for Structure Stability

Model	Group	Configural invariance			Metric invariance
		$\chi^2(df)$	χ^2/df	RMSEA	$\chi^2(df)$
Two-factor	Age	771.6 (501) [†]	1.54	.08	23.9 (22)
	Gender ^{b,d}	861.4 (502) [†]	1.72	.05	26.9 (20)[†]
	Ethnicity ^{a,c}	814.8 (503) [†]	1.62	.04	28.3 (20)[†]
Four-factor	Age	731.7 (491) [†]	1.49	.08	23.2 (20)
	Gender ^d	817.2 (492) [†]	1.66	.05	20.8 (19)
	Ethnicity ^{a,c,e}	783.2 (492) [†]	1.59	.04	26.3 (17)[†]

Notes: * $p < .05$; [†] $p < .15$. Bold represents partial invariance. The following items have unequal loadings: ^aMy personal identity independent of others, is very important to me. ^bI respect people who are modest about themselves. ^cI have respect for the authority figures with whom I interact; ^dMy happiness depends on the happiness of those around me. ^eI enjoy being unique and different from others in many respects.

For gender, full metric invariance was not found for both models. However, when loading constraints on two interdependence items were freed in the two-factor model, the constrained and unconstrained models did not differ significantly, $\Delta\chi^2(20) = 26.87$, $p < .14$. This finding suggests partial metric invariance for gender. For the two-factor model, the two items with unequal loadings between genders were “My happiness depends on the happiness of those around me” (male, $\lambda = .55$; female, $\lambda = .25$) and “I respect people who are modest about themselves” (male, $\lambda = .57$; female, $\lambda = .18$). Of these two items, only the first appeared to load unequally (male, $\lambda = .62$; female, $\lambda = .25$) in the four-factor model, which also suggests partial metric invariance, $\Delta\chi^2(19) = 20.79$, $p < .35$.

For ethnicity, full metric invariance was not found, but partial metric invariance emerged for both the two-factor and four-factor models. One independence item and one interdependence item loaded unequally in the two-factor model: “I have respect for the authority figures with whom I interact” (interdependence; Hispanic, $\lambda = .85$; Other, $\lambda = .60$) and “My personal identity independent of others, is very important to me” (independence; Hispanic, $\lambda = .17$; Other, $\lambda = .42$). These two items also appeared similarly unequal in the four-factor model (in which the first item represents responsibility and the other item represents achievement), with an additional unequal loading item representing achievement: “I enjoy being unique and different from others in many respects.” The loadings of these three unequal items in the four-factor model are: $\lambda = .76$ (Hispanic) versus $\lambda = .57$ (Other) for the item “respect for the authority,” $\lambda = .24$ (Hispanic) versus $\lambda = .60$ (Other) for the item “my personal identity,” and $\lambda = .55$ (Hispanic) versus $\lambda = .19$ (Other) for the item “enjoy being unique.” Despite these unequal loadings, the finding of sufficient configural and partial metric invariance supports the stability of the factor structure and allows for further MIMIC analysis.

Analytic strategy: Group differences on latent factor means and observed indicators. We then proceeded to make error-free comparisons of latent group means across age group, gender, and ethnicity. This is accomplished by differentiating associations between the latent variables and the grouping variables (age group, gender, and ethnicity) from any remaining associations between the indicator items and the

grouping variables. Associations between an indicator and a grouping variable represent differential item functioning because they suggest that item endorsement differences persist even after the effects of group differences on the latent variable have been accounted for. In MGCFA, this remaining association is equivalent to non-invariance of item intercepts. However, because age group and ethnicity are highly correlated in our small sample, a MGCFA cross tabulating age group and ethnicity would be impractical (Muthén, 1989). Instead, we used a MIMIC model in which age, gender, and ethnicity (i.e., Hispanic vs. White) coexist as exogenous variables in the model to examine their simultaneous effects on the latent variables, as well as on each observed item. Compared with MGCFA, the MIMIC is advantageous in several aspects with regard to the present sample. First, unlike MGCFA, which divides the sample into several groups, in MIMIC the sample is considered a whole, which maintains the power to detect heterogeneity effects. Second, in MIMIC, all exogenous variables (i.e., latent factors and grouping variables) were tested simultaneously, each controlling for the others even if they are correlated. Therefore, each grouping variable's effects can be evaluated after the common contribution has been parted out (Muthén, 1989). The second set of analyses in the MIMIC approach (corresponding to the straight arrows from the boxes to the ovals in Figure 1) was conducted in two steps. First, the three grouping variables were entered into the best fitting model from the above-mentioned dimensionality analysis. On this step, paths from the grouping variables to the latent variables are allowed, whereas paths from grouping variables to the indicators are fixed to zero. A significant path coefficient from the grouping variable to the latent construct is interpreted similarly to an unstandardized beta coefficient in a regression with dichotomous predictors. That is, the unstandardized coefficient reflects the mean difference between the two groups. Second, additional regression paths were allowed between the grouping variables and the indicator variables. At this step, a significant direct path from a covariate to an indicator reflects measurement non-invariance (i.e., differential item functioning) on the specific indicator related to the covariate. The regression coefficients represent estimates of the strength of measurement differences in each indicator associated with the grouping variable (Vandenberg & Lance, 2000).

Results: Group differences on latent factor means. Table 5 displays the unstandardized coefficients for the effects of the covariates on the latent factors and on the items for the two-factor model, and Table 6 displays the corresponding results for the four-factor model. Unstandardized coefficients were used so that the strength of these effects can be explained and compared in terms of the 5-point response scale used for the self-construal items.

The results of the two–four-factor model may partially contradict Hypothesis 3 because older adults scored higher on the independence factor (Unstandardized $\beta = .27, p < .05$). The gender difference on independence scores was in the direction predicted by Hypothesis 4, with women scoring lower than men (Unstandardized $\beta = -.18, p < .05$). No significant age or gender effects were found on the interdependence scores, and no ethnicity effects emerged on either the independence or interdependence scores. Breaking these two factors into four suggests that it is uniqueness—the horizontal dimension of independence—on which age (Unstandardized $\beta = .24, p < .05$) and gender (Unstandardized $\beta = -.20, p < .05$) differences emerged. Men and older adults endorsed higher scores on the uniqueness dimension (i.e., vertical independence). In addition, men were found to score higher (Unstandardized $\beta = -.24, p < .05$) on responsibility—the vertical dimension of

TABLE 5 Effects of Grouping Variables on Self-Construal Latent Factors and Endogenous Indicators in the Two-Factor Model

Factor/item	Age		Gender		Ethnicity	
	β^a	<i>SE</i>	β^a	<i>SE</i>	β^a	<i>SE</i>
Interdependence	.22	0.13	-.21	0.11	-.07	0.09
Independence	.27*	0.10	-.18*	0.07	.01	0.06
I enjoy being unique and different from others in many respects	-1.41*	0.18	-	-	-	-
My personal identity, independent of others, is very important to me	-.68*	0.15	-	-	-	-
I am comfortable with being singled out for honors and awards	-	-	-	-	-.46*	0.10
Having a lively imagination is important to me	-.53*	0.14	-	-	-	-
My happiness depends on the happiness of those around me	.62*	0.18	-	-	-	-
Even when I strongly disagree with members of my group, I avoid an argument	.63*	0.19	-	-	-	-
I would offer my seat on a bus to my professor	-.56*	0.19	.38*	0.19	-	-
I feel comfortable using someone else's first name soon after I meet them, even if they are much older than I am	.54*	0.21	-	-	-	-
I often have the feeling that my relationships with others are more important than my own accomplishments	.47*	0.19	-	-	-	-
I will stay in a group if they need me, even if I am not happy with the group	-	-	-	-	.28*	0.12

Notes: * $p < .05$. ^aUnstandardized β . **Bold** items appeared equal in the four-factor model. These items were taken from Harry C. Triandis and Michele J. Gelfand (1994) *Journal of Personality and Social Psychology*, 74(1), 118–128. Copyright 1994 by the American Psychological Association. Reprinted with permission of the American Psychological Association.

interdependence. No age group or gender differences emerged for the achievement dimension of independence. However, two marginally significant effects may be worth mentioning: (a) the older group scored higher on cooperativeness (Unstandardized $\beta = .27$, $p < .10$); and (b) Hispanics scored higher on achievement (Unstandardized $\beta = .15$, $p < .10$).

Results: Differential item functioning. We conducted differential item functioning (DIF) analyses on both the two- and four-factor models. The specific relationships

TABLE 6 Effects of Grouping Variables on Self-Construal Latent Factors and Endogenous Indicators in the Four Factor Model

Factor/item	Age		Gender		Ethnicity	
	β^a	<i>SE</i>	β^a	<i>SE</i>	β^a	<i>SE</i>
Cooperation	.27	0.14	-.17	0.11	-.07	0.10
Responsibility	.16	0.14	-.24*	0.11	-.05	0.09
Uniqueness	.24*	0.10	-.20*	0.08	.03	0.06
Achievement	-.20	0.12	-.07	0.10	-.15	0.08
I enjoy being unique and different from others in many respects	-.88*	0.09	-	-	-	-
Speaking up during a class or meeting is not a problem for me	.65*	0.21	-	-	-	-
My happiness depends on the happiness of those around me	.63*	0.18	-	-	-	-
Even when I strongly disagree with members of my group, I avoid an argument	.61*	0.20	-	-	-	-
I would offer my seat on a bus to my professor	-.54	0.20	.42*	0.20	-	-
I feel comfortable using someone else's first name soon after I meet them, even if they are much older than I am	.51	0.21	-	-	-	-
I often have the feeling that my relationships with others are more important than my own accomplishments	.46	0.20	-	-	-	-
I will stay in a group if they need me, even if I am not happy with the group	-	-	-	-	.28*	0.12

Notes: * $p < .05$. ^aUnstandardized β . **Bold** items appeared equal in the two-factor model. These items were taken from Theodore M. Singelis (1994) *Personality and Social Psychology Bulletin*, 20(5), 580–591. Copyright 1994 by Sage Publications. Reprinted with permission of Sage Publications.

between the grouping variables and the self-construal items are presented in the lower portion of Tables 5 and 6. We first present results for the two-factor model. On the basis of MIMIC analyses, when direct paths from age, gender and ethnicity to each of the indicator variables were constrained to zero in the two-factor model, modification indices suggested that we add paths from age to eight items, from gender to one item, and from ethnicity to two items. The model fit improved significantly each time one of these constraints was released, with chi-square differences (1 *df* each) ranging from 3.95 to 52.90. These significant chi-square differences indicated that, after controlling for the overall age group, gender, and ethnic differences on latent achievement scores, some items remained significantly associated with age, gender, and/or ethnicity. For example, elderly participants were less interested in “being unique and different from others in many respects” (Unstandardized $\beta = -1.414$).

The differential item effect found in the two-factor model was largely replicated in the four-factor model, except that elders were found to be more anxious about “speaking up during a class” (Unstandardized $\beta = .651$). This difference did not emerge in the two-factor model. Two items differing by age (“My personal identity, independent of others, is very important to me”; “Having a lively imagination is important to me”) and one item differing by ethnicity (“I am comfortable with being singled out for praise or rewards”) in the two-factor model did not differ by age or ethnicity in the four-factor model.

Discussion

Self-in-relation theory has evolved from (a) a unilevel and unidimensional perspective, which assumes that individuals construe themselves as either separate from or connected to others depending on their culture to (b) a multilevel and bidirectional model that conceptualizes individuals as sharing cultural value orientations at a global level, while construing themselves as both interdependent with and independent from others at the individual level. A further advance has been to separate individualism and collectivism into horizontal and vertical forms (Singelis et al., 1995; Triandis & Gelfand, 1998). However, no systematic empirical efforts have been undertaken to examine the tenability of this shift for the study of individual-level self-construal. The present study represents the first known attempt to empirically examine the dimensionality of self-construal by comparing model fit indices from confirmatory factor analyses for these three solutions. A four-factor model emerged from the CFA and reasonably represents the data. The four-factor model was statistically superior to one- and two-factor models. Remarkably, this four-factor solution was compatible with a four-factor solution for individualism–collectivism that emerged from analysis with our second sample.

Support for, and practical implications of, the four-factor model of self-construal was further suggested by the measurement invariance analysis. This four-factor model was demonstrated to be configurally and metrically invariant across variations in age, gender, and ethnicity. This finding suggests that the Self-Construal Scale is appropriate for use with diverse populations and provides some counter-evidence to Markus and Kitayama’s (1998) claim that self-report scales are most appropriate for respondents with a “Euro American personality” (p. 75). With regard to practical implications, the present results suggest gender, age, and ethnic effects on each of the four aspects of self-construal that may not emerge or may be misinterpreted if the four aspects are lumped together in the simpler one- or two-factor models. In terms of aging effects, when the two age groups were compared based on the two-factor model, older participants appeared unexpectedly higher on independence, and not different on interdependence, compared to younger participants. However, when the groups were compared along the more nuanced dimensions (i.e., the four-factor model including vertical and horizontal independence and interdependence), the source of these unexpected results became clear. First, older adults endorsed uniqueness, a horizontal independence dimension, significantly more on average than young adults. No similar result was found for achievement, the vertical dimension of independence. This result is consistent with Erikson’s (1950) idea that humans seek self-realization in later stages of life. Although it may appear counterintuitive in light of the hypothesis that younger adults would score as more independent than older adults, this finding from the four-factor model comparison provides a plausible explanation for the unexpected aging

effect on independence score when the two-factor model was used. On the other hand, the older group's marginally significantly higher mean on the cooperation dimension of interdependence, but not on the responsibility dimension, provides partial support for the hypothesis that the older adults would be more relational than their younger counterparts. This aging effect was not present when the groups were compared along the two broad dimensions. Overall, this pattern of age group differences further supports the conceptualization of independence and interdependence as separate factors, with horizontal and vertical dimensions within each factor.

An additional focus in this study was gender-related differences in self-construal. In the two-factor model comparison, although men appeared more independent than women as predicted, the lack of gender differences on interdependence was unexpected. The comparison along the four dimensions again provided further clarification. Men reported greater levels of uniqueness and responsibility, but lower level of cooperativeness, than women. There was no gender difference on achievement. Taken together, the results suggest that both genders strive for achievement, but perhaps through different means: men need to stand out to demonstrate their uniqueness and to fulfill their socially assigned responsibilities, whereas women try to cooperate with others.

The results of our measurement invariance analyses also address the effects of differential item functioning on the psychometric properties of the Singelis Self-Construal scale. The age differences found may guide future development and use of this scale with elderly populations. Empirically, MIMIC analyses demonstrated age effects on two items that serve as indicators for the underlying dimension of achievement (horizontal independence) and four items for responsibility (horizontal interdependence). From a measurement invariance perspective, these age effects suggest that summing of the items for the achievement or responsibility factors may lead to inaccurate comparisons of achievement or responsibility between younger and older individuals. From a differential item functioning perspective, these findings suggest that these items function differently between two age groups, even after adjusting for overall desire for achievement. One explanation for this finding is that the Self-Construal Scale was designed for use with adolescents and young adults, and that some items may need to be revised for use with older adults. For example, "Speaking up during a class is not a problem for me" may cause more anxiety in the older group (e.g., "How should I answer this question?") because these participants were not typically in school. Another explanation is that some items may be on a relative scale (Borsboom, Mellenbergh, & Heerden, 2002). For example, a young woman, striving for uniqueness, may imagine a social occasion full of youngsters and conclude that she would impress others if she dressed up in a new fashion. An elderly person with the same desire for uniqueness may conclude that she would be scorned if she engaged in the same behavior, and therefore she would therefore be likely to disagree with an item referencing dressing up to look unique. As a result, although on average the older participants reported less preference for "being unique and different from others in many respects," it should be kept in mind that the items were designed for adolescents and young adults—not for elders. To be applicable to elders, the self-construal items would need to be reworded to be specific to the contexts in which older individuals function, or else presented with a specific set of instructions such as comparing oneself to a same-aged reference group. Overall, based on the relatively better fit of the four-factor model and differential item functioning among the groups, the overriding practical implication from this study is that four scores rather than two scores should be calculated in research or practice

involving age or gender comparisons—and that the items or instructions may need to be revised to be age-appropriate for older adults.

Limitations and Future Directions

The present results should be considered in light of several important limitations. First, the young adults in the present sample were university students, whereas the older adults were community residents who were approached in the shopping mall. Neither the younger adults nor the older adults were representative of their respective populations. Because university students may not be representative of the general population, and because older adults visiting a shopping mall and volunteering to complete a survey without compensation may not represent the general population of elders, the comparability of the younger and older adult samples may be somewhat compromised. Second, as mentioned in introduction, most of the young adults in the present sample were Hispanic, whereas most of the older adults were non-Hispanic White. As a result, the metric invariance found across age, gender, and ethnic groups may be confounded to some extent. For example, if the finding of configural or metric invariance across age groups was an artifact of the finding of configural and metric invariance across ethnicity, the findings of differential item functioning across age groups effect could be due to lack of configural or metric invariance across age groups rather than to differential functioning of the items. Future studies should be designed such that age, gender, and ethnic differences are largely independent of one another to rule out the possibility that these variables may have confounded one another's effects. Moreover, samples of younger and older adults should be selected in comparable ways (i.e., both subsamples drawn from community organizations) and should be selected randomly from their respective populations.

Selecting younger versus older adults also carries a set of limitations. The United States and other Western countries have become increasingly individualistic during the second half of the 20th century and the first years of the 21st century (Arnett, 1998, 2000; Côté & Allahar, 1994). As a result, the “cohort effects” inherent in comparing individuals who were young adults in the 1950s and 1960s to those who are young adults in the 21st century must be considered. Clearly it is difficult—and time-consuming—to follow the same group of individuals from young to older adulthood, and therefore cross-sectional research is often used to test for age differences (Kraemer, Yesavage, Taylor, & Kupfer, 2000). At the same time, the inherent limitations of this approach—including cohort and historical effects—should be acknowledged.

Another issue related to sampling of this study is that its relatively small size may reduce the power to detect measurement non-invariance. However, the fact that each comparison is made between groups of equal size may, to some extent, temper this limitation; biasing effects of small sample size on invariance tests are generally strongest when sample sizes differ across groups (e.g., Lubke, Dolan, Kelderman, & Mellenbergh, 2003). Nevertheless, this study should be viewed as exploratory and as a springboard for future research with larger samples.

It should also be noted that the results of this study, especially the measurement invariance component, only apply to the ethnic and age groups included in the study. Additional research is needed to replicate the current findings in other ethnicities and age groups. Moreover, through longitudinal invariance analyses combined with other methods, future studies should examine the developmental trajectory of self-construal and its measurement (Fuligni, 2001).

Future studies should also evaluate the degree of cross-level correspondence by conducting multilevel measurement invariance analyses. Specifically, it would be of interest to examine whether, given increasing globalization and the decreasing importance of national boundaries (Arnett, 2002), self-construal scores at the individual level have the same meaning and metric as individualism–collectivism scores at the cultural level. If they have different meanings, one possible explanation is a shift in meaning due to aggregation from the individual level to the group level or due to disaggregation from the group level to the individual level. If there is no shift in meaning but the metrics are different, then the observed differences at one level have limited predictive value at the other level.

Despite these limitations and caveats, the present study has provided the first known empirical investigation into the dimensionality of self-construal. Results support the four-dimensional latent structure of self-construal and demonstrate that this structure is robust across age, gender, and ethnic groups. Most importantly, the structure of self-construal appears similar to the structure of individualism–collectivism at the individual level. It is hoped that the present results can provide a springboard for future investigations into the dimensionality of self-construal and other aspects of cultural identity.

Note

1. The ICC is computed as the ratio of the between-group factor variance and residual to the total variability present.

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