

The Importance of Taking Psychology: A Comparison of Three Levels of Exposure

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Abstract

We compared the performance of senior psychology majors, introductory psychology students, and similarly aged individuals with no college psychology on seven different outcome measures including multiple-choice knowledge tests, attitudes, and open-ended scenarios requiring qualitative responses. On all measures, both senior psychology majors and introductory psychology students significantly outperformed individuals with no college psychology. However, the absolute magnitude of introductory psychology student performance would be depicted as a failing grade at most institutions (i.e., below 60% correct). We discuss this pattern of results in the context of judging the effectiveness of the major, the role of the introductory psychology course, and judging the effectiveness of the assessment/outcome measures utilized.

Keywords

introductory psychology, psychology majors, peer comparisons, quantitative and qualitative outcomes

Psychology as a discipline has been under threat for some time, and this situation is well-documented (Halonen & Dunn, 2018). Although psychology is one of the most popular majors in college with 117,440 bachelor's degrees awarded in 2015–2016 (National Center for Education Statistics, 2017) and an introductory psychology course is taken by 1.2 to 1.6 million students yearly (Gurung et al., 2016), the field has not successfully measured what majors learn or effectively assessed the impact of the course. What is the importance of taking psychology? Is more psychology better than just a single course? Borrowing from the methodological approach of developmental psychologists interested in the impact of college, we answer these two pivotal questions by comparing individuals with no college psychology, those in the midst of an introductory psychology course, and senior psychology majors on eight common measures of knowledge. Does taking psychology change a person's attitude about the discipline, knowledge of career options, change their knowledge about psychology in general, and research methods and ethics in particular? Is the knowledge acquired by senior psychology majors substantially more than what is known by the end of the typical introductory psychology course and are introductory psychology students fundamentally different than others who never took the course? These are our key questions of interest.

A Renewed National Interest in Introductory Psychology

As fragmented as the discipline of psychology may be, perhaps the undergraduate-level introductory psychology course is the singular tie that binds the field together. Nearly all future

psychology graduate program matriculates will have completed the introductory psychology course, as well as the majority of undergraduate psychology majors who seek gainful employment with their bachelor's degree (Norcross et al., 2016). Regardless of the method by which professionals in the field advance psychology (through education, as a science, as a practitioner), the introductory psychology course serves as the gateway to future pursuits in our field. The course may also serve as the singular inoculation for college students worldwide to appreciate the principles of human behavior as well as to attempt to minimize the effects of psychological myths that impact their future personal, professional, and civic lives.

Given this disproportionate importance of the introductory psychology course in the United States, assessing the long-term impact of the course (what students remember from the course, optimal pedagogical strategies for educators at all levels) seems paramount (American Psychological Association [APA], 2017). It is not surprising that this course has been the center of attention for researchers and higher education policy makers alike. Stemming from the National Conference on Undergraduate Education in Psychology held in 2008, Dunn et al. (2010) recommended a common core for introductory psychology

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courses, a recommendation in parallel to their recommendation for a common core to the undergraduate major. This latter recommendation was further reinforced by the publication of the APA (2013) *Guidelines for the Undergraduate Psychology Major: Version 2.0*. Recommendations quickly followed, based on a report issued by the APA (2014) Board of Educational Affairs Working Group on Strengthening the Common Core and the subsequent publication of this new model for teaching introductory psychology in the *American Psychologist* (Gurung et al., 2016).

There are many other indicators that point to the relative importance of the introductory psychology course (Gurung & Hackathorn, 2018). For example, studying the textbooks used in introductory psychology has a long past (e.g., Weiten, 1988; Weiten & Wight, 1992), and this interest continues to be strong presently (e.g., Bartels, Milovich, & Moussier, 2016; Griggs & Bates, 2014; Griggs & Christopher, 2016; McCann, Immel, Kadah-Ammeter, & Adelson, 2016). Another fruitful line of research within the realm of introductory psychology involves the acknowledgment of undergraduate student misperceptions and myths about human behavior and the efforts to refute those misperceptions in the introductory psychology course (e.g., Amsel, Baird, & Ashley, 2011; Bensley & Lilienfeld, 2017; Kowalski & Taylor, 2009; McCarthy & Frantz, 2016). Additionally, researchers studying introductory psychology are interested in the skill development of these students (Jhangiani & Hardin, 2015), sometimes taking the form of strengthening scientific reasoning skills (Stevens, Witkow, & Smelt, 2016) or a broadly designed competency-based education approach (Simonds, Behrens, & Holzbauer, 2017).

For many educators, the ultimate utility of the accumulation of evidence derived from research about the introductory psychology course revolves around teaching and learning, plain but not so simple. Discussions about and research concerning the content of what should be covered in the introductory psychology course have been ongoing for some time (Miller & Gentile, 1998; Weiten & Wight, 1992) and have led to the recent emergence of the common core model for the course. For instance, there have been numerous efforts to identify core concepts in the introductory psychology course, for example (Boneau, 1990; Landrum, 1993; Quereshi, 1993; Quereshi & Sackett, 1977; Zechmeister & Zechmeister, 2000). A host of other approaches, however, reinforces the importance and prevalence in the practical teaching and learning aspects of introductory psychology. For example, researchers have examined the role of quizzing in introductory psychology (Batsell, Perry, Hanley, & Hostetter, 2017), studied helping students improve study skills for a midterm exam (Cathey, Visio, Whisenhunt, Hudson, & Shoptaugh, 2016), investigated the efficacy and attitudes about the course (Walker & Brakke, 2017), and examined how to teach the introductory course using team-based learning (Travis, Hudson, Henricks-Lepp, Street, & Weidenbenner, 2016).

Not only are many educators interested in what students learn (and the best ways to shape the delivery of content and the acquisition of skills) but they are also interested in what

students remember after the course is complete. There is a rich history of studies in this area, ranging back to the 1930s (e.g., Greene, 1931). Vanderstoep, Fagerlin, and Feenstra (2000) reported that at the end of the introductory psychology course, students remembered vivid demonstrations in class but not much of the content covered. When Landrum and Gurung (2013) readministered a cumulative multiple-choice final exam 2 years after the introductory course was complete, percentage correct scores fell significantly from an initial 80.6% to 56.0% 2 years later. Considering the relative importance of the introductory psychology course, and the reliance on this course as prerequisite in psychology and so many other disciplines, the amount of information retained 2 years later by these students is troubling. But then again, demonstrating anything to be remembered from college can be a difficult task.

The General Challenge of Knowledge Acquisition and Retention

The introductory psychology course may play multiple important roles in the undergraduate curriculum (i.e., introduction to the discipline, prerequisite for later courses in and out of psychology, an opportunity to correct misperceptions, completing a general education requirement, etc.). Because of the introductory psychology course's potential, it would be beneficial to know that what is learned in introductory psychology is remembered by the student. However, Landrum and Gurung's (2013) participants showed a significant decline in multiple-choice test performance 24 months after course completion. Given the fallibility of memory as we understand it, perhaps the goal of the introductory psychology course is not lifelong retention of course content, but it serves more as a one-time inoculation or exposure to our discipline. Perhaps the benefits are indeed relatively short-lived with regard to content retention, but that there are still benefits. In order to believe this, it would be helpful to demonstrate the beneficial effects of taking the introductory psychology course compared to those individuals who have not ever taken the course. When Ellis and Rickard (1977) studied the retention of introductory psychology 4 months after the course compared to a control group of students who had never taken the course, instructed students did recall more information, but the practical size of the effect was relatively small. Rickard, Rogers, Ellis, and Beidleman (1988) attempted a replication but added a third comparison group (certain concepts were emphasized with illustrated examples). Students having received some form of instruction demonstrated about 70% retention 4 months after the course, whereas the control group correctly answered 62% of the questions.

The argument could be made that the retention interval of these studies (ranging from 4 to 24 months) is too short and that it takes time for memories to consolidate and thus be retrievable from long-term memory. Conway, Cohen, and Stanhope (1991) tested former student's knowledge of the content of a cognitive psychology course up to 125 months later. There was a rapid decline in memory after the first few years, followed by a leveling off of performance that remained above chance

levels. Names of researchers were forgotten more readily than concepts. In a follow-up test, Conway, Cohen, and Stanhope (1992) reported that grades earned on assignments during the course were better predictors of long-term retention than final examination grades. Based on the observed outcomes of previous studies, perhaps long-term retention is too much to ask. What about the comparison of students presently enrolled in the introductory psychology course compared to noncollege individuals? Does a brief (semester-long) exposure to introductory psychology concepts have any short-term benefit? Furthermore, perhaps only repeated exposures, as would be the case with someone majoring in psychology and taking multiple classes on topics in psychology—perhaps it is these types of learning situations where meaningful long-term retention of information might be expected (as compared to a one-semester exposure to the field).

The Importance of Comparisons With Individuals With No College Psychology

There has been a long-standing concern within psychology about study samples being drawn from college students only (Jung, 1969; Smart, 1966; Wintre, North, & Sugar, 2001), and those concerns about homogeneous populations continue to present day (Levenson, 2017; Medin, 2017). In his seminal article, Sears (1986) lamented that psychologists “. . . have learned a great deal from studying college sophomores in the laboratory” (p. 527), but systematic biases exist when the examination of psychological phenomenon is so narrowly focused, even though it is convenient for researchers to access the typical undergraduate human subject pool. When researchers make the comparison between same-aged peers but individuals not attending college, important differences emerge across different studies. For example, college students report significantly more nonmedical use of prescription stimulants than same-aged noncollege peers (Ford & Pomykacz, 2016), measures validated on a college sample may not be valid with a same-aged noncollege sample about marital beliefs (Willoughby & Egbert, 2016), and college students consume more alcohol (and experience more negative consequences) than noncollege peers (Schnitzer, Schulenberg, & Buchanan, 2013). Furthermore, some treatment approaches were found to be more effective for college students than their same-aged noncollege peers.

It is clear that the discipline greatly values the introductory psychology course for a variety of reasons, but actual data about the effectiveness of achieving these multiple goals are ambiguous at best. This disconnect between the importance of and the impact achieved by the introductory psychology course was the primary motivation for the present study. To preview, we compared individuals with no college psychology with introductory psychology students from three universities and senior psychology majors on seven different measures, including their knowledge about (1) psychology in general, (2) psychological misperceptions, (3) research methods, (4)

psychological ethics, (5) careers option with a psychology major, (6) attitudes about psychology as a science, and (7) two open-ended scenario-based questions in an attempt to detect problem-solving skills beyond multiple-choice testing. We hypothesize that for each of the outcome measures, senior psychology majors would outperform students enrolled in the introductory psychology course and individuals with no college psychology.

Method

Participants

Introductory psychology students. All authors recruited participants from their introductory psychology subject pools; Boise State University $n = 425$; Weber State University $n = 569$; and University of Wisconsin, Green Bay $n = 130$.

Individuals with no college experience. We utilized the panel service offered by Qualtrics (www.qualtrics.com) in order to recruit and test 461 individuals with no college experience for our study. We specified, a priori, that (1) the age range of participants be 18–28 years old, (2) the sample should contain 60% women and 40% men, (3) the average age of the sample be around 24, and (4) no one in this sample has ever enrolled in college/taken a college course. How does Qualtrics recruit participants for panel studies? The process is described below (Layne Rasmussen, personal communication, September 15, 2015):

Our panel partners each have their own method of recruitment, though all are fairly similar. Typically, respondents join a panel through one of three different processes including a double opt-in process, recruitment, or voluntary sign-up. Upon registration, they enter some basic data about themselves, including demographic information, hobbies, interests, etc. If they potentially qualify for a survey we will send them a couple of refinement questions to help solidify that the respondents are real. Whenever a survey is created that that individual would qualify for based on the information they have given, they are notified via email and invited to participate in the survey for a given incentive. The email invitation is simple and generic, informing the participant the duration of the survey and if they qualify for the survey or not. If they do qualify, they are given a link and told to follow it if they would like to participate.

The cost for each completed participant to the researchers from the Qualtrics panel service was ~US\$7.00; each participant received ~US\$1.10 for their participation.

Senior-level psychology majors. All senior-level psychology majors not enrolled in the first author's courses during the spring 2016 semester ($N = 457$) were invited to participate in this study for US\$5 remuneration, with $n = 88$ participating.

Materials/Measures

Each of the measures utilized in the present study is described here. Note, many of the scales are binary and use a Kuder–Richardson–20 (KR-20) measure for reliability. Unlike Cronbach's α , scores above .5 are considered reliable (McGahee & Ball, 2009). This measure is also influenced by the difficulty of the scale.

Psychology As Science (PAS) Questionnaire. Developed by Friedrich (1996), participants answer 20 items on a 7-point Likert-type agreement scale (with 15 items used for coding and 5 filler items). A person's total score is the average agreement score on the select 15 items. The higher the cumulative score signifies a stronger belief that psychology is a science. An example item from the PAS Questionnaire is the statement "It's just as important for psychology students to do experiments as it is for students in chemistry and biology." Our Cronbach's α interitem reliability = .81.

Psychological Knowledge (PK) Questionnaire. Developed by Thompson and Zamboanga (2004), 25 multiple-choice items are presented, each with five possible answers. A total score is calculated from the number of items correctly answered; the higher the percentage, the more accurate knowledge about psychology. An example item from the PK Questionnaire is "You are probably aware of feeling somewhat anxious or worried while sitting in your doctor's or dentist's office. This is probably because you have previously experienced uncomfortable examinations there. To a psychologist, this illustrates: (a) short-term memory, (b) operant conditioning, (c) cognitive social learning, (d) defense mechanisms, (e) classical conditioning." Our KR-20 reliability (binary calculation due to right/wrong answers) = .71.

Psychological Misperceptions (PM) Questionnaire. Developed by Thompson and Zamboanga (2004), 16 items are answered using the scale items *very sure it's false*, *somewhat sure it's false*, *somewhat sure it's true*, and *very sure it's true*. Items are actually true or false, so only *very sure it's false* and *very sure it's true* are scored as correct answers. The total score is the percentage of items correctly answered, and the higher the score, the greater the ability to avoid misperceptions. An example item from the PM Questionnaire is "Your eyes, ears, and other sensory organs provide an accurate experience of the world as it truly exists." Our KR-20 reliability (binary calculation due to right/wrong answers) = .46.

Psychological Research Methods (PRM) Survey. Developed by Amsel, Allen, and Bauer (2014), 10 items are presented, each with four possible answers. A total score is calculated from the number of items correctly answered; the higher the percentage correct, the more accurate knowledge about PRM. An example item from the PRM Survey is "A correlation between self-esteem and annual income of -.75 would indicate that: (a) higher level of annual income are

associated with lower levels of self-esteem, (b) lower levels of self-esteem are associated with lower levels of annual income, (c) higher levels of self-esteem are associated with higher levels of annual income, (d) it is impossible to predict annual income levels from knowledge of self-esteem levels." Our KR-20 reliability (binary calculation due to right/wrong answers) = .59.

Psychological Ethics Survey. Developed by Zucchero (2011), 15 multiple-choice items are presented with four possible answers. A total score is calculated from the percentage of items correctly answered, and the higher the score, the more accurate knowledge about PE. An example item from the PE Survey is "In obtaining informed consent for participation in a psychology experiment, a psychologist (a) allows potential subjects the freedom to decline participation, (b) is required to have written consent for every experiment, (c) discusses every implication of withdrawing and continuing in the experiment, (d) does not give the prospective participants the opportunity to ask questions." Our KR-20 reliability (binary calculation due to right/wrong answers) = .62.

Qualitative scenarios. Participants were presented with two scenarios, each followed with an open-ended text box for the participant's answer/reply. In each case, participants were told that their response needed to be a minimum of 100 characters. The first scenario:

You have an 18-month old child who continually plays with all of the electrical outlets throughout your house and in other locations. You have tried the electrical outlet covers, but the child removes them. What would you do to keep your child away from the outlets? Please explain in detail (minimum 100 characters).

The second scenario:

Your friend or close family member shares with you that he or she has been feeling down lately. The person reports a lost interest in activities he or she used to enjoy and instead just stays at home, often sleeping for a long period of time. The person has seen a general practitioner to get a checkup and the person received a clean bill of health. But the person still wants your advice. What advice would you give this person? Please be detailed (minimum 100 characters).

Undergraduate raters were trained to a minimum interrater reliability level of .90; both scenario responses were coded as 0 = *no psychological insight into the problem*, 1 = *partial psychological insight into the problem*, and 2 = *complete psychological insight into the problem*. Thus, each rater assigned a score of 0, 1, or 2, and the overall score per participant per scenario ranged from 0 to 2, with a higher score indicating a higher level of psychological insight into a problem.

Psychology Majors Career Information Quiz (PMCIQ). Developed by Thomas and McDaniel (2004), 15 true/false statements are

Table 1. Descriptive Data (Means, Standard Deviations, and Confidence Intervals) for All Quantitative Variables Across Three Groups.

Variable	No College	Introductory Psychology	Senior	F
Age	23.08 (3.28) [22.78, 23.38]	21.36 (6.59) [21.36, 20.95]	28.68 (10.60) [28.68, 25.87]	47.78
PAS	4.82 (0.77) [4.75, 4.89]	4.92 (0.81) [4.87, 4.97]	5.55 (0.87) [5.36, 5.74]	28.20
PK	0.32 (0.01) [0.31, 0.33]	0.41 (0.01) [0.40, 0.39]	0.61 (0.02) [0.58, 0.55]	106.67
PM	0.48 (0.01) [0.47, 0.46]	0.51 (0.01) [0.50, 0.51]	0.59 (0.02) [0.55, 0.61]	24.89
PRM	0.35 (0.01) [0.33, 0.36]	0.38 (0.01) [0.37, 0.39]	0.55 (0.03) [0.50, 0.61]	25.54
PE Survey	0.33 (0.01) [0.32, 0.34]	0.39 (0.01) [0.37, 0.40]	0.53 (0.02) [0.50, 0.57]	65.04
PMCIQ	0.51 (0.01) [0.50, 0.52]	0.56 (0.01) [0.55, 0.57]	0.66 (0.02) [0.61, 0.71]	28.31

Note. The PAS Scale was scored on a 7-point Likert-type agreement scale, with higher scores (from 1 to 7) indicating greater agreement. For all of the remaining scales (PK, PM, PRM, PE, and PMCIQ), items on these scales have correct or incorrect answers; the scores reported are proportion correct. All p s < .001. PAS = Psychology As Science; PK = Psychological Knowledge; PM = Psychological Misperceptions; PRM = Psychological Research Methods; PE = Psychological Ethics; PMCIQ = Psychology Major Career Information Quiz.

presented, and a total score is calculating with the percentage of items correctly answered. The higher the score, the more accurate knowledge of psychology major career information. An example item from the PMCIQ is “The beginning of your last semester in college is a good time to start investigating graduate schools you might want to attend.” Our KR-20 reliability (given the binary nature of right/wrong answers) = .37.

Procedure

Following recruitment, potential participants were provided with online informed content materials at the beginning of the survey. Using the Qualtrics panel service, multiple prescreening questions were used to confirm that individuals in the non-college peer group had never enrolled in college nor had taken a college course. For all three groups, participants had unlimited time to complete the survey but most completed it within 25–35 min. At the end of the survey, debriefing information was presented and the contact information for the researchers was provided. Funding for participant remuneration was provided by the Department of Psychological Science at Boise State University.

Results

We addressed three different questions with regard to our statistical analyses: (1) What, if any, are the interrelationships between the measures used in the study? (2) What are the differences, if any, between senior psychology majors, introductory psychology students, and age-matched individuals with no college psychology experience? and (3) Which variables predict scores on applied measures of learning? The analyses to follow are organized around these three key questions. Means and standard deviations for all measures are shown in Table 1.

Intercorrelations Between Measures

Given that there are multiple measures utilized in this study, there could be overlap in the constructs underlying the measures. Furthermore, we wanted to test the associations between different types of knowledge (e.g., myths vs. research

Table 2. Intercorrelations Between Outcome Measures.

Variables	PAS	PK	PM	PRM	PE	PMCIQ
PAS	—	.32	.16	.25	.32	.22
PK	—	.28	.41	.39	.27	
PM	—	.19	.19	.25		
PRM	—	.32	.20			
PE Survey	—	.25				
PMCIQ	—					

Note. All correlations statistically significant at $p < .001$. PAS = Psychology As Science; PK = Psychological Knowledge; PM = Psychological Misperceptions; PRM = Psychological Research Methods; PE = Psychological Ethics; PMCIQ = Psychology Major Career Information Quiz.

methods). To ascertain this, we calculated correlation coefficients for all possible relationships; see Table 2 for details.

Not surprisingly, measures of different types of psychological content knowledge were positively and statistically significantly associated with each other. Correlations ranged from a high of $r(1,483) = .41, p < .001$, between general psychology knowledge and knowledge of research methods, to $r(1,495) = .16, p < .001$, between PAS score and knowledge of psychology myths. Of note, even knowledge of psychology careers was significantly correlated with knowledge of ethics, myths, research methods, PAS, and general knowledge of psychology.

Differences Between College Students and Individuals With No College Experience

How does taking psychology courses predict knowledge about psychology? One method of answering this question is to directly compare the performance of senior psychology students, students enrolled in the introductory psychology, and individuals who have never taken the course in college.

We conducted a multivariate analysis of variance on the six major quantitative measures in the study completed by all three groups. As predicted, we found significant differences between groups on all six measures (see Table 1), Pillai's trace, $F(2, 1245) = 23.09, p < .001, \eta^2 = .10$. Pairwise comparison tests showed that individuals with no college psychology scored significantly lower than students in introductory psychology

and senior psychology majors on all six measures as shown in Table 1. Students in introductory psychology and individuals without college psychology scored significantly lower than senior-level psychology majors on all six measures.

Predicting Scenario Scores

We predicted performance on our two scenario assessments using hierarchical multiple regression analyses. We first entered gender in the first step. Next, we entered dummy codes signifying group membership (no college experience vs. introductory psychology, no college experience vs. senior psychology majors) using no college experience participants as the comparison group (assigned to 0). Finally, we entered our six psychology-related knowledge scales as a block in the third step.

Scenario 1. The results of the first step of this analysis showed that gender accounted for a small but significant amount of variability, $R^2 = .01$, $F(1, 1201) = 14.68$, $p < .001$, indicating that men tended to have higher scores on this scenario, $\beta = -.11$, $p < .001$, CI $[-.32, -.11]$. In the second step, group membership predicted an additional and significant amount of additional variance, $R^2 = .04$, $F(2, 1199) = 16.79$, $p < .001$, indicating senior-level and introductory psychology students have higher scores on this scenario as compared to individuals with no college experience. The third step provided the major test of the utility of our knowledge measures. As predicted, the final step was significant, predicting an additional portion of variance, $R^2 = .05$, $F(6, 1193) = 8.69$, $p < .001$. Knowledge of psychology research methods, $\beta = .09$, $p = .003$, CI $[.04, .83]$ was a significant variable.

Scenario 2. The results of the first step of this analysis showed that again gender accounted for a small but significant amount of variability, $R^2 = .03$, $F(1, 1191) = 32.95$, $p < .001$, although for this scenario women tended to have higher scores on this scenario, $\beta = .16$, $p < .001$, CI $[.18, .39]$. Group membership was again significant suggesting both a college introductory psychology class and also being a senior psychology major did effect performance on this scenario, $R^2 = .01$, $F(2, 1189) = 15.65$, $p < .001$. The third step provided the major test of the utility of our knowledge measures. As predicted, the final step was significant, predicting an additional portion of variance in Scenario 2 scores, $R^2 = .07$, $F(6, 1183) = 15.90$, $p < .001$. Five measures were significant. Participants knowledge of psychology as a science, $\beta = .10$, $p = .001$, CI $[.04, .07]$; research methods, $\beta = -.08$, $p = .011$, CI $[-.61, -.03]$; ethics, $\beta = .10$, $p = .002$, CI $[.25, .99]$; careers, $\beta = .10$, $p = .001$, CI $[.17, .86]$; and general psychology knowledge, $\beta = .13$, $p < .001$, CI $[.36, 1.12]$ were significant variables.

Discussion

What good does taking psychology do? The good news is that senior psychology majors and introductory psychology

students score higher on all measures than individuals with no college psychology. In the face of documented assaults on the field of psychology (Halonen & Dunn, 2018), these results are important and vital to supporting the need for courses in the discipline even among those students going directly into the workforce. Instead of being obvious or commonsense, empirically demonstrating the importance of taking even a college introductory psychology class (over not taking one) has not been done before and goes toward making a case for increasing how well we teach the course (APA, 2014).

It is encouraging to see these beneficial effects of taking psychology and the introductory psychology course in particular. In fact, our introductory psychology students in the course have more knowledge of ethics and commonly acceptable facts that are actually myths, making the argument for requiring the introductory course for students even outside the major (i.e., for general education). However, the relative magnitude of some of the scores is surprising. For example, on the PK Questionnaire, introductory psychology students on average answered 41.5% of the multiple-choice questions correctly, compared to 31.7% answered correctly by noncollege peers. This is a statistically significant difference with an effect size $d = .69$ (between a medium and large effect size). However, scoring 41.5% correctly on a multiple-choice test would result in a failing grade in many/most college courses. Continuing this line of reasoning, introductory psychology students answered, on average, 50.2% of the PM Questionnaire items correctly, 38.7% of the PRM Questionnaire items correctly, 55.7% of the Psychology Major Career Information Quiz items correctly, and for Qualitative Scenario #1 (where a participant's score could range from 0 to 2), the average score for introductory psychology students was .89, which would convert to 44.5% correct.

The low absolute scores on measures of psychology knowledge are not an anomaly. In many different studies of the introductory psychology course, students do not show high level of learning. In one recent example, Hudson and colleagues (2015) measured student learning in introductory classes over a period of year as part of assessing changes to course design. Although students showed improvements in learning over the course of the semester, average scores on the final assessment were only 66%. In a more recent study also assessing learning in introductory psychology, Hardin and colleagues (2018) reported students scored between 47% and 54% on end of semester assessments. Studies like the two cited here and many others focus on assessing interventions or comparing textbooks and correspondingly have not drawn attention to the low values of learning. The current study provides a clear picture of just how low learning levels are and urge educators to develop ways to increase how much students learn.

There is certainly overlap in the constructs being measured across the eight outcome measures, as indicated by the number and pattern of intercorrelations between measures (see Table 2 and the regression analyses). We conclude that these relations suggest that elements of the discipline are not learned separately and in isolation. That is, as students gain insight into the

discipline, it seems to have impact across multiple areas—from specific knowledge, to general research design, to applications and careers. Although there may be an underlying conceptual structure supporting such learning, the nature and changes in that structure as students are exposed to the discipline are unknown. This finding may also have broader applications as well. Understanding the nature and changes in the conceptual structure formed by students when learning elements of the discipline in introductory psychology may help with discussions about the contents of the core model for the class. Models that recognize a foundational role for research methods (e.g., Gurung et al., 2016) find support by data demonstrating that knowledge of such methods predicted performance on both qualitative analyses of real-world applications of PK.

How much exposure to the discipline is necessary to demonstrate increased performance across measures is also an open but answerable question. For instance, there are very few studies addressing the beneficial effects of minoring in psychology (e.g., Jurs, Daugherty, & Bowen, 2017; Stache, Perlman, McCann, & McFadden, 1994) and some analysis of the PK of student earning an associate degree (Alexander et al., 2016). Teachers of psychology (and especially curriculum planners) could certainly utilize our premise of the benefit of “taking more psychology” as support for the psychology minor or psychology associates degree.

Another factor to consider is the time during the semester when introductory psychology students participated in the study. Students participating earlier in the semester might score lower on overall PK tests because they have not “covered” certain concepts yet in their course. Also, it could be that time in semester positively influences scores on outcome measures. If psychology careers are addressed early in the course and if research methods are also covered early in the introductory course, then completing the survey earlier is a sensible explanation for the pattern of results that emerged.

As with any study, there are limitations. For instance, the self-selected samples from three universities may not be (a) representative of those universities and (b) representative of a national sample of introductory psychology students after being combined. While we found significant differences between the college and noncollege sample, we do not know if the noncollege sample had any high school psychology a factor that could further influence the findings. In a similar vein, having a college sample who have not taken Introductory Psychology. (but have other college education) would provide a useful additional comparison which we lacked. Care must also be taken not to overconclude based on the outcomes reported here. That introductory psychology students outperform individuals without college psychology is laudable, but the absolute magnitude of correct answering (e.g., 38–55%) is troubling. It may be that multiple-choice testing is not the optimal method to measure what students learn in the introductory psychology course. We also used two qualitative scenario items that provide an alternative approach. Introductory psychology students and senior psychology majors clearly outperformed noncollege psychology peers on both qualitative

scenarios. Attempting to measure a students’ application of psychological principles through a skills-centered approach may be a fruitful approach in disentangling the outcomes of what is learned in introductory psychology compared to the outcomes of how that learning is tested.

We provide strong evidence of the utility of both the psychology major and introductory course—there are clear benefits to taking psychology. The introductory psychology course is truly ubiquitous, and understanding the utility of the course can help psychology as a discipline explain the discipline’s beneficial effects to the general public. For so many high school, community college, college, and university students, introductory psychology is their only exposure to the science of psychology. This singular opportunity is both highly valued, and to make the most of this tie that binds, all parties interested in the success of psychology as a discipline should also be focused on the success of the introductory psychology course.

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References

- Alexander, D., Amsel, E., Gerber, B., Hailstorks, R., Leppien-Christensen, K., & Wilson-Doenges, G. (2016). *Assessment at the associate level: APA summit working group on AA integration*. Retrieved from <http://pass.apa.org/assessment-at-the-associate-level/>
- American Psychological Association. (2013). *APA guidelines for the undergraduate psychology major: Version 2.0*. Washington, DC: Author.
- American Psychological Association. (2014). Strengthening the common core of the introductory psychology course. *APA Board of Educational Affairs Working Group on Strengthening the Common Core of the Introductory Psychology Course*. Retrieved from <http://www.apa.org/ed/governance/bea/intro-psych-report.pdf>
- American Psychological Association. (2017). Assessment of outcomes of the introductory course in psychology. *Working Group*

- on *Introductory Psychology Assessment*. Retrieved from <http://www.apa.org/precollge/undergrad/index.aspx>
- Amsel, E., Allen, L., & Bauer, R. (2014, August). *Psychological literacy: Its nature, acquisition, and application*. Presented at the Sixth International Conference on Psychology Education, Flagstaff, AZ.
- Amsel, E., Baird, T., & Ashley, A. (2011). Misconceptions and conceptual change in undergraduate students' understanding of psychology as a science. *Psychology Learning and Teaching, 10*, 3–10. doi:10.2304/plat.2011.10.1.3
- Bartels, J. M., Milovich, M. M., & Moussier, S. (2016). Coverage of the Stanford prison experiment in introductory psychology courses: A survey of introductory psychology instructors. *Teaching of Psychology, 43*, 136–141. doi:10.1177/0098628316636290
- Batsell, W. R., Jr., Perry, J. L., Hanley, E., & Hostetter, A. B. (2017). Ecological validity of the testing effect: The use of daily quizzes in introductory psychology. *Teaching of Psychology, 44*, 18–23. doi:10.1077/0098628316677492
- Bensley, D. A., & Lilienfeld, S. O. (2017). Psychological misconceptions: Recent scientific advances and unresolved issues. *Current Directions in Psychological Science, 26*, 377–382. doi:10.1177/0963721417699026
- Boneau, C. A. (1990). Psychological literacy: A first approximation. *American Psychologist, 45*, 891–900.
- Cathey, C. L., Visio, M. E., Whisenhunt, B. L., Hudson, D. L., & Shoptaugh, C. F. (2016). Helping when they are listening: A mid-term study skills intervention for introductory psychology. *Psychology Learning & Teaching, 15*, 250–267. doi:10.1177/1475725716646319
- Conway, M. A., Cohen, G., & Stanhope, N. (1991). On the very long-term retention of knowledge acquired through formal education: Twelve years of cognitive psychology. *Journal of Experimental Psychology: General, 120*, 395–409.
- Conway, M. A., Cohen, G., & Stanhope, N. (1992). Why is it that university grades do not predict very-long-term retention? *Journal of Experimental Psychology: General, 121*, 382–384.
- Dunn, D. S., Brewer, C. L., Cautin, R. L., Gurung, R. A. R., Keith, K. D., McGregor, L. N., . . . Voigt, M. (2010). The undergraduate psychology curriculum: Call for a core. In D. F. Halpern (Ed.), *Undergraduate education in psychology: A blueprint for the future of the discipline* (pp. 47–61). Washington, DC: American Psychological Association.
- Ellis, N. R., & Rickard, H. C. (1977). Retention of knowledge acquired in a course in general psychology. *Teaching of Psychology, 4*, 128–132.
- Ford, J. A., & Pomykacz, C. (2016). Non-medical use of prescription stimulants: A comparison of college students and their same-age peers who do not attend college. *Journal of Psychoactive Drugs, 48*, 253–260. doi:10.1080/02791072.2016.1213471
- Friedrich, J. (1996). Assessing students' perceptions of psychology as a science: Validation of a self-report measure. *Teaching of Psychology, 23*, 6–13.
- Greene, E. B. (1931). The retention of information learned in college courses. *Journal of Educational Research, 24*, 262–273.
- Griggs, R. A., & Bates, S. C. (2014). Topical coverage in introductory psychology: Textbooks versus lectures. *Teaching of Psychology, 41*, 144–147. doi:10.1177/0098628314530347
- Griggs, R. A., & Christopher, A. N. (2016). Who's who in introductory psychology textbooks: A citation analysis redux. *Teaching of Psychology, 43*, 108–119. doi:10.1177/0098628316636276
- Gurung, R. A. R., & Hackathorn, J. (2018). Ramp it up: A call for more research in introductory psychology. *Teaching of Psychology, 45*, 302–311. doi:10.1177/0098628318796413
- Gurung, R. A. R., Hackathorn, J., Enns, C., Frantz, S., Cacioppo, J. T., Loop, T., & Freeman, J. E. (2016). Strengthening introductory psychology: A new model for teaching the introductory course. *American Psychologist, 71*, 112–124. doi:10.1037/a0040012
- Halonen, J. S., & Dunn, D. S. (2018). Embedding career issues in advanced psychology major courses. *Teaching of Psychology, 45*, 41–49. doi:10.1177/0098628317744967
- Hardin, E. E., Eschman, B., Spengler, E. S., Grizzell, J. A., Moody, A. T., Ross-Sheehy, S., & Fry, K. M. (2018). What happens when trained graduate student instructors switch to an open textbook? A controlled study of the impact on student learning outcomes. *Psychology Learning & Teaching*. Advance online publication. doi:10.1177/1475725718810909
- Hudson, D. L., Whisenhunt, B. L., Shoptaugh, C. F., Visio, M. E., Cathey, C., & Rost, A. D. (2015). Change takes time: Understanding and responding to culture change in course redesign. *Scholarship of Teaching and Learning in Psychology, 1*, 255–268. doi:10.1037/stl0000043
- Jhangiani, R. S., & Hardin, E. E. (2015). Skill development in introductory psychology. *Scholarship of Teaching and Learning in Psychology, 1*, 362–376. doi:10.1037/stl0000049
- Jung, J. (1969). Current practices and problems in the use of college students for psychological research. *The Canadian Psychologist, 10*, 280–290.
- Jurs, B. S., Daugherty, T. K., & Bowen, M. (2017). Minor questions about research methods. *North American Journal of Psychology, 19*, 709–716.
- Kowalski, P., & Taylor, A. K. (2009). The effect of refuting misconceptions in the introductory psychology class. *Teaching of Psychology, 36*, 153–159. doi:10.1080/00986280902959986
- Landrum, R. E. (1993). Identifying core concepts in introductory psychology. *Psychological Reports, 72*, 659–666.
- Landrum, R. E., & Gurung, R. A. R. (2013). The memorability of introductory psychology revisited. *Teaching of Psychology, 40*, 222–227. doi:10.1177/0098628313487417
- Levenson, R. W. (2017). Do you believe in the field of psychological science is headed in the right direction? *Perspectives on Psychological Science, 12*, 675–679. doi:10.1177/1745691617706507
- McCann, L. I., Immel, K. R., Kadah-Ammeter, T. L., & Adelson, S. K. (2016). The importance and interest of introductory psychology textbook topics: Student opinions at technical college, 2-, and 4-year institutions. *Teaching of Psychology, 43*, 215–220. doi:10.1177/0098628316649477
- McCarthy, M. A., & Frantz, S. (2016). Challenging the status quo: Evidence that introductory psychology can dispel myths. *Teaching of Psychology, 43*, 211–214. doi:10.1177/0098628316649470

- McGahee, T. W., & Ball, J. (2009). How to read and really use an item analysis. *Nurse Educator* 34, 166–171.
- Medin, D. L. (2017). Psychological science as a complex system: Report card. *Perspectives on Psychological Science*, 12, 669–674. doi:10.1177/1745691616687746
- Miller, B., & Gentile, B. F. (1998). Introductory course content and goals. *Teaching of Psychology*, 25, 89–96.
- National Center for Education Statistics. (2017). Table 325.80. Degrees in psychology conferred by postsecondary institutions, by level of degree and by sex of student: Selected years, 1949-50 through 2015-16. *Digest of Education Statistics*. Retrieved from https://nces.ed.gov/programs/digest/d17/tables/dt17_325.80.asp?current=yes
- Norcross, J. C., Hailstorks, R., Aiken, L. S., Pfund, R. A., Stamm, K. E., & Christidis, P. (2016). Undergraduate study in psychology: Curriculum and assessment. *American Psychologist*, 71, 89–101. doi:10.1037/a0040095
- Quereshi, M. Y. (1993). The contents of introductory psychology textbooks: A follow-up. *Teaching of Psychology*, 20, 218–222.
- Quereshi, M. Y., & Sackett, P. R. (1977). An updated content analysis of introductory psychology textbooks. *Teaching of Psychology*, 4, 25–30.
- Rickard, H. C., Rogers, R., Ellis, N. R., & Beidleman, W. B. (1988). Some retention, but not enough. *Teaching of Psychology*, 15, 151–152.
- Schnitzer, L. W., Schulenberg, S. E., & Buchanan, E. M. (2013). Differential associations among alcohol use, depression and perceived life meaning in male and female college students. *Journal of Substance Abuse*, 18, 311–319. doi:10.3109/14659891.2012.661026
- Sears, D. O. (1986). College sophomores in the laboratory: Influences of a narrow data base on social psychology's view of human nature. *Journal of Personality and Social Psychology*, 51, 515–530.
- Simonds, J., Behrens, E., & Holzbauer, J. (2017). Competency-based education in a traditional higher education setting: A case study of an introduction to psychology course. *International Journal of Teaching and Learning in Higher Education*, 29, 412–428.
- Smart, R. G. (1966). Subject selection bias in psychological research. *The Canadian Psychologist*, 7a, 115–121.
- Stache, C., Perlman, B., McCann, L., & McFadden, S. (1994). A national survey of the academic minor and psychology. *Teaching of Psychology*, 21, 69–74.
- Stevens, C., Witkow, M. R., & Smelt, B. (2016). Strengthening scientific reasoning skills in introductory psychology: Evidence from community college and liberal arts classrooms. *Scholarship of Teaching and Learning in Psychology*, 2, 245–260. doi:10.1037/stl0000070
- Thomas, J. H., & McDaniel, C. R. (2004). Effectiveness of a required course in career planning for psychology majors. *Teaching of Psychology*, 31, 22–27.
- Thompson, R. A., & Zamboanga, B. L. (2004). Academic aptitude and prior knowledge as predictors of student achievement in introduction to psychology. *Journal of Educational Psychology*, 96, 778–784. doi:10.1037/0022-0663.96.4.778
- Travis, L. L., Hudson, N. W., Henricks-Lepp, G. M., Street, W. S., & Weidenbenner, J. (2016). Team-based learning improves course outcomes in introductory psychology. *Teaching of Psychology*, 43, 99–107. doi:10.1177/0098628316636274
- VanderStoep, S. W., Fagerlin, A., & Feenstra, J. S. (2000). What do students remember from introductory psychology? *Teaching of Psychology*, 27, 89–92.
- Walker, E. R., & Brakke, K. E. (2017). Undergraduate psychology students' efficacy and attitudes across introductory and advanced statistics courses. *Scholarship of Teaching and Learning in Psychology*, 3, 132–140. doi:10.1037/stl0000088
- Weiten, W. (1988). Objective features of introductory psychology textbooks as related to professors' impressions. *Teaching of Psychology*, 15, 10–16.
- Weiten, W., & Wight, R. D. (1992). Portraits of a discipline: An examination of introductory psychology textbooks in America. In A. E. Puente, J. R. Matthews, & C. L. Brewer (Eds.), *Teaching psychology in America: A history* (pp. 453–504). Washington, DC: American Psychological Association.
- Willoughby, B. J., & Egbert, J. (2016). Complexities in assessing marital beliefs: Illustrations across college and non-college emerging adults. *Marriage & Family Review*, 52, 722–741. doi:10.1080/01494929.2016.1157124
- Wintre, M. G., North, C., & Sugar, L. A. (2001). Psychologists' response to criticisms about research based on undergraduate participants: A developmental perspective. *Canadian Psychology*, 42, 216–225.
- Zechmeister, J. S., & Zechmeister, E. B. (2000). Introductory psychology textbooks and psychology's core concepts. *Teaching of Psychology*, 27, 6–11.
- Zuccherro, R. A. (2011). Psychology ethics in introductory psychology textbooks. *Teaching of Psychology*, 38, 110–113. doi:10.1177/0098628311401583