



Examining the dimensionality of self-construals and individualistic–collectivistic values with random intercept item factor analysis

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ABSTRACT

The construct of self-construal and its counterpart, individualistic and collectivistic (I–C) values, have been widely studied in cross-cultural research. Although theorists often conceptualize the two self-construals (independence–interdependence) as being bipolar to each other, empirical research has found that these construals are orthogonal. The current research re-visits the dimensionality of self-construals and I–C values using random intercept item factor analysis, a statistical procedure used to control for acquiescence bias. Our results ($N = 524$ in Study 1; $N = 22,402$ in Study 2) suggest that acquiescence bias exists consistently in the self-construal measure and the I–C values measure, and that independence and interdependence, as well as I–C values, correlate slightly negative with but are not entirely opposite to each other. This result supports the bidimensionality model for both self-construals and I–C values. Our findings have substantial implications for the future conceptualization and measurement of self-construals.

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1. Introduction

Independent and interdependent self-construals are probably the most widely studied individual difference variables in cross-cultural research. Understanding the nature of self-construals is thus crucial because it helps to explain the observed national differences in psychological phenomena (Markus & Kitayama, 1991) and organizational behaviors (Gelfand, Erez, & Aycan, 2007). Traditionally, researchers conceptualized independence and interdependence as opposite poles of the same construct, termed the self-construal construct (see Schimmack, Oishi, & Diener, 2005, for a discussion). This conceptualization had a direct influence on the measurement practice of self-construals and its counterpart, individualistic–collectivistic (I–C) cultural values (Schwartz, 1990). Some researchers assessed self-construals at the person-level by taking the difference between the independence and interdependence scores of their participants (e.g., Aaker, 2000; Lee, Aaker, & Gardner, 2000; Pöhlmann & Hannover, 2006; Vohs & Heatherton, 2001; see Cross, Hardin, & Gercek-Swing, 2011, for a discussion). Other researchers also calculated the difference between individualistic and collectivistic values to form a single index to represent independent–interdependent self-construals (e.g., Bretones & Gonzalez, 2011). However, these calculation

methods have received limited empirical support. When researchers conducted factor analysis on self-construal items, they consistently found the relationship between independence and interdependence to be orthogonal (e.g., Singelis, 1994) or slightly positive (Kwan, Bond, & Singelis, 1997). Independence and interdependence should thus be treated as separate constructs.

One potential reason that researchers are in favor of these difference score calculation methods is to counter for acquiescence bias in self-construal measurements (Schimmack et al., 2005). Acquiescence bias has the potential to influence the factor structure of a construct, causing a unidimensional construct to appear bidimensional in factor analyses. The purpose of the current investigation is to re-examine the dimensionality (i) between independence and interdependence and (ii) between I–C values, using an advanced factor analytic procedure, random intercept item factor analysis (RIIFA; Maydeu-Olivares & Coffman, 2006). RIIFA is a method that can be used to control for acquiescence bias while examining the dimensionality of a construct. The answer to the factor structure of self-construals is important for both the conceptualization and the measurement of self-construals.

1.1. Self-construals and acquiescence bias

Independence is characterized by individual autonomy and distinction from others (Cross et al., 2011; Markus & Kitayama, 1991). In contrast, interdependence refers to a self-identity that emphasizes

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relations with others and with social groups (Cross et al., 2011; Markus & Kitayama, 1991; Oyserman, Coon, & Kemmelmeier, 2002). Although researchers have found an orthogonal and sometimes positive correlation between independence and interdependence, the self-construal measurements have been shown to be prone to acquiescence bias. Acquiescence bias refers to respondents' consistent tendency to agree or disagree with a survey item regardless of the actual content in the item, and this tendency is likely to bias correlation in the positive direction (i.e., inflate positive correlations and deflate negative correlations). Hofstede (1980) used within-subject standardization to control for the cross-cultural differences in acquiescence bias and other response biases, and he found that self-construal scores at the country-level correlate meaningfully with other country-level variables (e.g., well-beings). More recently, Schimmack et al. (2005) found that individualism scores (i.e., independence measured at the country-level) from a self-construal scale correlated meaningfully with other measures of individualism and with the human development index only after statistically controlling for acquiescence bias. Indeed, acquiescence response bias has always been a concern of cross-cultural psychologists, particularly because some cultures may have a stronger norm of agreeing to survey items irrespective of item content (see Smith & Fischer, 2008, for a recent review). By extension, the same concern is also apparent at the person-level measurement of self-construals. To counteract acquiescence bias, researchers often rely on the use of reverse-keyed items; however, self-construal scales seldom contain reverse-keyed items. Therefore, the negative relationships between the two self-construals can be deflated by acquiescence bias (Schimmack et al., 2005; see also Kam & Meyer, 2012a, 2012b), rendering them to appear orthogonal or even positively correlated.

One common method to statistically control for acquiescence bias is to sum up the raw scores of both the regular-keyed items and the reverse-keyed items in a construct and use this score in subsequent statistical analyses to partial out acquiescence bias (e.g., Schimmack et al., 2005). However, this method has a serious disadvantage. If one sums up the regular-keyed and reverse-keyed item scores for a measure, this summary score represents more than just acquiescence bias because it often correlates with the original measure score (for an empirical example, see Billiet & McClendon, 2000). This is because the summary score is made up of both independence and interdependence scores. Therefore, it is necessary to come up with another method to control for acquiescence bias.

1.2. RIIFA and the current studies

The current research re-examined the relationship between independence and interdependence and between I-C values by conducting RIIFA (Maydeu-Olivares & Coffman, 2006). RIIFA is an extremely useful confirmatory factor analytic technique (CFA) that can control for participants' tendency to endorse both independence and interdependence items (Maydeu-Olivares & Coffman, 2006). Unlike other CFAs, RIIFA includes a random intercept that captures participants' idiosyncratic tendency to endorse all items simultaneously (see Fig. 1; see Maydeu-Olivares & Coffman, 2006, for details). Common factor analytic models (e.g., common CFA models) assume that an item intercept is identical across participants, but the random intercept in RIIFA relaxes this assumption. Maydeu-Olivares and Coffman (2006) suggested supplementing common factor analytic procedures with RIIFA when a researcher suspects that acquiescence bias has adversely affected construct dimensionality. Thus, researchers can become more confident of their results if normal factor analytic results and RIIFA results converge to a consistent conclusion.

In Study 1 we examined the factor structure of a widely used self-construal measure – the Singelis (1994) Self-Construal Scale. We also tested the validity evidence between the self-construal

factor scores (derived from RIIFA) and common correlates (self-esteem, modesty, relational-interdependence self-construal, and relationship self-efficacy). Previous research has shown that independent individuals value self-esteem and personal agency. In contrast, interdependent individuals value modesty and relationships with others (e.g., Cross, Bacon, & Morris, 2000; Kwan et al., 1997; Markus & Kitayama, 1991). In Study 1, we demonstrate how the discriminant validity evidence of the two self-construal scores is enhanced after RIIFA. In Study 2 we extend our examination by studying the correlation between I-C values using the Schwarz Values Survey in seven countries.

2. Study 1: Self-Construals

2.1. Method

2.1.1. Participants

The sample is comprised of 524 undergraduate students (258 females; $M_{\text{age}} = 22.21$; $SD_{\text{age}} = 2.28$) in Beijing, China. They completed the survey in exchange for RMB\$10 (approximately US\$1.20). They completed the following measures in their native language. Items were translated and back-translated to ensure accuracy. Unless otherwise specified, all scales were measured in a 7-point Likert Scale, anchors ranging from -3 (*Strongly Disagree*) to +3 (*Strongly Agree*).

2.1.2. Measures

2.1.2.1. *Singelis Self-Construal Scale*. The Singelis (1994) Self-Construal Scale (SSCS) measures the cultural syndromes of independent and interdependent self-construals. The SSCS demonstrates a good reliability and validity (Singelis, 1994). Each dimension of self-construal is measured by 15 items without any reverse-keyed items.

2.1.2.2. *Rosenberg Self-Esteem Scale*. The Rosenberg (1965) Self-Esteem Scale (RSES) measures participants' global evaluation of themselves. The original scale consists of 10 items, half of which are reverse-keyed.

2.1.2.3. *Modesty Scale*. This 8-item scale, revised from the modesty subscale from the IPIP NEO agreeableness domain (Goldberg et al., 2006), measures participants' tendency to be modest and humble. Half of the items are reverse-keyed. A sample item is "I dislike talking about my accomplishments".

2.1.2.4. *Relationship Self-Efficacy*. This 7-item scale with no reverse-keyed items, revised from the relationship satisfaction scale from Murray, Bellavia, Rose, and Griffin (2003) and Kwan et al. (1997), measures respondents' perceived confidence in establishing close and harmonious relationships with others. Participants rated the extent to which they felt confident in performing the content in each statement in an 11-point Likert Scale, ranging from 0 (*Cannot do at all*), through +5 (*Moderately certain I can do*) to +10 (*Certain I can do*). Sample items are "To maintain harmonious relationships with others" and "To effectively decrease or ameliorate your conflict with others."

2.1.2.5. *Relational-Interdependence Self-Construal*. For a subset of the sample ($N = 72$), we included the Relational Interdependence Self-Construal (RISC) Scale from Cross et al. (2000). The RISC measures one's tendency to define oneself in terms of relationships with others, whereas interdependence in SSCS also measures one's self-identification in terms of relationships with social ingroups. One of the 11 items in the RISC is reversed-keyed.

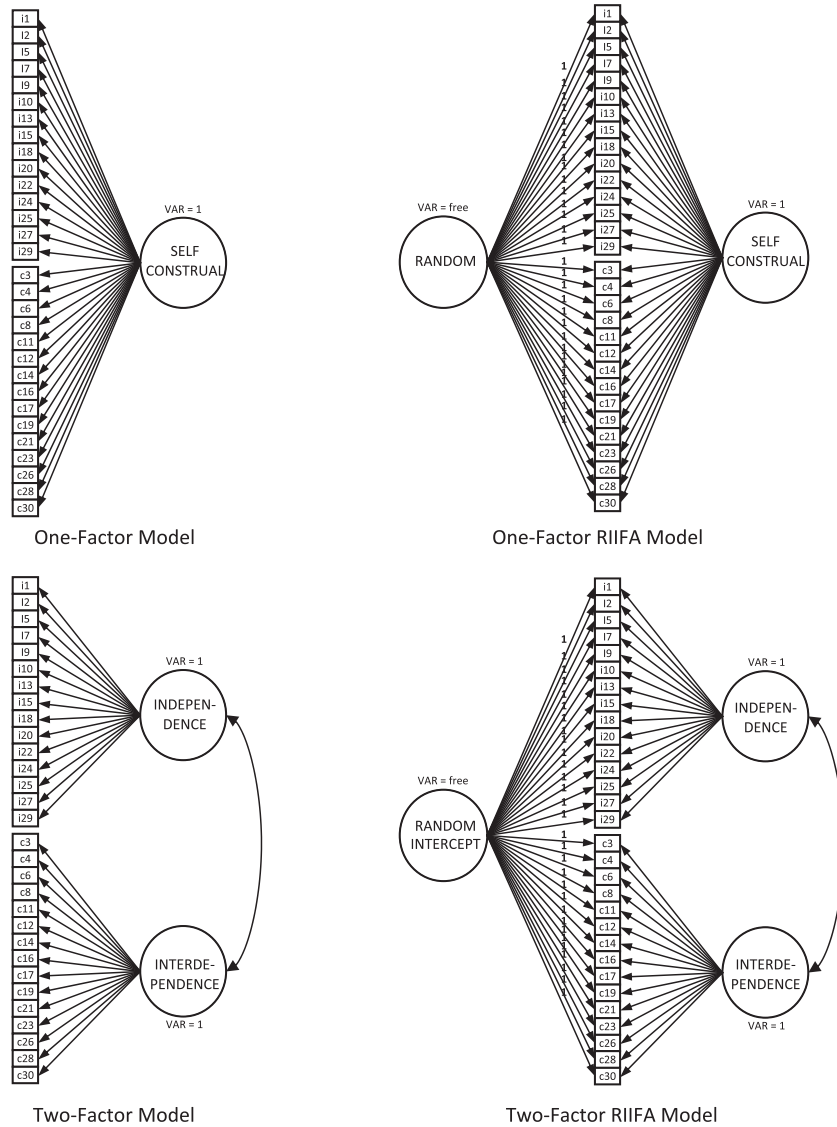


Fig. 1. Tested Models. VAR = variance; i = independence item; c = interdependence item.

2.2. Results and discussion

The correlations among the variables and scale reliabilities are shown in Table 1. The SSCS was first subjected to a series of confirmatory factor analyses (CFA; see Table 2). In these analyses we compared among the following four models: a one-factor model, a two-factor model, a one-factor RIIFA model, and a two-factor RIIFA model (see Fig. 1). The difference between a RIIFA model and a simple CFA model is the inclusion of a random intercept, which

captures participants' idiosyncratic tendency to endorse items of both self-construals. All three other models were nested within the two-factor RIIFA model (see Maydeu-Olivares & Coffman, 2006), and thus model fit was examined through a chi-square difference test. Our results showed that the one-factor solution did not converge. In addition, the two-factor RIIFA model fit significantly better than a two-factor model, $\Delta\chi^2 = 123.53$, $\Delta df = 1$, $p < .001$, or a one-factor RIIFA model, $\Delta\chi^2 = 40.73$, $\Delta df = 1$, $p < .001$. Interestingly, the independence-interdependence correla-

Table 1
Scale reliabilities and variable correlations in Study 1.

		M	SD	α	1	2	3	4	5
1.	Independent self-construal	0.86	0.66	.74	–				
2.	Interdependent self-construal	1.18	0.57	.73	.21**	–			
3.	Self-esteem	1.39	0.95	.85	.21**	–.02	–		
4.	Modesty	0.13	0.75	.60	–.28**	.26**	–.40**	–	
5.	Relationship self-efficacy	7.32	1.41	.83	.18**	.36**	.30**	–.08	–
6.	Relational interdependence	1.29	0.65	.77	–.01	.43**	.18	.12	.29*

* $p < .05$.

** $p < .001$.

Table 2
Model comparisons in Study 1.

Models	Model Fit Indices						
	χ^2	<i>df</i>	<i>p</i>	TLI	CFI	RMSEA	
1.	One-factor	Non-convergence					
2.	Two-factor	1356.34	404	<.001	.53	.59	.07
3.	One-factor RIIFA	1273.54	404	<.001	.57	.63	.06
4.	Two-factor RIIFA	1232.81	403	<.001	.59	.65	.06

tion dropped from .30 ($C.R. = 5.41, p < .001$) in the two-factor model to $-.33$ ($C.R. = -3.89, p < .001$) in the two-factor RIIFA model, suggesting that acquiescence bias has the potential to bias factor correlations.

Readers outside the field of self-construal research may be surprised by the low fit indices in the two-factor model in Table 2. However, these findings are consistent with the CFA results obtained by previous researchers (e.g., Hardin, Leong, & Bhagwat, 2004; Levine et al., 2003). For example, Levine et al. (2003) reported the fit of the SCSS for four CFA analyses, each with a distinct sample (two Korean samples, one Japanese sample and one American sample), as follows: CFIs = .44–.64, RMSEAs = .08–.27 (this study did not report TLI). The fit indices in our sample are thus generally better than those reported in previous studies. Self-construal theorists (e.g., Singelis, 1994) have argued that the low fit indices of common self-construal scales are acceptable because each self-construal measures a broader range of characteristics than other psychological constructs and because each self-construal is measured by a high number of item indicators, which adversely affects fit indices.

Table 3 shows the factor loadings of each SSCS item in the two-factor RIIFA model. The one non-significant independence item is

Table 3
Standardized factor loadings for the two-factor models in Study 1.

Item content	Two-factor	Two-factor RIIFA
<i>Independence</i>		
1 Unique	.50	.51
2 Talk to an older acquaintance openly	.49	.43
5 Do my own thing	.43	.46
7 Independent	.50	.38
9 Saying "no"	.47	.31
10 Lively imagination	.39	.30
13 Direct	.44	.23
15 Praised alone comfortably	.32	.20
18 Speak up	.39	.32
20 Consistent behaviors	.34	.24
22 Value good health	.24	.02
24 Self-benefit	.25	.27
25 Taking care of oneself	.27	.23
27 Personal identity	.53	.54
29 Consistent behaviors	.31	.16
<i>Interdependence</i>		
3 Avoid arguments	.31	.21
4 Respect authority figures	.29	$-.05$
6 Respect modest people	.32	$-.02$
8 Sacrifice for ingroup	.55	.46
11 Consider parents' advice	.30	.08
12 Feeling intertwined	.31	.15
14 Feel good when cooperating	.37	.01
16 Responsible for relatives	.33	.19
17 Importance of relationships	.49	.45
19 Offer my seat to my boss in a bus	.29	$-.06$
21 Others' happiness	.48	.36
23 Remain in ingroup	.43	.41
26 Respect groups' decision	.57	.40
28 Group harmony	.60	.35
30 Get along with what others want	.38	.42

Note: Significant factor loadings are bolded.

about health, which does not have much commonality with other independence items (Hardin et al., 2004). Four of the five non-significant interdependence items were about respecting a specific other (an authority figure, parents, a modest person, one's own boss), which may have more to do with power distance than with close or harmonious relationships. Compared to the simple 2-factor CFA, RIIFA appears to identify items in which the content is heterogeneous with the rest of the items.

When we compared how raw scores and RIIFA scores of self-construals correlate with exogenous variables, we found that the RIIFA procedure enhances the validity evidence of self-construals (see Table 4). For the two scales with a balanced set of regular- and reverse-keyed items (i.e., self-esteem and modesty), their association with the two self-construal scores became more distinct and divergent after RIIFA, demonstrating stronger discriminant validity evidence between the two self-construals. For the two scales without a balanced set of regular- and reverse-keyed items (i.e., relationship self-efficacy and RISC), after RIIFA both self-construals correlated more weakly with relationship self-efficacy, and interdependence correlated more weakly with RISC. This result is not surprising because all of these scales are measured predominantly or exclusively by regular-keyed items and are liable to correlation inflations due to acquiescence bias. In this case, RIIFA has apparently mitigated such correlation inflations.

Overall, the findings of Study 1 show that the independence-interdependence correlation turns slightly negative after RIIFA, and thus these findings support neither the orthogonal nor the bipolar view of self-construal. The purpose of Study 2 is to extend Study 1 by examining the correlation between individualistic and collectivistic values.

3. Study 2: Individualistic-Collectivistic Values

3.1. Method

3.1.1. Participants

The data for Study 2 came from the Schwarz Values Survey (SVS), a worldwide survey including 38 countries. Participants from seven countries were chosen from the SVS dataset. We chose one sample from each of the seven major world continents to enhance the generalizability of our results across the world population. Respondents from the United States ($N = 4012$) and Mainland China ($N = 1006$) were chosen as samples for North America and Asia, respectively, because they often exemplify examples of independence and interdependence measured at the country level (Hofstede, 1980). We then randomly selected the remaining countries as samples: Chile ($N = 1225$) for South America, South Africa ($N = 1147$) for Africa, Israel ($N = 7154$) for the Middle East, Finland ($N = 6030$) for Europe, and Australia ($N = 1828$). The data was collected by surveying a combination of students and working adults from each country.

3.1.2. Measure

3.1.2.1. Schwarz Values Survey (SVS). The Schwarz Values Survey, a widely validated measure, measures participants' endorsement of 10 universal values across cultures (Schwartz & Boehnke, 2004). Researchers have often used the combined scores of these values to probe the constructs of independence and interdependence at both the individual level and the country level (e.g., Bretones & Gonzalez, 2011; Triandis, McCusker, & Hui, 1990; Welzel, 2010). Based on the conceptualization of self-construals by Markus and Kitayama (1991) and the common content of self-construal scales investigated by Oyserman et al. (2002), we studied each item in the SVS and carefully selected nine items for independence ($\alpha_s = .65-.75$) and another nine items for interdependence ($\alpha_s = .70-.75$).

Table 4
Correlation between self-construals and exogenous constructs in Study 1.

	N	Raw Scores		Two-factor RIIFA scores	
		Independence	Interdependence	Independence	Interdependence
<i>Balanced scales</i>					
Self-esteem	524	.21***	-.02	.14***	-.26***
Modesty	524	-.28***	.26***	-.39***	.33***
<i>Non-balanced scales</i>					
Relationship Self-Efficacy	524	.18***	.36***	-.02	.12**
Relational Interdependence (RISC)	72	-.01	.43***	-.23	.29*

* $p < .05$.

** $p < .01$.

*** $p < .001$.

The independence items represent defining characteristics such as personal agency, self-direction, self-enhancement, and creativity. Past research has also showed that independents endorse values of excitement and exploration (Triandis et al., 1990), possibly because these values allow actualization of an individual's own potential (Welzel, 2010). The interdependence items represent distinguishing features such as communion with others, concern with family and close others, fulfilling duties, conformity and responsibilities to ingroups, and self-effacement. Each of the items was rated from -1 (*opposed to my values*) through 0 (*not important*) to 7 (*of supreme importance*).

3.2. Results and discussion

We conducted separate CFA factor analyses for each culture. In every country that we examined, a two-factor RIIFA model consistently fit better than a one-factor model, a one-factor RIIFA model or a two-factor model, as revealed by chi-square difference tests ($ps < .001$). The model fits for the two-factor models are shown in Table 5. (The fits for the one-factor models are not shown due to space limitations.) The average correlation between independence and interdependence across all seven countries was .41 in the two-factor model and $-.26$ in the two-factor RIIFA model. In all of the countries we looked at except South Africa, the correlations between independent and interdependent values switched from positive to negative in the RIIFA models. Although the correlations fluctuate across samples, the overall pattern of results is consistent with the conclusion we drew from Study 1.

4. General discussion

In reviewing the dimensionality of self-construals, Schimmack et al. (2005) concluded that the correlation between independent and interdependent self-construals is likely to be influenced by acquiescence bias and that further research is needed to address

this issue. The current study used advances in factor analytic procedures to address the dimensionality of self-construals and its counterpart – I–C values. The data we obtained from the SSCS and the SVS revealed a consistent pattern: acquiescence bias exists in self-construal measurement and it has the potential to distort the correlation between independence and interdependence and between I–C values (as evidenced by our RIIFA results). However, independence–interdependence and I–C values were consistently revealed to be two-dimensional even under the RIIFA procedure. Interestingly, self-construals become slightly and negatively correlated in the RIIFA models in the Chinese sample, as do the I–C values in five of the seven countries studied. This result suggests the possibility that in at least some countries independence and interdependence are not orthogonal to each other. Overall, from both theoretical and measurement perspectives our study questions the validity of treating the two self-construals as being directly antithetical to each other (i.e., unidimensionality).

4.1. Acquiescence as a potential threat to construct validity

Past self-construal theorists (e.g., Markus & Kitayama, 1991) have postulated that independent individuals value higher self-esteem and lower modesty and relational identities. In contrast, they postulated that interdependent individuals value higher modesty and relational identities but lower self-esteem. However, past empirical findings have not always been consistent with these conceptualizations. Independence showed a positive correlation with self-esteem but null correlation with relational interdependence; interdependence showed a positive correlation with relational interdependence but null correlation with self-esteem (e.g., Cross et al., 2000; Kwan et al., 1997). There have been concerns that acquiescence bias may compromise the construct validity of self-construals (Schimmack et al., 2005), and the results from Study 1 in this paper suggest that RIIFA may help to enhance the validity of a construct score. Particularly, Study 1 showed that acquies-

Table 5
Model fit comparison in Study 2.

	Two-factor model				Two-factor RIIFA model				r (independence, interdependence)	
	χ^2	TLI	CFI	RMSEA	χ^2	TLI	CFI	RMSEA	2-Factor model	2-Factor RIIFA model
Australia	1138.21	.80	.82	.06	845.87	.85	.87	.05	.44**	-.15*
Chile	839.28	.73	.77	.07	553.93	.84	.86	.06	.41**	-.30**
China	510.75	.79	.81	.06	458.66	.81	.84	.05	.44**	-.43**
Finland	3725.18	.79	.82	.07	3428.46	.81	.83	.06	.33**	-.41**
Israel	4268.10	.74	.77	.07	2113.95	.87	.89	.05	.48**	-.43**
South Africa	573.97	.82	.84	.06	424.65	.88	.89	.05	.43**	.03
United States	2124.15	.78	.81	.07	1561.33	.84	.86	.06	.34**	-.12**
Average r									.41	-.26

* $p < .01$.

** $p < .001$.

cence bias may distort the correlations among scores that are measured only by regular-keyed items -- after RIIFA, independence and interdependence demonstrate stronger discriminant validity evidence with self-esteem and modesty. As such, in the future we encourage researchers to supplement their raw correlational or regression analyses with RIIFA (given that their sample size allows for SEM analyses) when their studies involve self-construals.

4.2. Implications for self-construal theories and measurement

Our results are inconsistent with the conceptualization and measurement of independence-interdependence as a unidimensional construct. Although past cross-cultural theories have acknowledged the bidimensionality of independence-interdependence, they have exclusively focused on how individuals who are high in independence differ from individuals who are high in interdependence. This conceptualization often influences the measurement practice of independent and interdependent values, as researchers treat them as opposite poles of the same construct. We believe that theory and empirical results should closely agree with each other. We thus urge researchers to invest more theoretical and empirical resources into understanding the characteristics of people who score simultaneously high or low in both self-construals. In addition, our results support the calculation of separate independence and interdependence scores, rather than deriving a summary score of self-construals or an overall score for I–C values.

4.3. Future directions and conclusion

Similar to most research the current study has certain limitations that lead to potential future directions. To begin with, although our purpose was not to compare the correlation between two self-construals across cultures, such research will further advance our current understanding of self-construals. Moreover, the current study did not examine independence and interdependence, or their corresponding cultural values, at the country level; however, this is likely to be a fruitful avenue for future research. Researchers should validate the use of RIIFA for country-level analyses and for cross-cultural comparisons before tackling these research questions. Finally, researchers need to start developing self-construal scales that contain reverse-keyed items. This suggestion has been made previously (e.g., Schimmack et al., 2005) but little progress has been made towards this goal.

The current research contributes to the existing literature by revisiting an old but unanswered question regarding the dimensionality of self-construals and I–C values using a new factor analytic procedure. Our results question the common conceptualization for self-construals. Furthermore, our results demonstrate the potential use of RIIFA to mitigate acquiescence bias and to enhance construct validity evidence for a self-construal measure.

Appendix

Independent and interdependent values from the Schwarz Values Survey.

Independence

1. FREEDOM (freedom of action and thought).
2. INDEPENDENT (self-reliant, self-sufficient).
3. CAPABLE (competent, effective, efficient).
4. CREATIVITY (uniqueness, imagination).
5. VARIED LIFE (filled with challenge, novelty and change).
6. INFLUENTIAL (having an impact on people and events).

7. AN EXCITING LIFE (stimulating experiences).
8. SELF RESPECT (belief in one's own worth).
9. CHOOSING OWN GOALS (selecting own purposes).

Interdependence

1. SENSE OF BELONGING (feeling that others care about me).
2. SELF DISCIPLINE (self restraint, resistance to temptation).
3. FAMILY SECURITY (safety for loved ones).
4. LOYAL (faithful to my friends and groups).
5. HUMBLE (modest, self effacing).
6. OBEDIENT (dutiful, meeting obligations).
7. HELPFUL (working for the welfare of others).
8. FORGIVING (willing to pardon others).
9. RESPONSIBLE (dependable, reliable).

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