Extreme Response Style: A Meta-Analysis

John H. Batchelor
University of West Florida

Chao Miao
Michael A. McDaniel
Virginia Commonwealth University

Presented at the 28th Annual Conference of the Society for Industrial and Organizational Psychology. Houston. Corresponding author: John H. Batchelor. E-mail: jbatchelor1@uwf.edu

Abstract

One high on extreme response style (ERS) would endorse extreme values on the endpoints on a Likert scale, whereas one low on ERS would endorse more mid-scale values. This meta-analysis synthesizes the ERS literatures and explores the correlates of ERS. It supports the existence of race and gender difference regarding ERS. Variables, such as intelligence and acquiescence, are found to be negatively and positively related to ERS respectively. Vector correlation analyses reveal that (a) age has non-linear relationship with ERS, (b) education is negatively related to ERS, and (c) number of points/items in scale is positively related to ERS.

Extreme Response Style: A Meta-Analysis

Extreme response style (ERS) is the tendency to prefer responding using extreme endpoints on rating scales. Thus, one high on ERS would tend to endorse either high or low values on a Likert scale, but one low on ERS would tend to endorse more mid-scale values. Thus, ERS, sometimes called extreme responding (Lau, 2005), is the opposite of the central tendency response style (Naemi, Beal, & Payne, 2009). ERS might best be viewed as a content irrelevant factor that can influence an individual's response to rating scales (Cronbach, 1946, 1950). A response style, such as ERS, is typically viewed as stable across time and situations (Jackson & Messick, 1958; Lau, 2007).

The presence of ERS may result in bias with respect to construct measurement and associations with other variables (Moors, 2004). ERS can be particularly damaging to measurement when scales lack item balance with respect to item direction. For example, a conscientiousness scale in which all items are phrased such that high ratings always indicate high conscientiousness would be unbalanced. Even when items in scales are balanced, ERS adds constructs-irrelevant variance to the ratings scales. Also, some measures cannot be readily balanced. For example, in job analysis, it would be cumbersome to balance ratings scales concerning importance of skills or frequency of task performance. Because ERS increases construct-irrelevant variance, it inflates within group variance and this reduces statistical power. Also, the construct-irrelevant ERS variance will reduce the magnitude of relationships among variables.

McDaniel, Psotka, Legree, Yost, and Weekley (2011) demonstrated that ERS can be particularly damaging in measures that are consensually scored. Consensual scoring is often used in situational judgment tests. In consensual scoring, expert judges are often used to identify best

response and on Likert-format response scale, scores are expressed as deviations of the respondent's Likert ratings from the expert judge ratings. Because the expert judge ratings are more likely to be found near the center of the Likert scale than at the extremes of the scales, respondents with ERS tendencies score lower, on average, than respondents with limited or no ERS tendencies.

Although ERS has been investigated since the early 1950's (Berg, 1953), its effects are usually ignored by researchers (Hamilton, 1968; Paulhus, 1991). Through a meta-analytic summary of the literature, this paper seeks to clarify the literature and renew interest in ERS,

Our first hypothesis pertains to race. Past research has shown Blacks, on average, are more likely to engage in extreme responding than Whites (Bachman & O'Malley, 1984; Berg & Collier, 1953). Hispanic respondents have been shown to engage in higher degrees of ERS than Whites (Clarke, 2000; Hui & Triandis, 1989) and Asian-Americans have been shown to engage in less ERS than White-Americans (Grandy, 1998). Bachman et al. (2010) found that Blacks were most likely to engage in ERS followed by Hispanics, with Whites and Asians exhibiting the lowest levels of ERS. Thus, we offer:

H1: Black and Hispanics show more ERS than Whites and Asians.

Research concerning sex differences in ERS in this area is contradictory but the magnitude of sex differences tend to be small. Some studies report no difference for gender with respect to ERS (i.e. Zuckerman et al., 1965; Greenleaf, 1992). Others show females engaging in more ERS than males (Adams & Berg, 1961). In Lau's (2005) qualitative review, he concluded that the preponderance of evidence on ERS suggest that females engage in more ERS than males. Thus, we offer:

H2. Females show more ERS than males.

Nationality differences in ERS may impact cross-cultural research. It has been argued that more collectivist societies are less likely to engage in ERS than more individualistic societies (Bettencourt & Dorr, 1997). The United States (U.S.) is considered one of the most individualistic societies. Thus, one might expect U.S. respondents to engage in higher levels of ERS than those in other countries, particularly collectivist nations. Despite the frequent discussion of ERS in cross-cultural studies, we located relatively few effect sizes. Given the large number of countries and the relatively few studies examining pair-wise country differences, we are hesitant to form hypotheses. We do, however, analyze the country comparisons for which we found data.

Most studies report a negative relationship between intelligence and ERS (Hamilton, 1968; Brengelmann, 1959; Das & Dutta, 1969). Meisenberg and Williams (2008) used data aggregated such that the unit of analysis was a country. Combining a country-level ERS measure derived from one data set with a country-level intelligence measure from a different data set, Meisenberg and Williams concluded that high ERS is associated with lower intelligence. We offer:

H3. Intelligence is negatively correlated with ERS.

There is some research on the relationship between acquiescence and ERS. For instance, Baumgartner and Steenkamp (2001) examined five forms of stylistic responding and found that the correlation between ARS (i.e., agreement tendency) and ERS is .59 and that the correlation between DARS (i.e., disagreement tendency) and ERS is .41. At the country level, Meisenberg and Williams (2008) reported both education and intelligence correlates of acquiescence. Consistent with above, we advance the following hypothesis.

H4. Acquiescence is positively correlated with ERS.

There are some ERS-relevant studies that do not report standardized mean differences or correlations with ERS. However, some of these studies report mean levels of age and years of education for the same sample as well as the average across respondents of percent of items in which extreme responses were given. Other studies report average extreme responses and the number of points in the scale (e.g., a Likert with 5 response options would have 5 "points") and/or the number of items in the scale from which the ERS score was derived.

The definition of average across respondents of percent of responses to items that were judged extreme can be misunderstood. To illustrate the calculation of the measure, consider a hypothetical sample with two people, Manny and Moe. If Manny was judged to respond extremely to 30 percent of the items and Moe was judged to respond extremely to 40 percent of the items, the sample would have an average of 35 percent extreme responses. Although one can calculate this ERS percentage in the same way across studies, the criteria used to judge an item response as extreme varied across studies. For example, with a 9-point scale, one study may consider a score of 1 or 9 to be an extreme response. Another study, also with a 9 point scale, might consider responses of 1, 2, 8, or 9 to be an extreme response. Thus, the ERS percentages are not strictly comparable across studies. Yet all the measures reflect tendencies to engage in ERS and one can calculate a vector correlation (Jensen, 1998, Hunter & Schmidt, 2004, refer to vector correlations as study characteristics correlations) for such data. One vector would be the ERS percentage in the sample. The second vector would be the correlate variable (e.g., age). One would weight the data contributing to the vector correlation by sample size.

A vector correlation analysis can inform concerning the relationship between ERS and age, as wells ERS and education relationship. A vector correlation analysis can also provide knowledge of the relationship with number of points in the scale and number of items in the

scale. We could locate no literature on these correlates and thus offer no hypotheses. As is the case with age and education, we present analyses on available data.

Methods

Literature Review. An initial search for data was conducted using research data bases (e.g. PsychInfo). Leaders in the area of response style research were contacted for leads on additional articles and provided access to unpublished data on the topic of extreme response style. Further, reference sections of identified articles were reviewed for additional articles. This search resulted in 174 journal articles, dissertations, theses, and conference papers published from 1953 to currently in press articles. The starting date of 1953 was chosen because it is the data of the earliest known study on ERS (Berg, 1953).

Decision Rules. To be included in this review, a study needed to measure ERS on a Likert scale or end points of a semantic differential scale where respondents present their answers using adjectives on a numbered or lettered scale (i.e., good to bad, dirty to clean, awful to nice, etc.)

Data were obtained for all available extreme response mean scores, frequency of extreme response, percentage of extreme response, and correlates of extreme response. The most commonly reported measure of extreme response was frequency followed closely by mean extreme response.

Analysis. All meta-analyses were performed using the Comprehensive Meta-analysis (CMA) software developed by (Borenstein, Hedges, Higgins, & Rothstein, 2005). Such analyses are different but computationally similar to “bare bones” meta-analysis in psychometric meta-analysis (Hunter & Schmidt, 2004). Vector correlations were calculated in SPSS. We could

locate very little data on the reliability of measures. Thus, psychometric meta-analysis with corrections for measurement error could not be conducted.

Results

The American Psychological Association (2010) style manual requires all meta-analyses to list the data analyzed. Table 1 presents information on studies that contributed standardized mean differences to the analysis. The data are related to mean racial differences, mean sex differences, and mean country differences in ERS. Table 2 lists information on studies that contributed correlations relating both intelligence and acquiescence with ERS. Table 3 contains information for studies used in the vector correlation analyses. These data concern age, education, number of points in scales, and number of items in scales. Table 4 presents meta-analysis results that address race, sex, and nationality relationships with ERS. The table also presents meta-analyses of correlations between both intelligence and acquiescence with ERS. Table 5 presents vector correlation analyses addressing the relationship between ERS and age, education, number of points in a scale and number of items in a scale.

Hypothesis 1 concerned race differences. Nine samples with a total sample size (*N*) of 232,327 examined White-Black ERS differences yielding a *d* of -.254 (see Table 4 for this and other mean racial comparisons). Thus, Whites engage in less ERS than Blacks. The *d* is interpreted in standard deviation units. Expressed in another way, Blacks, on average, are about one-fourth standard deviation higher in ERS than Whites. With respect to White-Hispanic differences, data were available on eight samples (*N* = 226,986). Hispanics engaged in ERS

slightly more often than Whites (d = -.089). The data are supportive of Hypothesis 1 in that Blacks and Hispanics showed more ERS than Whites.[1]

We located no data comparing Asians with Blacks or Asians with Hispanics, but we did locate 6 samples (N = 209,114) comparing Whites with Asians. Whites engaged in more ERS than Asians.

We had 10 samples (N = 268,571) contrasting Whites with Minorities in which the minority group consisted of multiple non-White races. Whites showed less ERS than the racially-heterogeneous minorities. Given that Asians show less ERS than Whites, but Blacks and Hispanics show more ERS than Whites, the analysis of a racially-mixed minority group does not have a clear interpretation. If the majority of a racially-mixed minority group is Black, then these results are consistent with the White-Black analysis.

Hypothesis 2 postulated that females will show more ERS than males. The comparison by sex is based on 19 samples (N = 287,501). Females, on average, had slightly more ERS than males (d = .09).

Hypotheses 3 offered that intelligence is negatively related to ERS and is supported by the correlation of -.260 reported in Table 4. The analysis is based only on 2 samples (N = 231). Although the hypothesis is supported, conclusions based on 2 samples with a total sample size of 231 should be viewed tentatively and replicated as additional data become available.

The final analysis shown in Table 4 addresses Hypothesis 4 and is the correlation between acquiescence and ERS. The results are based on five samples (N = 101,947) and yields a correlation of .204.

[1] The confidence intervals for the d do not include zero so that differences between Whites and Blacks and the differences between Whites and Hispanics are statistically significant. Readers can view the confidence intervals for all analyses to draw inferences regarding statistical significance.

Table 5 presents vector correlation analyses for several variables. In these vector correlation analyses, the unit of analysis is the sample. Thus, the sample size for the vector correlation is the number of samples and the confidence interval is based on a standard error of the correlation which is a function of the number of samples.

Age yields a vector correlation of -.649 suggesting that ERS declines with age. Because previous authors (Bachman et al. 2010; Greenleaf, 1992) have suggested an inverted U shaped relationship between age and ERS, we examined curvilinearity between age and ERS. To examine the possibility of a curvilinear relationship with one bend, we used a stepwise regression entering age in step one and age-squared in the second step. A departure from linearity would be supported by an increase in the R^2 from step1 to step 2. The R^2 increased from .649 to .772 suggesting a curvilinear relationship. The non-linearity is concave with ERS increasing with age until the early 20's and then declining with age.

With respect to other vector correlation analyses, years of education was unrelated to ERS (*vector r* = -.009). However, the variance of education in the sample was a strong moderator. For samples with low variance in education, the vector correlation with ERS was very small (-.012). However, for samples with larger variance, the vector correlation was much larger (-.477). Thus, with educational level heterogeneity in a sample, one can expect less educated samples to show more ERS.

ERS increased as the number of points in a scale increased (.263). Perhaps increasing the range of rating scale points enhances the reliability of the ERS measurement. ERS also increased with the number of items in the scale on which ERS was measured (.192). As with the number of points on a scale, increasing the number of items likely increases the reliability of ERS measurement.

Discussion

This paper sought to examine relationships between ERS and other variables. Our data set is characterized by a relatively small number of samples but with each sample tending to contain a large number of respondents. Our analyses support some conclusions but also identify gaps in the research.

Our findings show mean racial differences in ERS with the largest being the White-Black difference. Blacks, on average, engage in more ERS than Whites (d =.254). Hispanics, on average, engage in slightly more ERS than Whites (d = -.089). Asians, on average, engage in slightly less ERS than Whites (d = .158). The ERS sex differences were also small with females engaged in ERS slightly more so than males (d = .090).

Our conclusions about nationality differences must be tentative because we located only one effect size for each country comparison. U.S. residents, on average, displayed more ERS than Asians, Canadians and French and less ERS than Mexicans and Australians. Given that cross-cultural researchers often speculate about ERS differences, and their effects, research on cross-cultural ERS differences is encouraged. Researchers should provide sufficient data on the difference (i.e., means and standard deviations) such that a standardized mean difference can be calculated.

Consistent with suggestions by Meisenberg and Williams (2008) for data at the country level, we conclude that intelligence is negatively correlated with ERS (r = -.260) at the level of the individual but offer that conclusion as tentative given that there were only two small samples (N = 231).

Another topic for greater exploration is the positive correlation between ERS and acquiescence. Our meta-analytic result yields a correlation of .266 between ERS and

acquiescence, which is compatible with the findings from Baumgartner and Steenkamp (2001) and van Herk et al. (2004) and is consistent with country-level effects reported by Meisenberg and Williams (2008). Our finding thus corroborates the argument that a modest correlation between ERS and acquiescence may be commonly expected.

The vector correlations are also informative. The vector correlation analyses for age with ERS suggest a strong relationship. The linear relationship (*vector r* = -.649) suggest that ERS drops sharply with age. However there is also evidence for a curvilinear effect such that ERS increases with age until the early 20's and then declines. The vector correlations with number of points in the scale and number of items in the scale are both positive. We suggest that these correlations are a function of increased reliability of measure in ERS as the number of scale points increase and the number of items in the scale used to measure ERS increases.

There are some important limitations to our findings. First, the interpretation of the means of the distributions used in the meta-analysis is complicated by the large I^2 values. The statistic I^2 is the percentage of variance that is not attributed to sampling error (Higgins & Thompson, 2002). A large I^2 typically indicates the presence of some large moderators or many small moderators. Thus, our meta-analytic means are from distributions with substantial true (population) variability. This suggests that are other moderators in addition to those addressed in this study.

The second limitation is the relatively small number of samples. Even though the sample sizes tend to be very large, any given sample has a set of unique characteristics. Some of these may influence the relationships with ERS. These sample characteristics likely are responsible for the heterogeneity of the effect size distributions.

The third limitation is related to the limitations on inferences that can be drawn from vector correlations. Conclusions based on vector correlations reflect study level relationships. Generalizations to individual data should be made cautiously.

This paper has investigated relationship between ERS and several variables. This is the first quantitative review of this literature. We concur with past research in the conclusion that ERS presents a measurement challenge that is not widely known or addressed in much research involving Likert or similar scales. Thus, we encourage more research in this area.

References

The papers meta-analyzed in this study are marked with an asterisk.

Adams, H.E., & Berg, I.A. (1961). Affective tone of test option choice as a deviant response. *Psychological Reports, 8,* 79-85. doi: 10.2466/PRO.8.1.79-85.

*Albaum, G., Roster, C., Yu, J.H., & Rogers, R.D. (2007). Simple rating scale formats. *International Journal of Market Research, 49,* 633-650. doi: 10.1093/ijpor/edn011.

American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: American Psychological Association.

Bachman, J.G., & O'Malley, P.M. (1984). Yea-saying, nay-saying, and going to extremes: Black-White differences in response style. *Public Opinion Quarterly, 48,* 491-509. doi: 10.1086/268845

*Bachman, J.G., O'Malley, P.M., & Freedman-Doan, P. (2010). *Response styles revisited: Racial/ethnic and gender differences in extreme responding* (Monitoring the Future Occasional Paper No. 72). Ann Arbor, MI: Institute of Social Research. Available from http://www.monitoringthefuture.org/

Baumgartner, H., & Steenkamp, J. B. E. M. (2001). Response styles in marketing research: Across-national investigation. *Journal of Marketing Research, 38,* 143-156. doi: 10.1509/jmkr.38.2.143.18840

Berg, I.A. (1953). The reliability of extreme position response sets in two tests. *Journal of Psychology, 36,* 3-9. doi: 10.1080/00223980.1953.9712872

Bettencourt, B. A., & Dorr, N. (1997). Collective self-esteem as a mediator of the relationship between allocentrism and subjective well-being. *Personality and Social Psychology Bulletin, 23,* 955-964. doi: 10.1177/0146167297239005.

*Berg, I. A., & Collier, J. S. (1953). Personality and group differences in extreme response sets. *Educational and Psychological Measurement, 13,* 164-169. doi: 10.1177/001316445301300202

Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2005). *Comprehensive meta-analysis version 2*. Englewood, NJ: Biostat.

Brengelmann, J.C. (1959). Differences in questionnaire responses between English and German nations. *Acta Psychologica, 16,* 339-355. doi: 10.1016/0001-6918(59)90106-4

*Chen, C., Lee, S., Stevenson, H.W. (1995). Response style and cross-cultural comparisons of rating scales among East Asian and North American students. *Psychological Science, 6,* 170-175. doi: 10.1111/j.1467-9280.1995.tb00327.x

Clarke, I. (2000). Extreme response style in cross-cultural research: An empirical investigation. *Journal of Social Behavioral and Personality, 15,* 137-152.

*Clarke, I. (2001). Extreme response style in cross-cultural research. *International Marketing Review, 18,* 301-324. doi: 10.1108/02651330110396488

Cronbach, L.J. (1946). Response set and test validity. *Educational and Psychological Measurement, 6,* 475-494. doi: 10.1177/001316444600600405

Cronbach, L.J. (1950). Further evidence of response set test design. *Educational and Psychological Measurement, 10,* 3-31. doi: 10.1177/001316445001000101

*Das, J.P., & Dutta, T. (1969). Some correlates of extreme response set. *Acta Psychologica, 29,* 85-92. doi: 10.1016/0001-6918(69)90005-5de

*Dick, N. (1976). *The extreme response style as a function of psychotherapy and meaning fullness: A test of the deviation hypothesis.* (Unpublished master's thesis). University of Miami, Florida.

Grandy, J. (1998). Response bias in a survey of Asian-American and White science and engineering students. *Journal of Women and Minorities in Science and Engineering, 4,* 1-13.

*Greenleaf, E.A. (1992). Measuring extreme response style. *Public Opinion Quarterly, 56,* 328-351. doi: 10.1086/269326

*Gruber, R.E. (1979). *The impact of response style and response set on large scale survey research involving activities, interests and opinions (AIO) variables*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 7904082)

*Hamilton, D. L. (1965). *An analysis of extreme response set as related to personality.* (Unpublished master's thesis). University of Richmond, Virginia.

Hamilton, D.L. (1968). Personality attributes associated with extreme response style. *Psychological Bulletin, 69,* 192-203. doi: 10.1037/h0025606.

Higgins, J. P. T., & Thompson, S. G. (2002). Quantifying heterogeneity in a meta-analysis. Statistics in Medicine, 21, 1539-1558. doi: 10.1002/sim.1186

*Hui, C.H., & Triandis, H.C. (1989). Effects of culture and response format on extreme response style. *Journal of Cross-Cultural Psychology, 20,* 296-309. doi: 10.1177/0022022189203004

Hunter, J. E., & Schmidt, F. L. (2004). *Methods of meta-analysis: Correcting error and bias in research findings*. (2nd ed.). Newbury Park, CA: Sage.

*Hurley, J.R. (1998). Timidity as a response style to psychological questionnaires. *The Journal of Psychology, 132,* 201-210. doi: 10.1080/00223989809599159

Jackson, D.N., & Messick, S. (1958). Content and style in personality assessment. *Psychological Bulletin, 55,* 243-252. doi: 10.1037/h0045996

Jensen, A. R. (1998). *The g factor: The science of mental ability*. Westport, CT: Praeger

*Johnson, T., Kulesa, P., Chou, Y.I., Shavitt, S. (2005). The relation between culture and response styles: Evidence from 19 countries. *Journal of Cross-Cultural Psychology, 36,* 264-277. doi: 10.1177/0022022104272905

Lau, M.Y. (2007). *Extreme response style: An empirical investigation of the effects of scale response format and fatigue* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3299156)

Lau, M. Y., & Howard, G. S. (2005). *Extreme response style: A review of the evidence, assessment and potential solutions to the problem.* Poster presented at the Division 17 Student Poster Session at the American Psychological Association Annual Convention in Washington, DC.

*Marin, G., Gamba, R.J., & Marin, B.V. (1992). Extreme response style and acquiescence among Hispanics. *Journal of Cross-Cultural Psychology, 23,* 498-509. doi: 10.1177/0022022192234006

McDaniel, M.A., Psotka, J., Legree, P.J., Yost, A.P., & Weekley, J.A. (2011). Toward an understanding of situational judgment item validity and group differences. *Journal of Applied Psychology, 96,* 327-336. doi: 10.1037/a0021983

*Meisenberg, G., & Williams, A. (2008). Are acquiescence and extreme response styles related to low intelligence and education? *Personality and Individual Differences, 44,* 1539-1550. doi: 10.1016/j.paid.2008.01.010.

Moors, G. (2004). Facts and artifacts in the comparison of attitudes among ethnic minorities. A multigroup latent class structure model with adjustment for response style behavior. *European Sociological Review, 20,* 303-596. doi: 10.1093/esr/jch026

Naemi, B.D., Beal, D.J., & Payne, S.C. (2009). Personality predictors of extreme response style. *Journal of Personality, 77,* 261-286. doi: 10.1111/j.1467-6494.2008.00545.x

*Norman, R.P. (1969). Extreme response tendency as a function of emotional adjustment and stimulus ambiguity. *Journal of Consulting and Clinical Psychology, 33,* 406-410. doi: 10.1037/h0027803.

Paulhus, D.L. (1991). Measurement and control of response bias. In J.P. Robinson, P.R. Shaver, & L.S. Wright (Eds.), *Measurement of personality and social psychology attitudes* (pp. 17-59). New York: Academic Press.

van Herk, H., Poortinga, Y. H., & Verhallen, T. M. M. (2004). Response styles in rating scales: Evidence of method bias in data from six EU countries. *Journal of Cross-Cultural Psychology, 35,* 346 – 360. doi: 10.1177/0022022104264126

*Van Ijzendoorn, M.H. (1984). Answers without questions: A note on response style in questionnaires. *Perceptual and Motor Skills, 59,* 827-831. doi: 10.2466/pms.1984.59.3.827

*Watkins, M. L. (1992). The implications of extreme response style (ERS) for cross-cultural and comparative research in South Africa. *Journal of Industrial Psychology, 18,* 13-19. doi: 10.4102/sajip.v18i1.537

*Zax, M., Gardiner, D. H., & Lowy, D. G. (1964). Extreme response tendency as a function of emotional adjustment. *Journal of Abnormal and Social Psychology, 69,* 654-657. doi: 10.1037/h0048877

Zuckerman, M., Oppenheimer, C., & Gershowitz, D. (1965). Acquiescence and extreme sets of actors and teachers. *Psychological Reports, 16,* 168-170. doi: 10.2466/pr0.1965.16.1.168

*Weech-Maldonado, R., Elliott, M.N., Oluwole, A., Schiller, K.C., & Hays, R.D. (2008). Survey response style and differential use of CAHPS rating scales by Hispanics. *Mecial Care, 46,* 963-968. doi: 10.1097/MLR.0b013e3181791924.

*Wilkinson, A. E. (1970). Relationship between measures of intellectual functioning and extreme response style. *The Journal of Social Psychology, 81,* 271 – 272. doi: 10.1080/00224545.1970.9922451

Table 1. Studies contributing standardized mean differences to the meta-analysis

Studies	Difference Being Analyzed	*N*	*d*
Bachman et al. (2010)	White-Black	60,762	0.182
Bachman et al. (2010)	White-Black	11,217	0.056
Bachman et al. (2010)	White-Black	36,346	-0.460
Bachman et al. (2010)	White-Black	39,374	-0.534
Bachman et al. (2010)	White-Black	44,710	-0.383
Bachman et al. (2010)	White-Black	39,141	-0.536
Bachman et al. (2010)	White-Black	248	-0.734
Berg and Collier (1953)	White-Black	207	-0.123
Watkins (1992)	White-Black	322	0.237
Bachman et al. (2010)	White-Hispanic	32,952	-0.041
Bachman et al. (2010)	White-Hispanic	37,158	-0.041
Bachman et al. (2010)	White-Hispanic	35,897	-0.135
Bachman et al. (2010)	White-Hispanic	38,888	-0.141
Bachman et al. (2010)	White-Hispanic	43,831	-0.064
Bachman et al. (2010)	White-Hispanic	38,150	-0.087
Hui and Triandis (1989)	White-Hispanic	35	-1.506
Hui and Triandis (1989)	White-Hispanic	75	-0.122
Bachman et al. (2010)	White-Asian	30,315	0.132
Bachman et al. (2010)	White-Asian	34,186	0.176
Bachman et al. (2010)	White-Asian	32,756	0.141
Bachman et al. (2010)	White-Asian	35,485	0.144
Bachman et al. (2010)	White-Asian	41,195	0.200
Bachman et al. (2010)	White-Asian	35,177	0.157
Bachman et al. (2010)	White-Minority (multiple minorities)	39,981	-0.074
Bachman et al. (2010)	White-Minority (multiple minorities)	45,085	-0.102
Bachman et al. (2010)	White-Minority (multiple minorities)	42,179	-0.151
Bachman et al. (2010)	White-Minority (multiple minorities)	45,693	-0.177
Bachman et al. (2010)	White-Minority (multiple minorities)	49,982	-0.082
Bachman et al. (2010)	White-Minority (multiple minorities)	45,086	-0.156

Table 1 continued.

Studies	Difference Being Analyzed	*N*	*d*
Berg and Collier (1953)	White-Minority (multiple minorities)	248	-0.734
Berg and Collier (1953)	White-Minority (multiple minorities)	207	-0.123
Hui and Triandis (1989)	White-Minority (multiple minorities)	35	-1.506
Hui and Triandis (1989)	White-Minority (multiple minorities)	75	-0.122
Bachman et al. (2010)	Female - Male	60,762	0.182
Bachman et al. (2010)	Female - Male	11,217	0.056
Bachman et al. (2010)	Female - Male	9,348	0.182
Bachman et al. (2010)	Female - Male	3,739	0.226
Bachman et al. (2010)	Female - Male	65,437	0.164
Bachman et al. (2010)	Female - Male	10,283	0.089
Bachman et al. (2010)	Female - Male	9,348	0.158
Bachman et al. (2010)	Female - Male	2,804	0.167
Bachman et al. (2010)	Female - Male	73,568	0.119
Bachman et al. (2010)	Female - Male	10,283	-0.035
Bachman et al. (2010)	Female - Male	8,413	0.096
Bachman et al. (2010)	Female - Male	2,804	0.075
Berg and Collier (1953)	Female - Male	370	-0.506
Berg and Collier (1953)	Female - Male	85	0.125
Hui and Triandis (1989)	Female - Male	35	-1.506
Hui and Triandis (1989)	Female - Male	75	-0.122
Hamilton (1965)	Female - Male	104	-0.478
Johnson et al. (2005)	Female - Male	18,307	0.074
Watkins (1992)	Female - Male	528	-0.105
Chen et al. (1995)	US- Japan	3,118	0.234
Chen et al. (1995)	US-Asian (multiple Asian groups)	4,475	0.271
Clarke III (2001)	US-Mexico	504	-0.148
Chen et al. (1995)	US-Canadian	2,861	0.267
Clarke III (2001)	US-Australian	504	-0.128
Clarke III (2001)	US-French	504	0.175

Note. A negative d indicates the first group has a less extreme response than the second group; a positive *d* indicates that first group has more extreme responding that the second group. For example, a White-Black *d* that is negative indicates that Whites have a mean of extreme

responding that is below the Black mean. A Female-Male *d* that is positive indicates that females have more extreme responding than males.

Table 2

Studies contributing correlation coefficients to the meta-analysis

Study	Correlate	*N*	*r*
Das and Dutta (1969)	Intelligence	100	-.213*
Wilkinson (1970)	Intelligence	131	-.295*
Gruber (1979)	Acquiescence Response Style	1,797	.050*
Das and Dutta (1969)	Acquiescence Response Style	25	.489*
Clarke III (2001)	Acquiescence Response Style	1,009	.190*
Meisenberg and Williams (2008)	Acquiescence Response Style	79,053	.241*
Johnson et al. (2005)	Acquiescence Response Style	18,307	.050*
Baumgartner and Steenkamp (2001)	Acquiescence Response Style	10,477	.590*

Table 3

A list of studies used in vector correlation analyses

Studies	Difference Being Analyzed	Mean	ERS Percentage	*N*
Ijzendoorn (1984)	Age	21	0.480	175
Marin et al. (1992)	Age	31.9	0.452	263
Marin et al. (1992)	Age	34.7	0.421	150
Marin et al. (1992)	Age	31.2	0.425	363
Marin et al. (1992)	Age	38.8	0.351	229
Marin et al. (1992)	Age	37.6	0.716	245
Marin et al. (1992)	Age	31.8	0.576	243
Marin et al. (1992)	Age	38.2	0.252	1,037
Marin et al. (1992)	Age	46	0.224	13,803
Zax et al. (1964)	Age	40.3	0.452	30
Zax et al. (1964)	Age	37.5	0.233	30
Zax et al. (1964)	Age	20.33	0.306	15
Zax et al. (1964)	Age	20.67	0.146	15
Zax et al. (1964)	Age	11.93	0.161	38
Zax et al. (1964)	Age	12.2	0.139	42
Hui and Triandis (1989)	Education	12	0.218	17
Hui and Triandis (1989)	Education	12	0.520	18
Hui and Triandis (1989)	Education	12	0.226	38
Hui and Triandis (1989)	Education	12	0.256	47
Marin et al. (1992)	Education	13	0.452	263
Marin et al. (1992)	Education	14	0.421	150
Marin et al. (1992)	Education	12.3	0.425	363
Marin et al. (1992)	Education	14.4	0.351	229
Marin et al. (1992)	Education	10.6	0.716	245
Marin et al. (1992)	Education	15.1	0.576	243
Marin et al. (1992)	Education	11.1	0.252	1,037
Marin et al. (1992)	Education	12.7	0.224	13,803
Zax et al. (1964)	Education	10.07	0.452	30
Zax et al. (1964)	Education	10.76	0.233	30
Zax et al. (1964)	Education	14.53	0.306	15
Zax et al. (1964)	Education	14.73	0.146	15

Table 3 continued

Studies	Difference Being Analyzed	Mean	ERS Percentage	*N*
Albaum et al. (2007)	Number of Points in Scale	5	0.660	217
Dick (1976)	Number of Points in Scale	7	0.248	3,060
Dick (1976)	Number of Points in Scale	7	0.616	3,060
Dick (1976)	Number of Points in Scale	7	0.645	3,060
Hurley (1998)	Number of Points in Scale	5	0.207	419
Norman (1969)	Number of Points in Scale	7	0.167	10
Norman (1969)	Number of Points in Scale	7	0.138	10
Norman (1969)	Number of Points in Scale	7	0.087	10
Weech-Maldonado et al. (2008)	Number of Points in Scale	10	0.536	215,712
Zax et al. (1964)	Number of Points in Scale	7	0.452	30
Zax et al. (1964)	Number of Points in Scale	7	0.233	30
Zax et al. (1964)	Number of Points in Scale	7	0.306	15
Zax et al. (1964)	Number of Points in Scale	7	0.146	15
Zax et al. (1964)	Number of Points in Scale	7	0.161	38
Zax et al. (1964)	Number of Points in Scale	7	0.139	42
Albaum et al. (2007)	Number of Items in Scale	6	0.660	217
Dick (1976)	Number of Items in Scale	20	0.248	3,060
Dick (1976)	Number of Items in Scale	20	0.616	3,060
Dick (1976)	Number of Items in Scale	20	0.645	3,060
Hurley (1998)	Number of Items in Scale	18	0.207	419

Table 3 continued

Studies	Difference Being Analyzed	Mean	ERS Percentage	*N*
Ijzendoorn (1984)	Number of Items in Scale	9	0.480	175
Norman (1969)	Number of Items in Scale	63	0.167	10
Norman (1969)	Number of Items in Scale	63	0.138	10
Norman (1969)	Number of Items in Scale	63	0.087	10
Zax et al. (1964)	Number of Items in Scale	210	0.452	30
Zax et al. (1964)	Number of Items in Scale	210	0.233	30
Zax et al. (1964)	Number of Items in Scale	210	0.306	15
Zax et al. (1964)	Number of Items in Scale	210	0.146	15
Zax et al. (1964)	Number of Items in Scale	210	0.161	38
Zax et al. (1964)	Number of Items in Scale	210	0.139	42

Table 4

Meta-Analysis of standardized mean differences between groups on ERS and correlations of intelligence and acquiescence with ERS

Demographic Mean Differences

Distribution	# Samples	# Studies	*N*	*d*	Confidence Interval	I^2
Race						
White-Black	9	3	232,327	-.254	-.505 to -.002	99.789
White-Hispanic	8	2	226,986	-.089	-.130 to -.048	87.063
White-Asian	6	1	209,114	.158	.137 to .179	-
White-Minority (multiple minorities)	10	3	268,571	-.135	-.173 to -.097	91.365
Sex						
Female-Male	19	6	287,510	.090	.055 to .125	93.012

Country Mean Differences

Distribution	# Samples	# Studies	*N*	*d*	Confidence Interval	I^2
US- Japan	1	1	3,118	.234	.157 to .311	-
US-Asian (multiple Asian groups)	1	1	4,475	.271	.212 to .329	-
US-Mexico	1	1	504	-.148	-.323 to .027	-
US-Canadian	1	1	2,861	.267	. 181 to .353	-
US-Australian	1	1	504	-.128	-.047 to .303	-
US-French	1	1	504	.175	.00 to .350	-

Correlations with ERS

Distribution	# Samples	# Studies	N	r	Confidence Interval	I^2
Intelligence	2	2	231	-.260	-.377 to -.135	0.000
Acquiescence	6	6	110, 668	.266	.078 to .436	99.817

* A negative *d* indicates the first group has a less extreme response than the second group; a positive *d* indicates that first group has more extreme responding that the second group. For example, the White-Black *d* of -.254 indicates that Whites have a mean of extreme responding that is about one-fourth of a standard deviation below the Black mean. A Female-Male *d* of .09 indicates that females have slightly more extreme responding than males.

Table 5

Vector correlations analyses

Distribution	# Samples	# Studies	*N*	Vector *r*	Confidence Interval
Age (linear relationship)	15	3	16,678	-.649	-.657 to -.641
Age (non-linear relationship)	15	3	16,678	.772	.776 to .778
Education	16	3	16,543	-.009	-.024 to .006
Education (Low Variance)	9	2	15,736	-.012	-.028 to .004
Education (High Variance)	7	2	807	-.477	-.529 to -.422
Number of Points in Scale	15	6	225,728	.263	. 260 to .266
Number of Items in Scale	15	6	10,191	.192	.174 to .210