5-2015

Confirmatory and exploratory factor analysis of the Mini-IPIP with a multi-institutional sample of first-year college students

Richard M. Wielkiewicz
College of Saint Benedict/Saint John's University, rwielkiewicz@csbsju.edu

CONFIRMATORY AND EXPLORATORY FACTOR ANALYSIS OF THE MINI-IPIP WITH A MULTI-INSTITUTIONAL SAMPLE OF FIRST-YEAR COLLEGE STUDENTS[1]

Richard M. Wielkiewicz

College of Saint Benedict/Saint John's University

Abstract

The Mini-IPIP was administered to 4,292 first-year college students as part of a multi-institutional study of leadership beliefs. An exploratory principal components analysis using varimax rotation with Kaiser Normalization and listwise deletion of missing data resulted in a five-component rotated solution accounting for 56% of total variance. Fit indices for a confirmatory factor analyses were: χ^2 = 3,079.12, df = 160; CFI = .844; RMSEA = .069. The study supported continued use of the Mini-IPIP when a short and convenient measure of personality is desired.

[1] Address correspondence to Richard M. Wielkiewicz, email rwielk@csbsju.edu

Donnellan, Oswald, Baird, and Lucas (2006) created a short-form of the 50-Item International Personality Item Pool—Five-Factor Model (IPIP-FFM) measure developed by Goldberg (1999). The Donnellan, *et al.* short-form (the Mini-IPIP) contains only 20 items with four items per factor. Wielkiewicz, Fischer, Stelzner, Overland, and Sinner (2012) conducted a multi-institutional study of leadership attitudes and beliefs of incoming first-year college students with a sample size of 4,292. This study included the Mini-IPIP. The purpose of the present study was to verify the factor structure of the Mini-IPIP using both exploratory and confirmatory techniques taking advantage of the large sample used by Wielkiewicz et al.

The Five-factor Model (FFM) originates from factor analytic studies of adjectives used to describe human personality characteristics. The basic idea is that words describing human personality contain a fairly complete catalog of human personality characteristics. This is called the lexical hypothesis. By asking individuals to rate their own personalities on these common terms and then subjecting the data to factor analysis, the result should be a fairly complete description of the basic dimensions of human personality. Currently, the findings of numerous researchers have converged upon a five-factor solution to this problem (Goldberg, 1992, 1993; McCrae, 2001; Paunonen & Ashton, 2001) although alternative models have also emerged (e.g., Ball, 1995; Block, 2001; Durrett & Trull, 2005).

The Mini-IPIP Scales (Donnellan, *et al.,* 2006; see p. 203, for the items in the scales) is a 20-item public domain measure of the Five Factor Model of Personality (e.g., Goldberg, 1992, 1993). The scale measures the five dimensions of the Big Five Model (Extraversion, Agreeableness, Conscientiousness, Neuroticism, & Intellect/Imagination) with 4 items per dimension, while maintaining good subscale reliabilities. Donnellan, *et al*. used exploratory factor analysis procedures to find items in the original 50-item IPIP-FFM that could be used to

construct a short version of the scale. The shortened scales had coefficient alphas ranging from .65 to .77. In a second study with a much smaller sample size, alphas ranged from .70 to .82.

A confirmatory factor analysis (CFA) was conducted by Donnellan, *et al.* (2006) using a sample of 300 undergraduates who participated in exchange for course credit or extra credit. The questionnaire was distributed via the Internet. The 50-item IPIP-FFM was administered and the values for the Mini-IPIP were calculated from the relevant items contained in this measure. In that study, alphas also ranged from .70 to .82. The authors also conducted a confirmatory factor analysis on a subset of individuals who had completed all items (N = 296). The results showed a reasonable degree of fit with RMSEA = 0.07 and p close fit < .05. However, the χ^2 value was 359.30, df = 160. According to Byrne (2010) the RMSEA (Root Mean Square Error of Approximation) is the most robust of the many measures of fit. Values less than .05 represent good fit whereas values between .06 and .08 reasonable approximations. The CFI (Closeness of Fit Index) reported by Donnellan, *et al*. of .88 was close to the suggested cutoff of .90.

Socha, Cooper, and McCord (2010) conducted a CFA of the M5-50, which is a reordered and version of the 50-item IPIP-FFM (McCord, 2002). With ten items per factor instead of four, one would expect this measure to provide superior fit. The sample consisted of 760 volunteers, recruited via the Internet, who were students, faculty, and staff from a midsized public university in the southwest U.S. Thus, the sample was more diverse than the typical study, especially in terms of age. Coefficient alphas for the five scales ranged from .76 to .86. Of six theoretically based models tested by the researchers, the one with the best fit was the standard five-factor model. The fit indices were: χ^2 = 5,291.2, df = 1165; CFI = .706; RMSEA = .068; SRMR (Standardized Root Mean Residual) = .083. Overall, these indices indicated a moderate fit of the raw data to the standard five-factor model.

Cooper, Smillie, and Corr (2010) included 1066 women and 415 men in a CFA of the Mini-IPIP. The participants were recruited via email which provided a link to the online survey. Correlations among the scores for the five main factors ranged from -.03 to -.26 with six out of ten correlations being above the criterion for a small effect size of .10. The fit indices from the five-factor CFA were: χ^2 = 1323.12, *df* = 160; CFI = .82; RMSEA = .07; SRMR (Standardized Root Mean Residual) = .06. Fit indices for other tested models were generally worse. In an exploratory factor analysis (EFA), eigenvalues for the first six factors were 3.46, 2.47, 2.15, 1.79, 1.47, and 1.09. The authors concluded that their results were supportive of continued use of the Mini-IPIP. Furthermore, they argued that their replication using only the 20 items of the Mini-IPIP instead of extracting the Mini-IPIP from the 50-item IPIP-FFM lends further validity to the Mini-IPIP.

The purpose of the present study was to examine the factor structure of the Mini-IPIP using both EFA and CFA techniques and a relatively large sample, when compared to similar studies. The predictions were very straightforward. First, it was expected that alpha coefficients, factor/component structure, and confirmatory factor analysis fit indices would be similar to previous research. Second, it was expected that the evidence from the present study would support continued use of the Mini-IPIP in research where a short and reliable measure of personality is desirable.

Method

Participants

The present study used data collected by Wielkiewicz, *et al*. (2012) which was a study of leadership beliefs and attitudes of first-year college students. The Mini-IPIP was one of the measures in this study. Solicitation of participants occurred in two phases. In the first phase, cooperation of institutions was solicited through administrative contacts and announcements on

list serves. Institutions were invited to participate in a multi-institutional study that would provide them with information to improve leadership development programs. There were 22 participating institutions. On average, 27.2% of incoming first-year students at the participating institutions completed the survey. Institutions agreed to distribute three emails containing a link to an electronic version of the survey to all incoming first-year students within three weeks prior to the first day of classes. The survey took approximately 15 minutes to complete.

The sample (N = 4,292) was designed to represent college students in the United States and can be compared to national characteristics of the college student population. In this study, 31.7% of participants were male, which is lower than the national percentage of 44.6. Caucasian students were overrepresented at 83.4% compared to the national percentage of 77.3, while Students of Color (11.5%) were underrepresented compared to the national percentage of 21.2%. A representative sample of international students was obtained at 2.5% compared to 3.06% nationally (NASPA, 2008). Younger college students were also overrepresented: in this sample, 91.4% of the first-year students surveyed were between the ages of 18 and 19, compared with 60.0% of first-year students nationally; 65.6% of participants attended private schools, while nationally only 20.9% of students do (U.S. Census Bureau, 2010). While the sample did not represent college students proportionally by age, sex, and culture, it had substantial numbers in each subgroup, increasing the likelihood that the findings are representative of these groups.

Measures

For a complete description of the measures used in the study, please see Wielkiewicz, *et al*. (2012). The Mini-IPIP Scales (Donnellan, et al., 2006) is a 20-item public domain measure of the Five Factor Model of Personality (e.g., Goldberg, 1992). It measures the five dimensions of the Big Five Model (Extraversion, Agreeableness, Conscientiousness, Neuroticism, and

Intellect/Imagination) with four items per dimension, while maintaining good subscale reliabilities.

Results

Data analyses were performed using *IBM SPSS Statistics*, Version 19, Release 19.0.0 and *IBM SPSS AMOS*, Version 19.0. Table 1 shows characteristics of the Mini-IPIP scales; Table 2 shows bivariate correlations among the five subscales; and Table 3 shows male-female differences.

TABLE 1.

MEANS, STANDARD DEVIATIONS, KURTOSIS, SKEWNESS, AND ALPHAS FOR THE MINI-IPIP SCALES

Variable	Mean (*SD*)	Kurtosis (Std. Error)	Skewness (Std. Error)	Cronbach's Alpha
Extraversion	13.70 (3.50)	-.383 (.040)	-.425 (.079)	.808
Agreeableness	16.51 (2.56)	-.852 (.040)	1.16 (.079)	.717
Conscientiousness	14.50 (2.98)	-.271 (.040)	-.303 (.079)	.678
Neuroticism	10.51 (3.01)	.090 (.040)	-.263 (.079)	.636
Intellect	15.03 (2.92)	-.281 (040)	-.348 (.079)	.723

Note-- *N*'s ranged from 3,805 to 4,009.

TABLE 2

BIVARIATE CORRELATIONS AMONG THE FIVE SUBSCALES OF THE MINI-IPIP

	1	2	3	4	5
1. Extraversion	.808				
95%CI					
2. Agreeableness	.29‡	.717			
95%CI	(.26, .31)				
3. Conscientiousness	.03*	.13‡	.678		
95%CI	(-.00, .06)	(.10, .16)			
4. Neuroticism	-.09‡	-.01	-.04*	.636	
95%CI	(-.12, -.06)	(-.02, .04)	(-.07, -.01)		
5. Intellect	.18‡	.27‡	-.02	-.07‡	.723
95%CI	(.15, .21)	(.24, .30)	(-..05, .01)	(-.10, -.04)	

Note.—Cronbach's α for each subscale on the diagonal. All *N*′s = 3,805
*$p < .05$. †$p < .01$. ‡$p < .001$.

TABLE 3.

GENDER DIFFERENCES FOR THE MINI-IPIP SCALES

Variable	Male		Female				
	M	*SD*	*M*	*SD*	*t*	*P*	*ES (d)*
Extraversion	13.38	3.48	13.82	3.51	3.78	.000	.128
Agreeableness	15.78	2.64	16.83	2.48	12.14	.000	.411
Conscientiousness	14.17	2.83	14.62	3.04	4.46	.000	.151
Neuroticism	9.49	2.86	11.03	2.93	15.13	.000	.530
Intellect	15.13	2.96	14.96	2.89	.147	.092	.057

Note -- For males, all *N*'s were greater than 1,211. For females, all *N*'s were greater than 2,500.

Inspection of kurtosis and skewness suggests that the scales are not normally distributed with all deviations from zero being significant using a *z*-test with $p < .001$ (Tabachnick & Fidell, 2013). However, Tabachnick and Fidell suggest that with large sample sizes the *z*-test is oversensitive to deviations from normal, and so they recommend visual inspection of the distribution. Visual inspection indicated that all distributions were unimodal and good approximations to normal with the exception of Agreeableness which showed negative skew.

Exploratory Factor Analysis

An exploratory principal components analysis of the Mini-IPIP was conducted using varimax rotation with Kaiser Normalization and listwise deletion of missing data. The scree plot was noteworthy for two reasons. First, the number of factors with eigenvalues greater than 1.0 was six, not the expected value of five, similar to Cooper, *et al*. (2010). Second, the scree plot lacked a clear flattening of the slope. Parallel analysis was conducted to provide a better indication of the number of components (Thompson, 2004) using the programs written by O'Connor (2000). Parallel analysis permutates the original data file, creating a distribution of eigenvalues to which the original analysis can be compared. The program settings were: 3,000

permutations of the raw data and a two-tailed alpha of $p < .05$ (97.5 percentile). By these criteria, six components were to be extracted. When the program was set to generate 20 normally distributed variables instead of using the original raw data, the analysis also supported extraction of six components and indicated that the raw data were good approximations of normal distributions because the two parallel analyses did not differ.

SPSS replicates the predicted correlation matrix based upon the number of factors and then computes the residuals between the predicted values and the actual correlation matrix (Mertler & Vannatta, 2010). The number of residuals greater than .05 and the percent are then reported. Table 4 shows the number of factors, number of residual correlation values exceeding .05, the percent of such correlations, and the cumulative percentage of variance accounted for by the factors. Solutions ranging from 1 to 10 factors were forced. The five-factor rotated solution showed all the items loading on their predicted factors with only one item (*Am not really interested in others*.) showing a loading greater than .30 on two factors, Extraversion (.303) and Agreeableness (.595). When a sixth factor was forced, the sixth factor consisted of two items from the Agreeableness factor and one item (*Have a vivid imagination*) from the Intellect/Imagination factor with a loading of -.469. Thus, the sixth factor did not add anything interesting to the model.

TABLE 4.

NUMBER AND PERCENTAGE OF RESIDUAL CORRELATIONS GREATER THAN .05 AS A FUCTION OF NUMBER OF COMPONENTS EXTRACTED

Number of Components	Number Residuals > .05	Percentage Residuals > .05	Cumulative Variance Accounted for
1	128	67%	18.0%
2	124	67%	28.7%
3	137	72%	39.0%
4	117	61%	48.8%
5	51	26%	56.0%
6	64	33%	61.5%
7	62	32%	66.0%
8	47	24%	69.9%
9	48	25%	73.3%
10	45	23%	76.6%

Forcing a seven-factor solution broke the Intellect/Imagination component into two components, Intellect and Imagination. The seventh factor consisted of one item: *Seldom feel blue* which loaded at .914. Forcing an eight-factor solution continued to isolate *I seldom feel blue* into one factor whereas other factors separated based upon item content. The factors in this solution were Extraversion (remained intact), Conscientiousness (remained intact), Neuroticism (three items), "Feelings" (*Sympathize with others' feelings* and *Feeling others' emotions)*, "Imagination" (*Do not have a good imagination* and *Have a vivid imagination*), "Abstract Ideas" (*Am not interested in abstract ideas* and *Have difficulty understanding abstract ideas*), and "Others" (*Am not interested other peoples' problems* and *Am not really interested in others*). *Seldom feel blue* remained isolated as a single-item factor, consistent with its relatively low communality. Table 5 shows the five-component, rotated solution which accounted for 56% of the total variance.

Table 5. Rotated 5-component solution for the Mini-IPIP Scales

ROTATED 5-COMPONENT SOLUTION FOR THE MINI-IPIP SCALE

Item	Component					
	1	2	3	4	5	Communalities
Keep in the background.	.815					.709
Don't talk a lot.	.792					.643
Am the life of the party.	.768					.601
Talk to a lot of different people at parties.	.762					.636
Do not have a good imagination.		.744				.588
Have difficulty understanding abstract ideas.		.737				.576
Am not interested in abstract ideas.		.720				.535
Have a vivid imagination.		.708				.558
Sympathize with others' feelings.			.826			.688
Feel others' emotions.			.796			.661
Am not interested in other peoples' problems.			.628			.409
Am not really interested in others.	.303		.597			.506
Often forget to put things back in their proper place.				.752		.571
Make a mess of things.				.750		.616
Get chores done right away.				.666		.459
Like order.				.658		.485
Get upset easily.					.787	.643
Have frequent mood swings.					.778	.621
Am relaxed most of the time.					.656	.457
Seldom feel blue.					.486	.246

Note-- Principal Component Analysis with Varimax rotation and Kaiser Normalization.

Component loadings less than .30 are not printed to increase readability.

Confirmatory Factor Analyses

The CFA was conducted several times. First the entire sample was analyzed, allowing the AMOS program to impute missing data. The sample size for this analysis was N = 4,293. The fit

indices from a five-factor CFA with the factors allowed to be correlated were: χ^2 = 3,387.43, *df* = 160; CFI = .84; RMSEA = .069 (90% confidence interval: .067 to .071).

A second CFA analysis was performed using listwise deletion of missing data resulting in a sample size of *N* = 3,805. This analysis provided a wider range of fit statistics and data screening indices while avoiding the problems associated with estimating missing values. The fit indices from the five-factor CFA were: χ^2 = 3,220.38, *df* = 160; CFI = .837; RMSEA = .071 (90% confidence interval: .069 to .073); SRMR (Standardized Root Mean Residual) = .06. Mahalanobis distances were then used as the criteria for deleting three multivariate outliers reducing the sample size to *N* = 3,802. Fit indices then improved to the following: χ^2 = 3,079.12, *df* = 160; CFI = .844; RMSEA = .069 (90% confidence interval: .067 to .071). Fit indices deteriorated when factors were not allowed to be correlated.

Discussion

The current study provided a snapshot of personality characteristics of incoming first-year students with a large sample size (*N* = 4,292). These results should reasonably represent first-year college students who are the subject of many personality studies. Though the sample may not have proportionally represented all the demographic characteristics of incoming undergraduates, subgroups were represented by reasonable sample sizes. The present sample over-represented the Midwest, the East coast, and Catholic institutions. The sample under-represented the West coast and institutions serving high proportions of students of color. See Wielkiewicz et al. (2012) for more detailed discussion of the characteristics of the sample.

Table 3 shows sex differences for the variables in the study with four out of five differences being statistically significant. Incoming first-year women tended to be significantly more “neurotic” and agreeable than the males, with medium effect sizes. These two characteristics are probably related, and suggest the young women in this sample tend to react

more to events in their daily lives than do men. Furthermore, with their significantly higher scores on Agreeableness, it is likely relationships are responsible for some of this stress. These data are consistent with other evidence that women tend to take a more cooperative approach to life (e.g., Chin & Sanchez-Hucles, 2007; Eagly & Johnson, 1990; Kezar & Moriarty, 2000). Women also tended to be slightly more extraverted and conscientious than men.

Because there was no theoretical rationale for specifying anything other than a five-factor model for the 20 items in the Mini-IPIP, exploratory analyses were used to examine the question of whether a five-factor model would provide the best fit for these data. Two of the most common criteria for determining the number of components to extract provided ambiguous results. One of the most commonly use rules is to retain components with eigenvalues greater than 1.0 (Thompson, 2004). However, the three items loading on the sixth factor, which consisted of two items from the Agreeableness factor (*Am not really interested in others* and *Am not interested in other peoples' problems*) plus *Have a vivid imagination* (negative loading) from the Intellect/Imagination factor, do not seem to fit any known dimension of personality. It is possible that it takes some imagination or intellectual motivation to show an interest in others, so that some rationale exists for these items to coexist in a sixth factor. However, these items do not seem uniquely different from the original Agreeableness factor and their appearance in this sixth factor may merely reflect a correlation between Agreeableness and Intellect, and not reflect a separate dimension of personality that could justify further study.

Table 4 shows the number and percentage of reproduced correlations with residuals greater than .05 as a function of the number of factors extracted. With 51 (26%) of residuals greater than .05, the five-factor solution is superior to either a four-factor (117; 61%) or six-factor (64; 33%) solution. An eight-factor (47; 24%) solution needs to be forced in order to

provide a better fit than five factors. However, beyond five factors, items clustered together based upon the wording of the item content; with the exception of *I seldom feel blue*, which remained an isolated item with a loading of .486 on the Neuroticism scale of the five-component solution and .914 when it was alone as the seventh component.

The item, *I seldom feel blue*, may be a better descriptor of mood or valence than personality structure. Statistically speaking, it was the weakest of the 20 items of the Mini-IPIP. It had the lowest factor loading and lowest communality of any of the 20 Mini-IPIP items. Watson and Tellegen (1985) described a two-factor structure of affect consisting of two orthogonal factors, positive and negative affect. Using more liberal rules than FFM researchers to select trait descriptors, Almagor, Tellegen, and Waller (1995) combined trait descriptors reflecting temporary states and evaluative terms, which were excluded from the FFM criteria, with other trait descriptors. They found a seven-factor solution to the resulting item pool. The first factor of their solution was Positive Emotionality and the highest loading trait on this factor was *Depressed*, which was reversed scored. Thus, one explanation of the behavior of this item is that it may belong in a factor reflecting another dimension of personality such as Positive Emotionality.

The present results are comparable to the CFA conducted by Donnellan, *et al*. (2006) using an Internet survey of 300 undergraduates and Cooper, *et al*. (2010) using a sample of 1,481 online participants. Donnellan, *et al*. used values for the Mini-IPIP calculated from the relevant items contained in the 50-item IPIP-FFM measure. In Donnellan, *et al*., alphas ranged from .70 to .82, which is somewhat better than the present results which ranged from .63 to .80. Cooper, *et al.* obtained alphas ranging from .68 to .81. Due to the large sample size in the present study, the χ^2 values were much larger than Donnellan, *et al*. (359.3 vs. 3,079.1) and Cooper, *et al*.

(1,323.12). Other fit indices were quite comparable. For Donnellan, *et al.* and Cooper, *et al.*, RMSEA = 0.07 versus .069 in the present study. According to Byrne (2010) RMSEA (Root Mean Square Error of Approximation) is the most robust of the many measures of fit. Values less than .05 represent good fit whereas values between .06 and .08 represent reasonable approximations. The CFI reported by Donnellan, *et al*. of .88 was close to the suggested cutoff of .90, whereas it was .84 in the present study and .82 in Cooper, *et al*. (2010). Thus, the results from these three studies all indicated that the five component structure of the Mini-IPIP is solidly robust in a variety of samples. Continued research use of the Mini-IPIP in cases where a short and convenient measure of personality is desired is fully justified. However, one of the weaknesses of factor analysis is that it cannot identify factors or components that are not represented in the items. Thus, researchers may need to consider the value of including items representing Positive Emotionality and Negative Valence (e.g., Almagor, *et al.*, 1995) in their studies.

References

Almagor, M., Tellegen, A., & Waller, N. G. (1995). The Big Seven model: A cross-cultural replication and further exploration of the basic dimensions of natural language trait descriptors. *Journal of Personality and Social Psychology, 69*, 300-307.

Ball, S. A. (1995). The validity of an alternative five-factor measure of personality in cocaine abusers. *Psychological Assessment, 7*, 148-154.

Block, J. (2001). Millennial contrarianism: The five-factor approach to personality description 5 years later. *Journal of Research in Personality, 35*, 98-107. doi:10.1006/jrpe.2000.2293

Byrne, B. M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (2nd edition). New York: Routledge.

Chin, J. L., & Sanchez-Hucles, J. (2007). Diversity and leadership [Peer commentary on *American Psychologist*'s special issue on leadership, January 2007]. American Psychologist, 62(6), 608-609. doi:10.1037/0003-066X62.6.608

Cooper, A.J., Smillie, L. D., & Corr, P. J. (2010). A confirmatory factor analysis of the Mini-IPIP five-factror model personality scale. Personality and Individual Differences, 48, 688-691. doi: 10.1016/j.paid.2010.01.004

Donnellan, M. B., Oswald, F. L., Baird, B. M, & Lucas, R. E. (2006). The Mini-IPIP Scales: Tiny-yet-effective measures of the Big Five factors of personality. *Psychological Assessment, 18*, 192-203.

Durrett, C., & Trull, T. J. (2005). An evaluation of evaluative personality terms: A comparison of the big seven and Five-Factor model in predicting psychopathology. *Psychological Assessment, 17*, 359-368. doi:10.1037/1040-3590.17.3.359

Eagly, A. H., & Johnson, B. T. (1990). Gender and leadership style: A meta-analysis. *Psychological Bulletin, 108*, 233-256.

Goldberg, L. R. (1999). A broad-bandwidth, public-domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.), Personality psychology in Europe (Vol. 7, pp. 7-28). Tilburg, The Netherlands: Tilburg University Press.

Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American Psychologist, 48*, 26-34.

Goldberg, L. R. (1992). The development of markers for the big-five factor structure. *Psychological Assessment, 4*, 26-42.

Kezar, A., & Moriarty, D. (2000). Expanding our understanding of student leadership development: A study exploring gender and ethnic identity. *Journal of College Student Development, 41*, 55-69.

McCord, D. M. (2002). M5-50 Questionnaire [Administration and scoring materials]. Retrieved from http://paws.wcu.edu/mccord/m5-50/

McCrae, R. R. (2001). 5 years of progress: A Reply to Block. *Journal of Research in Personality, 35*, 108-113. doi:10.1006/jrpe.2000.2294

Mertler, C. A., & Vannatta, R. A. (2010). *Advanced and multivariate statistical methods* (4th ed.). Glandale, CA: Pyrczak Publishing.

NASPA - Student Affairs Administrators in Higher Education (2008). Profile of Today's College Student: Results. 2008. Available online at: http://www.naspa.org/divctr/research/profile/results.cfm.

O'Connor, B. P. (2000). SPSS and SAS programs for determining the number of component using parallel analysis and Velicer's MAP test. *Behavior Research Methods, Instruments, and Computers, 32*, 396-402.

Paunonen, S. V., & Ashton, M. C. (2001). Big five predictors of academic achievement. *Journal of Research in Personality*, 35, 78-90. doi:10.1006/jrpe.2000.2309

Socha, A., Cooper, C. A., & McCord, D. M. (2010). Confirmatory factor analysis of the M5-50: An implementation of the International Personality Item Pool item set. *Psychological Assessment, 22*, 43-49.

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Boston, MA: Pearson.

Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications*. Washington, DC: American Psychological Association.

U.S. Census Bureau, Bureau, Housing and Household Economic Statistics Division, Education & Social Stratification Branch. (October, 2008, last revised: 2010.). Type of College and Year Enrolled for College Students 15 Years Old and Over, by Age, Sex, Race, Attendance Status, Control of School, Disability Status, and Enrollment Status: October 2008. Retrieved from http://www.census.gov/population/www/socdemo/school/cps2008.html.

Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin, 98*, 219-235.

Wielkiewicz, R. M., Fischer, D., Stelzner, S. P., Overland, M., & Sinner, A. M. (2012). Leadership attitudes and beliefs of incoming first-year college students: A Multi-institutional Study of Gender Differences. *Journal of Leadership Education, 11*(2), 1-25.