

RELATIONSHIPS AMONG CRITICAL THINKING SKILLS,
ACADEMIC ACHIEVEMENT, AND MISCONCEPTIONS
ABOUT PSYCHOLOGY¹

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Summary.—Two groups of 60 students each were selected from introductory college psychology classes. One consisted of high academic achievers, the other of average achievers. They were given the McCutcheon Test of Misconceptions, a 65-item, multiple-choice test designed to measure common misconceptions about psychology. Subsequently, they were also given the Watson-Glaser Critical Thinking Appraisal. Both groups made many errors on the McCutcheon test, but high academic achievers made significantly fewer errors on both the McCutcheon test and the Watson-Glaser than average achievers. A stepwise multiple regression consisting of Watson-Glaser subscales 1 (the ability to draw valid inferences) and 4 (ability to weigh and interpret evidence) and GPA successfully predicted McCutcheon test scores ($R = .43$). This suggests that even beginning students with high grades and good critical thinking skills are likely to harbor many misconceptions about psychology.

Psychology professors have long been interested in and concerned about the many misconceptions that students seemingly bring with them to their first psychology class (Furnham, 1989; McCutcheon, 1991; Nixon, 1925). Early attempts to identify and measure these misconceptions were plagued by ambiguous test items and various psychometric difficulties (Brown, 1984; Furnham, 1989; McCutcheon, 1991; Ruble, 1986). More recently, the McCutcheon Test of Misconceptions, a 65-item, multiple-choice test in its sixth edition (MTM6), has been shown to have adequate reliability and validity, and has been constructed in such a way as to minimize problems found on earlier tests (McCutcheon, 1991; McCutcheon, Lummis, Lyons, & Packer, 1991).

Neither McCutcheon (1991) nor Best (1982) found significant relationships between psychology course grades and scores on misconceptions tests. On the other hand, Gutman (1979) found that course grades in psychology were positively related ($r = .35$) to scores on a test of misconceptions. These conflicting results suggest that the grade in a single psychology course may not be the best indication of academic achievement; perhaps a better measure of over-all academic achievement can be obtained by using grade point averages (GPA). GPA is derived from converting letter grades to numbers

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(A = 4, B = 3, etc.); for example, a GPA of 3.1 would be slightly higher than a "B" average. High academic achievers, presumably through a combination of intellectual ability and motivation to learn, have demonstrated greater mastery of course material than those with lower grade point averages. Furthermore, in an unpublished study² comparing high-achieving high schoolers with their schoolmates, the high-achieving group made significantly fewer errors on the McCutcheon Test 6. Does this superior academic achievement carry over to the "real" world? Are high achievers less susceptible to the common misconceptions the general public often has about psychological issues?

Critical thinking has been defined as "the reasoning we do in order to determine whether a claim is true" (Gray, 1991, p. 1). It involves the ability to use reason in examining evidence (Bell, 1991). The ability to reason clearly and logically could conceivably enable beginning psychology students to answer correctly several items on a misconceptions test. The Watson-Glaser Critical Thinking Appraisal was designed to measure five related critical thinking skills: the ability to draw valid inferences (subscale 1), the ability to recognize assumptions (subscale 2), the ability to deduce conclusions correctly (subscale 3), the ability to weigh and interpret evidence (subscale 4), and (subscale 5) the ability to evaluate the strengths and weaknesses of arguments (Watson & Glaser, 1980).

The main purpose of the present study was to estimate the relationship between susceptibility to misconceptions, academic achievement, and critical thinking skills, as measured by the five subscales of the Watson-Glaser Appraisal. Specifically, it was predicted that high academic achievers would score significantly higher (i.e., have fewer misconceptions) on the McCutcheon Test 6 than a group of average achievers. It was also predicted that, independent of academic achievement, there would be a significant positive relationship between the McCutcheon Test 6 and Watson-Glaser Appraisal scores. One can think of several variables that might lead to high grades, including some (self-esteem, extrinsic motivation for grades) that would seemingly be unrelated to knowledge of psychological misconceptions. On the other hand, the ability to reason should play an important role in enabling one to answer correctly more of the items on the McCutcheon Test 6. Therefore, we hypothesized that the Watson-Glaser Appraisal would be a better predictor of the McCutcheon Test 6 scores than GPA.

We assumed that some errors on the test of misconceptions would be more directly related than others to critical thinking skills and academic achievement. Thus we hoped also to identify those particular items which are most clearly linked to Watson-Glaser Appraisal scores and GPA.

²L. E. McCutcheon & R. Brugnoli. High school data on the MTM. (Unpublished data, 1991, available from the first author)

METHOD

Subjects

The subjects were 60 high academic-achieving college students and 60 average achievers chosen from introductory psychology classes at three state-supported colleges in the mid-Atlantic area. One is a small community college in a rural setting (C1), the second is a small, rural, four-year college (C2), and the third is a large, urban community college (C3). The high achieving group had a mean age of 23.6 ($SD = 7.0$) and a gender ratio of 37 women/23 men. The average achieving group had a mean age of 21.6 ($SD = 3.1$) and a gender ratio of 34 women/26 men.

Procedure

The McCutcheon Test 6 was administered to students in introductory psychology classes during the first two weeks of classes on each campus. All participants were volunteers. Most were enrolled in their first psychology course. Approximately a week later the subjects were given Form A of the Watson-Glaser (untimed). They were not told that there was any connection between the two instruments; they were told to do the best they could on both tests, but that scores would not affect psychology course grades. From each college the 20 students with the highest GPAs were selected for the high achieving group. The GPAs earned by this group ranged from 3.0 to 4.0, with a mean of 3.4 ($SD = .3$). From the remaining students at each college 20 subjects with GPAs below 2.9 were randomly chosen. The GPAs earned by this group ranged from .5 to 2.9, with a mean of 2.2 ($SD = .9$).

Subsequently, all students who took either test were told the purpose of the study in general terms and were encouraged to see their professor for further details. Students who expressed dismay upon seeing their McCutcheon Test 6 scores were reassured that almost every beginning psychology student obtains low scores because the test was designed to measure common misconceptions and that topics covered by the McCutcheon Test 6 would be specifically addressed in their psychology courses.

RESULTS AND DISCUSSION

A t test for use with unequal variances comparing the mean ages of the high and average achievers yielded a value of 2.02 ($df = 118$, $p < 0.05$). Although high achievers were significantly older, a previous study showed a non-significant ($r = .03$) relationship between age and McCutcheon Test 4 scores (McCutcheon, 1991). A cross-college comparison showed no significant differences on Watson-Glaser subscales one, three, and four.

Watson-Glaser total scores and those for subscales two and five were nearly identical for Schools C3 and C2, but significant F values and subsequent t tests showed that they were significantly lower at School C1. The t values comparing School C1 with C3 and again with C2 were both signifi-

cant at the 0.01 level on Watson-Glaser total scores, and both were significant at the 0.05 level on subscales two and five. Cross-college scores on McCutcheon Test 6 and GPA were almost identical. Because the three samples were similar on most of these variables, it was decided to collapse their data for further comparisons.

The high achievers made significantly fewer errors on both the McCutcheon Test 6 ($t = 3.42$, $p < 0.001$) and the Watson-Glaser Appraisal ($t = 3.52$, $p < 0.001$). High achievers also outscored the average group on all Watson-Glaser subscales except number three, which measures the ability to deduce conclusions correctly. Table 1 contains means and standard deviations for both groups on all of these variables.

TABLE 1
MEAN SCORES ON McCUTCHEON TEST OF MISCONCEPTIONS 6 AND WATSON-GLASER BY SUBJECT'S HIGH AND AVERAGE IN ACADEMIC ACHIEVEMENT

Group	McCutcheon Test	Watson-Glaser Appraisal					
		Total	1	2	3	4	5
High	19.5‡	52.4‡	8.7†	10.9*	10.0	11.7*	11.2*
Average	16.2	46.8	7.3	9.6	9.4	10.6	9.8

Note.—Averaged standard deviations on MTM6 and Watson-Glaser totals were 5.3 and 8.6, respectively. All variances satisfied the condition of homogeneity.
* $p < 0.05$. † $p < 0.01$. ‡ $p < 0.001$.

In the unpublished study comparing high school students, the gifted group averaged almost 3.4 points higher than average students on the McCutcheon Test 6.² That figure is very similar to the 3.3 difference obtained in the present study. We take this to mean that high academic achievers in general, but not necessarily those who merely do well in psychology, have a real but very small advantage on the McCutcheon Test 6. The finding of high scores on the Watson-Glaser Appraisal for the high achievers is consistent with the results of previous studies, all of which show moderately positive relationships between scores on the Watson-Glaser and various achievement measures (Watson & Glaser, 1980). This confirms that the ability to evaluate information critically is one of the factors that contributes to academic success.

The Watson-Glaser total scores, subscale scores, and GPA were used to predict McCutcheon Test 6 scores. Individually, the best predictors were subscale one (.34), total scores (.32), subscale four (.31), and GPA (.26). A stepwise multiple regression showed that only subscales one (standardized $beta = .23$) and four (standardized $beta = .19$) and GPA (standardized $beta = .18$) contributed to the over-all ability to predict McCutcheon Test 6 scores ($R^2 = .19$; $F = 8.56$, $p < 0.0001$). Thus the ability to draw valid inferences, the ability to weigh and interpret evidence, and good academic skills seem to be especially useful in answering correctly McCutcheon Test 6 items.

Using the total Watson-Glaser mean of 49.6 for all 120 subjects, we categorized them into three groups: High GPA—High Watson-Glaser ($n = 38$), Low GPA—Low Watson-Glaser ($n = 38$), and High GPA—Low Watson-Glaser and Low GPA—High Watson-Glaser, a category we called “mixed” ($n = 44$). Answers for each of the 65 items on the McCutcheon Test 6 were categorized as right or wrong. Because this resulted in 65 separate 2 by 3 chi-squared analyses the .001 confidence level was used. No items met this criterion and only three items, Nos. 6, 7, and 17, were significant at the 0.01 level; for all three the High-High group had the highest proportion of correct answers, followed by the mixed group and the Low-Low group, in that order.

In summary, it should be pointed out that the combination of the best three Watson-Glaser/GPA predictors could account for less than 19% of the variance. This suggests that intellectual ability, as indicated by good grades and good critical thinking skills, is a poor substitute for the experience of learning about the topics underlying most of the items on the McCutcheon Test 6. This is captured in slightly oversimplified advice that every psychology teacher might pass on to beginning students: “Even if you are pretty smart and you think you already know a lot about psychology, you may be wrong about some of the most ‘obvious’ issues.” The implicit message here is that psychology is more than common sense and that there are enough misconceptions about psychology that even the brightest and best students can profit from studying them.

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