The Relationship between Intelligence and Psychological Well-Being in College Students

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Introduction

While early applied psychology focused on identifying psychological illness (e.g., Freud, 1949), recent developments focus on psychological well-being (PWB). Ryff (1989) suggested six dimensions of PWB: Autonomy (AU), Self Acceptance (SA), Environmental Mastery (EM), Personal Growth (PG), Positive Relations with Others (PR), and Purpose in Life (PL).

Research into intelligence suggests a relationship with PWB, e.g., mental retardation has been linked to comorbidity with other mental disorders (Di Nuovo & Buono, 2007). At higher levels of intelligence, a great deal of research has focused on children and adolescents. Though not directly related to PWB, two conflicting lines of research can be found in this literature that suggest intelligence's relationship to it. The first suggests that intelligence is either positively or not related to PWB (Terman, 1925; Gallucci, 1988; Richards et al., 2003; Neihart, 1999). The second line suggests that intelligence, especially very high intelligence, is negatively related to PWB, especially socially (Hollingworth, 1942; Dauber & Benbow, 1990; Gross, 2004).

No quantitative research on PWB and intelligence in adults was found in the literature, though Lovecky (1986) suggested that high intelligence ("giftedness") is related to "divergency, excitability, sensitivity, perceptivity, and entelechy." The purpose of this study was to address the research gap with respect to PWB and intelligent young adults. The above literature suggested PG, PL, EM, and AU related positively with intelligence, while PR related negatively and curvilinearly.

Methods

Participants and Procedures

· Archival data from fall 2003, 2004, and 2005 "assessment days" at a central Virginia University. Only participation (not effort) was required. Incoming first-year students were randomly assigned to take a predetermined series of assessments; after removing two univariate outliers, a total of 3,829 students were included in the data set.

Measures

Scales of Psychological Well-Being (SPWB; Ryff, 1989): The 54-item version of Ryff's original scale (cf. Kaliski, 2006) was used. This assessment is scored on a 6-point Likert-type scale with answers ranging from, "*Strongly Disagree*," to "*Strongly agree*." Subscale reliability has been acceptable for this instrument (Kaliski, 2006; Danhauer et al., 2005).

SAT/SAT I (College Board, 1926-2005): This instrument includes mathematics and verbal subscales. Subscale test-retest reliability has been exceptional for this instrument (College Board, 2007). SAT scores have previously correlated strongly with IQ scores (Bilder et al., 2006; Frey & Detterman, 2004).

Analyses

Multiple regression analysis was conducted to determine whether or not SAT Verbal and Math scores predicted individual SPWB subscale scores as hypothesized. Additional exploratory analyses included a test of an interaction between component scores, and gender differences.

Results

Check of Multiple Regression Assumptions: A check of the assumptions of multiple regression suggested that they were very minor departures. Visual analysis of SPWB subscale scatterplots revealed likely ceiling effects.

Descriptive Statistics: SAT Verbal: Mean 549.6, S.D. 71.3; SAT Math: Mean 552.5, S.D. 69.3.

First-order correlations: SAT Verbal and Math correlated positively (r = 0.406); SPWB subscale correlations ranged from 0.319-0.688.

Internal consistency: Cronbach's α for the SPWB was acceptable for the purposes of this study (α: 0.736 to 0.808).

Exploratory analyses: Men had significantly higher AU scores, while women had higher scores on the remaining SPWB subscales (p < 0.05). Gender did not have a significant interaction with SAT subtest scores, which also did not interact with each other (p > 0.05). Interactions were removed as predictors from analyses of hypotheses.

Results (continued)

Analyses: Hypotheses

Multiple regression analysis was conducted to determine whether or not SAT Verbal and Math scores predicted individual SPWB subscale scores as hypothesized. Hypothesis-alpha was Bonferroni-adjusted to 0.05/5 = 0.01. Table 1 summarizes F-ratios, p-values, and R^2 values associated with each of the hypotheses, as well as standardized regression coefficients and probabilities of component scores. Support was found only for the fifth hypothesis and (partially) for the first. The remaining hypotheses for other F-ratios were significant, but in the opposite direction.

Discussion

Unexpectedly, three of the hypotheses were significant in the opposite direction, meaning in general, at higher intelligence levels, individuals generally had lower PWB.

Intelligence is well-predicted by verbal ability (cf. Jensen, 1998). Verbal ability was a mixed indicator of PWB dimensions (after controlling for math ability), significantly (p < 0.05) predicting PWB four dimensions. However, these relationships seem somewhat trivial for these dimensions, though Positive Relations with Others, with its two significant SAT Verbal predictors, may be considered an exception.

After controlling for verbal ability, math ability was consistently a negative predictor of PWB, significantly so for four of five dimensions. Math ability seemed to predict PL, PG, and PR beyond a trivial level. Three hypotheses may explain this. First, students better at math (after controlling for verbal ability) may take fewer liberal arts classes in high school in order to get into better-paying fields. Second, mathematical ability may be positively related to metacognition, helping students notice and report PWB deficits. Third, SAT Math may be related to cognitive, problem-solving responses to one's environment, rather than affective responses.

Limitations: This study has several limitations:
1. Effect sizes were small, accounting no more than 2% of explained variance for any given dimension of PWB.
2. If there was a ceiling effect on the SPWB, it would have lowered the overall effect size.
3. Students in this sample generally had SAT scores too low to attend the most selective institutions. Students with both high SAT Verbal and Math scores are less likely to be found in this sample. This may have attenuated the correlation between the correlation between these scores due to a restriction of range.
4. Given that students answered in a low-stakes testing condition, just prior to taking classes, they might have answered differently under more motivated and natural testing conditions.
5. Students with high SAT scores are more likely to attend more selective institutions; those who chose to attend the university in this study may have, for example, written poorer quality essays, had financial trouble, or had poorer high school grades; this might also have biased the results.
6. Structural Equation Modeling (SEM) may have corrected for measurement error in the measures used.
7. A different measure and conceptualization of PWB than Ryff's may have produced different results.
8. SAT is likely affected by other factors than intelligence (for example, motivation), which may also affect PWB.
9. This study is strictly correlational in nature; this study's results are not necessarily causally produced.

Conclusion: This study found generally found a negative relationship between intelligence and PWB dimensions. Further study into the causal nature of these relationships is recommended, as it could improve the lives of the most intelligent individuals, who could use this foundation to improve the lives of others and the world.

Table 1

Statistical tests and standardized coefficients of hypotheses

Hypothesis	F ratio	Prob.	R-
H1 (AU)	4.804	0.008	0.003
H2 (EM)	12.565	< 0.0005	0.007
H3 (PL)	37.072	< 0.0005	0.019
H4 (PG)	29.430	< 0.0005	0.015
H5 (PR)	18.008*	< 0.0005	0.019

	Predictors							
	SAT Math		SAT Verbal		Math squared (H5)		Verbal squared (H5)	
Hypothesis	Std. coeff.	Prob.	Std. coeff.	Prob.	Std. coeff.	Prob.	Std. coeff.	Prob.
H1 (AU)	-0.040	0.025	0.051	0.004	N/A	N/A	N/A	N/A
H2 (EM)	-0.029	0.102	-0.065	< 0.0005	N/A	N/A	N/A	N/A
H3 (PL)	-0.130	< 0.0005	-0.018	0.307	N/A	N/A	N/A	N/A
H4 (PG)	-0.134	< 0.0005	0.035	0.050	N/A	N/A	N/A	N/A
H5 (PR)	-0.111	< 0.0005	-0.050	0.007	-0.002	0.887	-0.045	0.009

* - significant in direction of hypothesis (α = 0.01)

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