

Some Roads Lead to Psychology, Some Lead Away: College Student Characteristics and Psychology Major Choice

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Abstract

Understanding which students enter and leave psychology majors in college is critical to understanding the pipeline into the field. In this study, we compared psychology majors with nonpsychology majors on the basis of demographic, degree planning, academic preparedness, and academic performance variables using a unique longitudinal sample of nearly a million college students at 249 colleges and universities. Guided by prior research, we examined which students would persist in psychology, enter psychology from another major, or leave psychology for another major between three points in time: intended major before entering college, second-year college major, and fourth-year college major. Critically, most students who majored in psychology did not initially express interest in the field, but entering and persisting in the field was strongly associated with high school exposure and performance in psychology. Students with poorer performance in college often transfer into psychology from majors that may be perceived as difficult (e.g., science, technology, engineering, and math), whereas higher-performing students appear to leave psychology for these same majors, which may also be perceived as more lucrative. These results are concerning for the field of psychology if individuals with high potential who are originally interested in the field eventually leave.

Keywords

application, education, individual differences

Over the years we have heard many stories about why college students major in psychology, and we may have told a few of our own as well—for example, the one about premed students who after an unpleasant collision with organic chemistry decided that psychology is more to their liking. Some bring up the academically weak student who uses psychology as a fallback major because it is just “common sense.” Then there is the very talented student who left psychology to study a physical science because they felt the job prospects were better. Finally, some may argue that there are really two types of psychology students. One type is more highly skilled and is dedicated to psychological science, and often the students in these stories have worked in our labs and wanted a long-term career in the field after graduate school. In contrast, the second type enters the major simply because it is recognizable and requires few prerequisite or cumulative courses.

We think moving beyond anecdotes is important for several reasons. Psychology is easily one of the most

popular majors. As of the 2014–2015 academic year in the United States, the bachelor's degree in psychology is the third most commonly conferred degree (6.1%), behind only business (19.2%) and health professions (11.4%; Snyder, de Brey, & Dillow, 2018). At least as important is the fact that the number of psychology majors is growing: Compared with the 2008–2009 academic year as a baseline, the number of new bachelor's degree holders in psychology (24.7% increase) actually outpaced the number of new degree holders overall (18.3% increase) in the 2014–2015 academic year. Understanding who these students are has implications for how we train the next generation of psychologists. A better picture of who leaves the field would also

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show us the kinds of students we are losing and can inform how we position and promote our field.

We decided to examine this issue not only because it is important but also because we were in a unique position to do so. We examined movement into and out of psychology majors with a longitudinal sample of 917,459 undergraduate students at 249 college and universities across the United States. These students entered college during the 2006 to 2011 academic years. This substantial data set allowed us to look at student attributes, college success, and major choice at three time points (preentry, second year, and fourth year), providing a comprehensive picture of the characteristics of students who major in psychology and the effects that entry and attrition to and from psychology majors have on the overall educational and demographic characteristics of psychology majors. Previous studies have carefully examined differences in psychology-program curricula with the goal of understanding *how* we train students (e.g., Norcross et al., 2016). We examined a complementary question by looking at differences between psychology majors and college students in general with the goal of understanding *whom* we train.

Major choice, in general, has been studied previously, and these studies have some limitations as well as insights. To provide a framework for interpreting the results, we first review approaches to understanding major choice and pair this with a review of the primary characteristics that appear to influence major choice.

Why Do Students Declare a Major?

Ultimately, student movement into and out of college majors is a result of their choices. Major choice has been studied through the theoretical lenses of person-environment fit (e.g., Porter & Umbach, 2006) and economic goals and needs (e.g., Altonji, Kahn, & Speer, 2014). Past research has firmly established that educational and vocational outcomes such as college-major choice are largely determined by cognitive ability and educational-vocational interests (Austin & Hanisch, 1990; Gottfredson, 1981, 2003, 2005; Lubinski, 2010; Rounds & Tracey, 1990), and relationships have been established between overall major choice and demographic characteristics, educational background and verbal- and math-reasoning abilities (e.g., Davison, Jew, & Davenport, 2014; Päßler & Hell, 2012), and subsequent wages earned (Altonji et al., 2014).

However, much of the literature focuses only on the degree earned and tends to restrict itself to comparisons with science, technology, engineering, and math (STEM) majors—a grouping that commonly excludes psychology. In addition, many studies examine major choice at a single point in time. Because college-major choice is

not a static affair, unpacking information regarding those who enter or leave a psychology major over time will provide a more complete examination of student characteristics related to psychology-major choice and help us better understand the process of major choice as well as possible differences at different points in time.

Students differ on a number of characteristics that are of interest for understanding the demographic background and skill set of students entering and leaving psychology. These characteristics are especially interesting if students entering or leaving the major are disproportionately represented compared with other majors. These variables can be roughly organized into the following categories: demographics (race, gender, and socioeconomic status, or SES), indicators of exposure and investment in psychology (Advanced Placement, or AP, psychology scores; psychology college credits earned in high school; and degree goals), academic preparedness (high school records, test scores in verbal reasoning and math reasoning, and writing skills), and college performance (grade point average, or GPA, earned in the first, second, third, and fourth years). We review previous research on each of these characteristics to provide background for our findings.

Demographics

Some demographic differences have been observed in previous research, although the causal mechanism is not fully understood. In a study on major choice, Porter and Umbach (2006) found that women were more likely to have pursued majors in the social sciences than in STEM, and this gender difference was largely accounted for by interests. In terms of race and ethnicity, they also found that Black or Hispanic students, but not Asian students, were more likely to have majored in the social sciences compared with White students. In this case, interests only partially accounted for the racial and ethnic differences. This overall pattern is consistent with the literature on vocational interests that has shown that vocational interests influence such choices and that women are more likely to express greater social interests and a preference for working with people (Su, Rounds, & Armstrong, 2009). Given the focus of psychology and one stereotype that psychology is about delivering therapy, this interest difference may account for observed differences.

SES could also be a driver of major choice, especially when related to the practicality of different college majors. The importance of considering potential income and employment may be higher for students coming from a low-SES background (based on factors such as family income and parental education) relative to

students from a high-SES background. Previous research has shown that this is the case, as low-SES students were more likely to choose more majors in more lucrative fields such as STEM and business (Leppel, Williams, & Waldauer, 2001; Ma, 2009; Porter & Umbach, 2006).

Exposure, interest, and career goals

Interest in majoring in psychology may be captured in multiple ways. The most straightforward is simply to ask the following question: “What college major do you intend to declare?” Another is to examine an activity that signals exposure or interest in psychology, such as engagement in AP or International Baccalaureate (IB) courses and exam scores before entering college. At least at the graduate level, subject-specific standardized tests scores have demonstrated arguably the strongest relationships with outcomes such as degree completion of any major admissions variable (Kuncel & Hezlett, 2007). Subject-specific test scores simultaneously reflect both knowledge and interest in the subject domain (Lubinski, 2009).

In 2016, more than 300,000 students worldwide took either the AP Psychology Exam or the IB Psychology Exam (College Board, 2016; International Baccalaureate, 2016). Simply having taken the exam would be expected to act as an indicator of interest and investment, whereas performance on the exam would capture additional interest, investment, and ability in the subject. In addition, high scores on these exams can exempt students from introductory courses, which may make pursuing a degree more attractive.

Interest in psychology may also stem from an interest in the occupational fields possible with an advanced degree (i.e., master’s or doctorate degree) in psychology. In a survey of undergraduate psychology majors, Gallucci (1997) found that interest in psychology as a subject, desire to become a professional psychologist, and belief that a bachelor’s degree in psychology will prepare one for a graduate or professional degree (e.g., PhD, JD) or a future job were influential reasons for majoring in psychology. Likewise, among traditional STEM majors, students who persisted in their chosen majors were more likely to have doctoral-degree goals than those who did not persist (Shaw & Barbuti, 2010). To the extent that students who major in psychology aim to attain a career that requires further advanced education in psychology, the degree goals of students would also be expected to influence their choice to major and to persist in psychology.

Academic preparedness

Important information about a student’s academic background can be obtained from their high school grades

and test scores evaluating foundational verbal and math skills. High school performance and aptitude have long been central characteristics in models of which college a student chooses to attend (Chapman, 1981) as well as the major he or she selects once in college (Maple & Stage, 1991). Considerable research has borne this out (although again with a focus on STEM majors; e.g., Davison et al., 2014; Päßler & Hell, 2012). In addition, relative strengths in verbal and math skills as measured by standardized tests appear to influence major choice such that students are more likely to choose majors that align with their relative strengths (e.g., engineering with math reasoning, English with verbal reasoning; Davison et al., 2014). The “tilt” of a student’s skill profile is related to major choice, and we expect that students entering psychology will tend to be tilted toward relatively stronger verbal skills over math skills despite the field, as a whole, moving toward a heavier emphasis on statistics in research. Most undergraduate psychology programs do not require more than one or two courses that are math-intensive.

College performance

Academic performance is a predictor of major persistence (Allen & Robbins, 2008), and students who perform poorly in their chosen major may switch to a major that they perceive as a better fit. STEM majors are a salient example. On average, students who initially majored in STEM but switched to a non-STEM major had fewer STEM credits, lower grades in STEM courses, and were more likely to have failed or withdrawn from a STEM course (Chen, 2013). In addition, STEM credits, grades, and failure/withdrawal all predicted the likelihood of persisting in STEM.

Another perception that may affect whether students major in psychology is a documented belief that psychology is easy (Halonen, 2011). Although students who switch into psychology from another major may be those who were lower performing among students in their original major, they may not necessarily be among the weakest students in their new major. If their academic performance is greater than that of psychology majors, their entry into psychology would result in driving up the overall standing of psychology majors on academic performance.

Current Study

Although much past research has helped to explain the reasons why college students may or may not ultimately decide to major in psychology, there is perhaps less of an understanding of the characteristics of students who actually end up choosing to major in psychology and how student characteristics in the major may shift over

the course of the typical 4 years of college. Practically speaking, understanding why students choose a particular major would help inform the development of policies to recruit and retain students, but identifying which students actually enter or persist in a major would be necessary for directing such policies toward where they would be most effective.

In support of this goal, we analyzed a large, national, longitudinal data set of college students to examine the individual differences in college students who major in psychology compared with those with a nonpsychology major. In addition, the dynamic aspect of major choice was accounted for by examining persistence, entry, and attrition in psychology majors between students' intended major when applying to college, second-year major, and fourth-year major. Our analyses addressed the following questions:

- What are the broad patterns of movement into and out of psychology? Are most psychology majors students who chose the major early or later?
- How do psychology majors compare to those in traditional STEM fields?
- Do the characteristics of psychology majors that are associated with entering or leaving the major systematically differ by SES or self-reported gender?
- When students leave psychology, what majors do they choose? When students choose psychology, what majors do they leave?
- Who identifies psychology as their intended major before entering college and how do they differ from students who claim other majors?
- What characterizes students who persist with psychology through their second year compared with the general college population, and how do they differ from those who decide to leave psychology to major in something else?
- Likewise, who enters psychology from another major in the second year? That is, how do they differ from students in general as well as the other psychology major groups?
- What is the nature of the same groups of students at the end of the fourth year of college? How do they compare with each other and students in general?

Method

To answer these questions, we analyzed longitudinal data that were collected by the College Board in partnership with 249 college and universities throughout the United States. Schools were identified on the basis

of a sampling plan to obtain a representation by size, region, selectivity, and public/private status. The students sampled began their first year of postsecondary education in the academic years between 2006 and 2011. Of 1,480,368 students at 249 postsecondary institutions that participated in the College Board's data collection, intended-major-choice information was available for 917,459 students, of which 39,361 students chose a psychology major. Major choice information was available for 679,365 second-year college students at 145 institutions; 35,006 chose a psychology major. Major choice information for fourth-year college students was available for 349,513 students at 78 institutions; 18,604 chose a psychology major. Changes in the number of institutions with data at each time point reflected the net entry and dropout of institutions participating in the College Board's data collection. Data were collected on preentry academic preparedness, demographics, exposure and investment in psychology, and college performance variables. Specific variable information is presented in Appendix A, further explanation of the analysis method is presented in Appendix B, and descriptive statistics for all study variables by psychology and nonpsychology majors are provided in Appendix C.

Because the sample sizes are sufficiently large enough that nearly any difference is statistically significant, the figures and tables focus on describing effect sizes. When examining mean differences between groups, Cohen's d values of 0.20, 0.50, and 0.80 are conventionally considered small, medium, and large effect sizes, respectively (Cohen, 1988). Given that the results can reasonably be said to speak to the field as a whole, even small effects should be taken seriously because of their implications for tens of thousands of college students in psychology majors.

Results

Overall trends across majors

Most students majoring in psychology did not identify the field as their intended major before entering college (see Table 1). In addition, the majority of students who initially identified psychology as their intended major ultimately chose something else. Between the intended and second-year major choices, 15,999 students entered psychology, whereas 11,460 students left. This was a 24.5% gain over the number of students who persisted in the field from preentry into college to the second year (7,067).

Students who entered psychology (i.e., did not intend to major in psychology but declared the major by the second year) frequently had intended to major

Table 1. Frequencies for Persist, Leave, and Enter Groups Between Intended Major to Second-Year Major and Second-Year to Fourth-Year Major

Major category	Intended major to second-year major				Second-year major to fourth-year major			
	Leave psychology		Enter psychology		Leave psychology		Enter psychology	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Agriculture and natural resources	163	1	75	0	15	1	25	1
Architecture	19	0	204	1	4	0	7	0
Area/ethnic/group studies	92	1	27	0	28	1	3	0
Arts	495	4	1,024	6	281	13	81	3
Biological sciences	740	6	1,518	9	181	8	428	13
Business	1,280	11	1,164	7	130	6	139	4
Communications	810	7	613	4	90	4	72	2
Computer sciences	206	2	150	1	22	1	297	9
Education	748	7	1,303	8	132	6	187	6
Engineering	192	2	536	3	30	1	65	2
English language and literature	568	5	343	2	70	3	79	2
Family and consumer sciences	348	3	73	0	60	3	69	2
Foreign languages and literature	214	2	143	1	48	2	60	2
Health professions	915	8	4,658	29	133	6	251	8
History	178	2	150	1	39	2	17	1
Interdisciplinary	400	3	63	0	86	4	140	4
Law and public affairs	1,014	9	1,179	7	201	9	99	3
Math and statistics	92	1	102	1	11	1	25	1
Philosophy and theology	172	2	116	1	47	2	15	0
Physical sciences	158	1	232	1	27	1	74	2
Psychology (persist)	—	—	7,067	100	—	—	10,636	100
Social Sciences	1,312	11	428	3	308	14	136	4
Other	701	6	511	3	129	6	753	23
Undeclared	643	6	1,387	9	62	3	183	6

Note: The persist group includes only students who chose psychology at both time points; the leave-group students are identified with the majors for which they left psychology, and the enter-group students are identified with the majors from which they entered psychology.

in health professions, the biological sciences, education, business, law and public affairs, and the arts. Students who left psychology (i.e., intended to major in psychology but did not choose a psychology major by their second year) largely ended up majoring in business, the social sciences, and law and public affairs.

This pattern repeated itself between the second-year and fourth-year major choices, with a 10.07% net gain in the number of students in the major. Students who entered psychology (i.e., did not choose a psychology major by their second year but did choose a psychology major by their fourth year) frequently came from biological sciences, computer sciences, health professions, and education majors. Students who left psychology (i.e., majored in psychology by their second year but switched to a nonpsychology major by their fourth year) largely ended up in the social sciences, the arts,

law and public affairs, the biological sciences, business, and education. Demographically, across all three time points there were proportionally more female students in psychology majors than nonpsychology majors and a higher proportion of Black and Hispanic students but fewer Asian students. Psychology majors also tended to have a somewhat lower SES than nonpsychology majors.

From these results, there does appear to be a trend for psychology students to be more diverse than the college-going population in general. In addition, psychology does appear to attract students from majors traditionally viewed as more difficult or intensive (e.g., health profession and STEM majors). However, their original intended major is arguably less important than who they are and what academic skills they bring to the field. We examine each of these next.

Who persists, leaves, or enters psychology?

Students who choose to major in psychology before college and persist with it tend to be comparable with most college students on verbal reasoning and writing skills but have slightly lower high school GPA (HSGPA) and an even larger gap in SAT math scores (see Fig. 1). Psychology students are also much more likely to have taken the AP Psychology Exam and to have earned a better score on the exam. Persisting psychology majors are also more likely to be Black, Hispanic, or from a low-SES family compared with those entering or leaving the field and compared with college students in general.

Students who intended to major in psychology but switched to another field do not differ much from persisting students on most variables except whether they had taken the AP Psychology Exam at all and the score they earned on it. Interestingly, students who leave psychology tend to have scored worse on the AP Psychology Exam than the average college student, including those who had expressed no interest in psychology as a major. Perhaps the exam was telling them something.

In contrast, students entering the psychology field tend to be academically stronger students pretty much across the board. They have stronger verbal, writing, and math scores on the SAT than those who persisted in psychology. They also earned better HSGPAs and AP Psychology Exam scores. They are, in fact, stronger than the average college student on all of these variables except for the SAT math test, where they tend to score better than the persisting psychology majors but are worse than the average for college students. They are also more likely to have earned a psychology-course exemption than the average student. They do not, however, stand out on psychology-course exemptions compared with those in the persist group or leave group.

All groups—persist, enter, and leave—had very similar college GPAs in their first and second years, but those who leave earned slightly lower grades. It is worth noting that all three groups had higher GPAs, on average, than the average college GPA. Although encouraging, it is worth keeping in mind that some fields tend to have, on average, harsher grading (Johnson, 2006), and some of the small observed differences may be a consequence of that.

Although it is not possible to establish a causal relationship, there does appear to be a consistent effect that *any* engagement with psychology as a major, be it persisting, entering, or leaving, is associated with having taken the AP Psychology Exam and having earned a psychology-course exemption. All three groups were much more likely to have done so than students in other majors between entry into college and the second year; persisting students had the highest proportion of having taken the AP Psychology Exam before college.

Comparisons with STEM majors

Figure 2 presents comparisons between the three psychology major-choice status groups and STEM majors. Much like the patterns for students overall, students who enter psychology from STEM fields are more likely to have taken AP psychology and tend to have scored better on it than their STEM peers. On average, psychology majors score worse on academic preparation variables (SAT and HSGPA). Students leaving psychology for a STEM major tend to have better academic preparation than those entering from STEM, who in turn tend to have better academic preparation than those who persist in psychology. Although these gaps exist for verbal, writing, and quantitative skills, they are especially apparent for quantitative skills, where the largest difference between psychology persisters and STEM majors approaches a standard deviation in size. In later college performance (third- and fourth-year college GPA), students who persist in psychology have higher college GPAs than those who enter from STEM or leave for STEM, which is similar to the average STEM student. In terms of subgroup demographics, the gender and racial/ethnic proportions of students who enter from STEM or leave for STEM are about the same within each subgroup.

Comparisons by gender and SES

Analyses are further broken down to examine whether any of the observed trends differ by gender (male vs. female; Fig. 3) or SES (median split; Fig. 4). Overall, the pattern of results is the same for both male vs. female and high- vs. low-SES comparisons, and this pattern also reflects the patterns observed in the overall analyses.

Discussion

Academic performance

Overall, the results paint a mixed picture for the field. Before college begins, psychology attracts students who have been exposed to the field and have done well. These students tend to be somewhat more diverse than other groups and tend to perform reasonably well on indicators of academic preparedness (with the exception of math). By the second year, the field has drawn in students from other majors who are generally above average in academic performance, although not extraordinarily so. After that, the field appears to get a second wave of students who are not doing well in college and who entered college with weaker verbal and mathematical reasoning skills. The difference in academic skills is especially large when we shift from considering the general student body and focus on STEM majors.

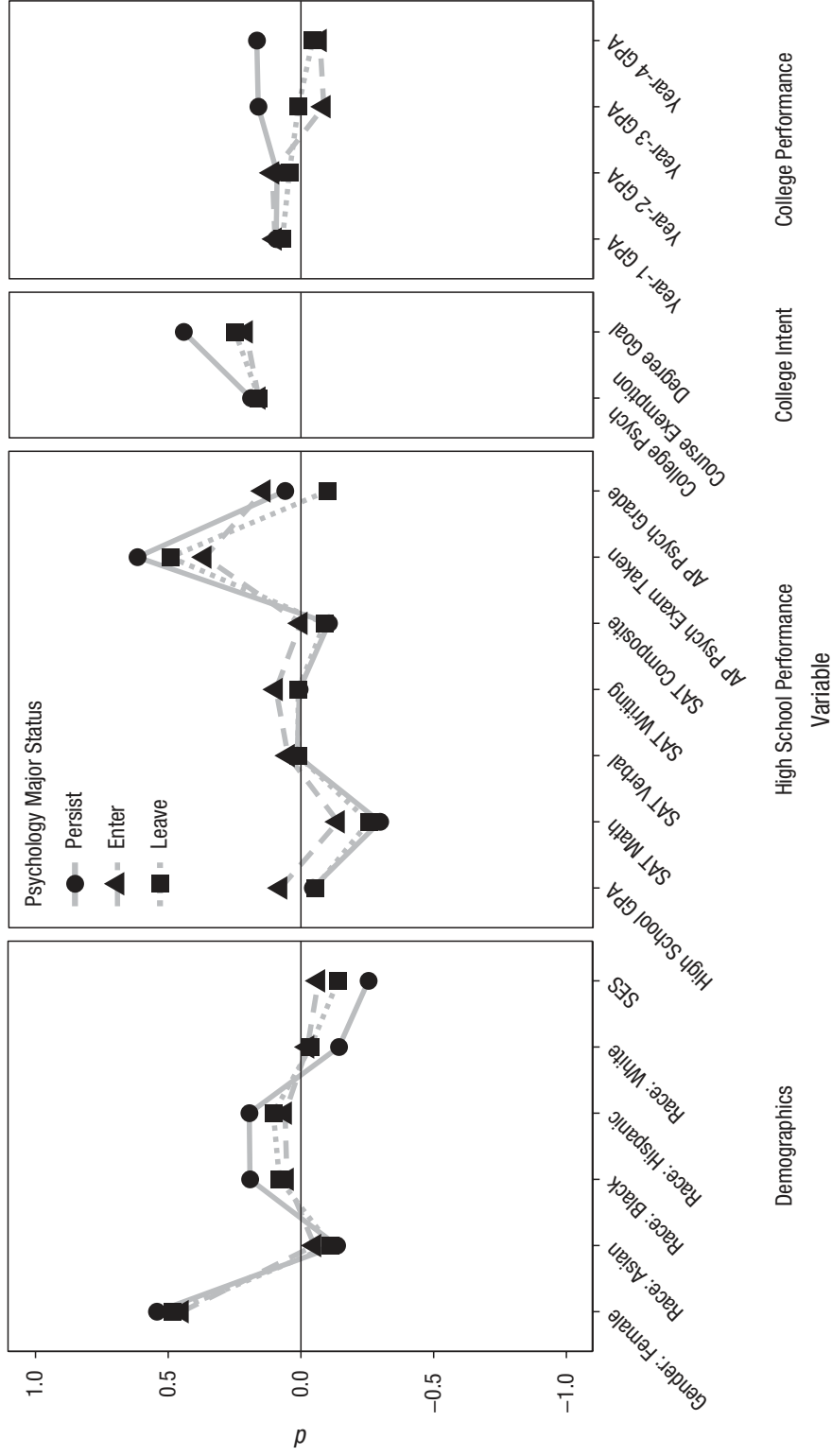


Fig. 1. Comparison of psychology persist, enter, and leave groups with the general college population. Cohen's d was calculated for the difference between all college students (horizontal line) and students who persisted in psychology (persist group), students who entered psychology from a different major (enter group), and students in psychology who left for a different major (leave group). Grade point average (GPA) statistics for third- and fourth-year college students were computed in the second- to fourth-year major-choice analysis sample. All other statistics were computed in the intended to second-year major-choice analysis sample. Values greater than zero indicate a group mean greater than the mean of all college students. Values less than zero indicate a group mean less than the mean of all college students. "Race: Asian" includes Asians and Pacific Islanders. SES = socioeconomic status.

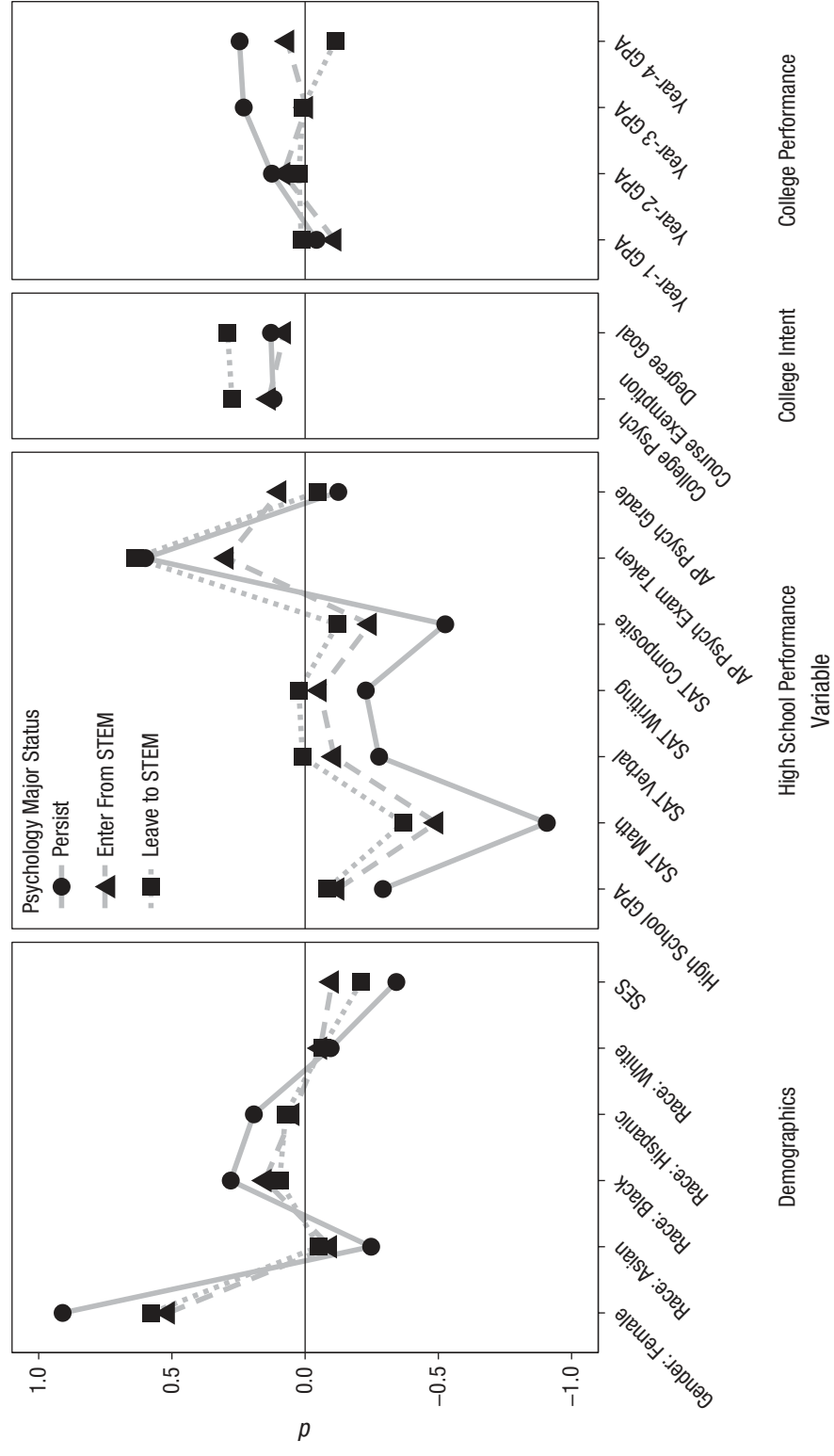


Fig. 2. Comparison of psychology persist, enter-from-STEM, and leave-to-STEM groups with science, technical, engineering, and math (STEM) majors. Cohen's d was calculated for the difference between all STEM majors (horizontal line) and students who persisted in psychology (persist group), students who entered psychology from a STEM major (enter-from-STEM group), and students in psychology who left for a STEM major (leave-to-STEM group). Grade point average (GPA) statistics for third- and fourth-year college students were computed in the second- to fourth-year major-choice analysis sample. All other statistics were computed in the intended to second-year major-choice analysis sample. Values greater than zero indicate a group mean greater than the mean of STEM majors. Values less than zero indicate a group mean less than the mean of STEM majors. "Race: Asian" includes Asians and Pacific Islanders. SES = socioeconomic status.

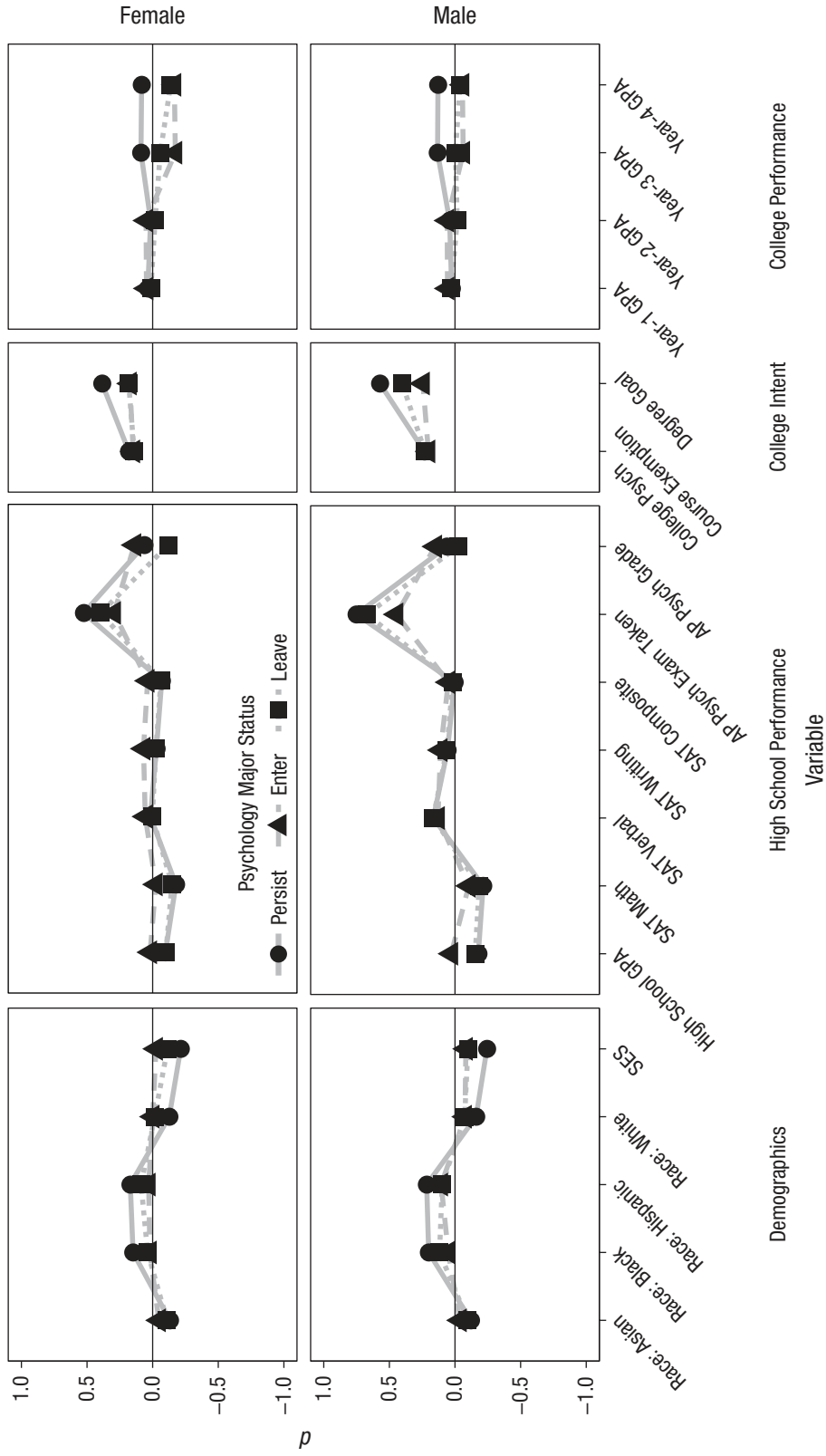


Fig. 3. Comparison of psychology persist, enter, and leave groups with the college population, divided by gender. Cohen's d was calculated for the difference between all college students according to gender (horizontal lines; female, top panel; male, bottom panel) and students who persisted in psychology (persist group), students who entered psychology from a different major (enter group), and students in psychology who left for a different major (leave group). Grade point average (GPA) statistics for third- and fourth-year college students were computed in the second- to fourth-year major-choice analysis sample. All other statistics were computed in the intended to second-year major-choice analysis sample. Values greater than zero indicate a group mean greater than the mean of all college students by gender. Values less than zero indicate a group mean less than the mean of all college students by gender. "Race: Asian" includes Asians and Pacific Islanders. SES = socioeconomic status.

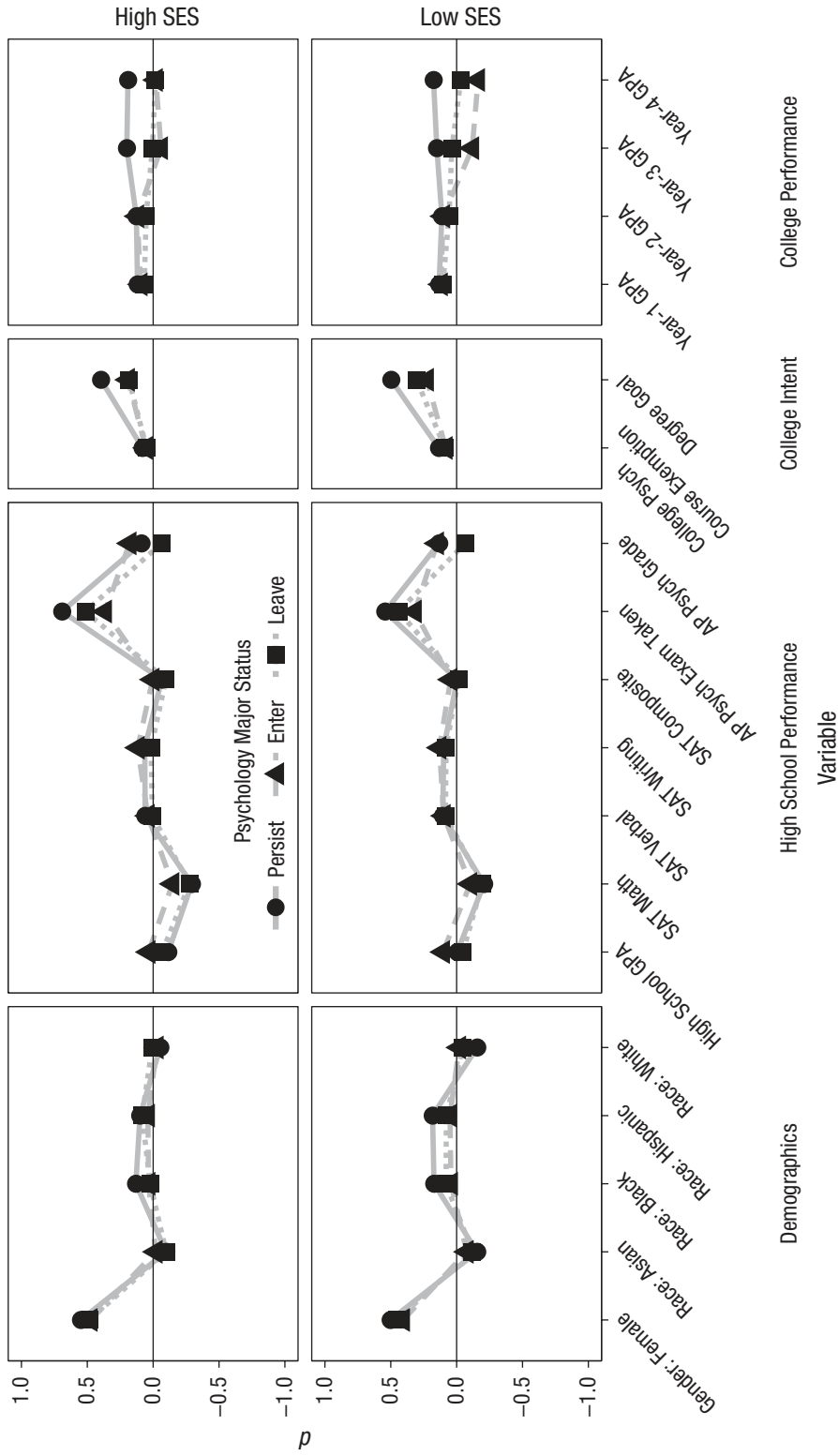


Fig. 4. Comparison of psychology persist, enter, and leave groups with the college population, divided by high and low socioeconomic status (SES; median split). Cohen's *d* was calculated for the difference between all college students (horizontal lines; high SES, top panel; low SES, bottom panel) and students who persisted in psychology (persist group), students who entered psychology from a different major (enter group), and students in psychology who left for a different major (leave group). Grade point average (GPA) statistics for third- and fourth-year college students were computed in the second- to fourth-year major-choice analysis sample. All other statistics were computed in the intended to second-year major-choice analysis sample. Values greater than zero indicate a group mean greater than the mean of all college students by SES. Values less than zero indicate a group mean less than the mean of all college students by SES. "Race: Asian" includes Asians and Pacific Islanders.

Psychology students, on average, have markedly lower quantitative, verbal, and writing skills and high school grades than STEM majors. Although the effect is comparatively small, psychology majors score slightly lower even on the AP Psychology Exam than those STEM majors who also took the exam. Although there is considerable variability in both groups, to the extent that psychology is moving toward a greater reliance on complex methods and statistics, these data suggest that the talent pool could be stronger.

Psychology is the science and study of human behavior, but it has historically been inconsistently recognized as a STEM discipline in part because of general perceptions that psychology is a helping profession with an emphasis on clinical judgment (American Psychological Association, 2010). The importance of scientific research and quantitative methods in our field has been understated in the eyes of the general public. Participation in undergraduate psychology research has been shown to be moderately correlated with test scores and graduate school attendance (Stoloff, Good, Smith, & Brewster, 2015). Many psychology students have low interest in psychology research (Vittengl et al., 2004) and prefer the human-interest courses more related to psychology as a helping profession than statistical and research methodology courses related to psychology as a science (Rajecki, Appleby, Williams, Johnson, & Jeschke, 2005). Consequently, the quantitative skills of psychology majors tend to be below those of the average college student and far below those of the average STEM major. There are at least two general recommendations for addressing this: (a) better market psychology as a science and inform interested students about the importance of quantitative skills in psychology and (b) provide additional support and resources to improve the quantitative skills of students who are weaker in this area.

Overall, psychology has neither a high barrier to entry nor long sequences of courses, and late movement into the field aligns with the perception that psychology is easy (Halonen, 2011). The results suggest that psychology does indeed act as a backup major for some students who are struggling academically. Creating barriers to these students (e.g., more prerequisites, more statistics, and more psychometrics) would likely reduce the number of students majoring in psychology. The implications for the health of psychology programs and the field in general would depend on our goals. An academically stronger group of students may permit the creation of more advanced coursework and shift perceptions over time. At the same time, a practical disadvantage is that many colleges consider the number of students in each major field of study when allocating resources. Creating barriers to entering psychology may

reduce a department's resources within a college. In all cases, the results are important to consider.

Vocational interests and career goals

In addition to ability, another key driver of educational choices such as major choice is educational or vocational interests (Lubinski, 2010). Past research has demonstrated that females are expected to have stronger social interests and desires to work with people (Su et al., 2009), which are interests in line with the nature of the psychology field. Subject-specific participation and performance have also been previously found to be related to ability and interests in the subject (Lubinski, 2009) and to predict further subject-specific persistence (Kuncel & Hezlett, 2007). Although interests in psychology are not directly captured by the data available for the current study, results for gender and subject-specific (i.e., AP psychology) participation and grades are consistent with what would be hypothesized on the basis of prior research with the caveat that the conclusions drawn here should be considered purely correlational given the lack of a direct measure of interests in the current study.

We think clarifying career opportunities and paths for students is important. Shifting interests in psychology as a result of occupational goals may also be rooted in misconceptions about such careers. In a comparison of college students who had not completed any psychology courses versus those who had completed at least three, students with psychology course experience demonstrated a more accurate conceptualization of psychology careers (Rosenthal, Soper, Rachal, McKnight, & Price, 2004).

Worryingly, Gallucci (1997) also reported that undergraduate students tended to rate employment prospects, salary, job autonomy, and job security in psychology more favorably than ratings from recent recipients of doctoral degrees in psychology. Compared with other majors, the average employment rate and salary of recent psychology graduates is low (Carnevale & Cheah, 2015). This has manifested into negative stereotypes about psychology, such as beliefs that the degree is not useful and that psychology graduates cannot obtain jobs with a high salary. Psychology students tended not to agree with stereotypes about the psychology field or degree, but they did exhibit neutral or slight agreement with the salary stereotypes (Brinthaup, Counts, & Hurst, 2012). As students learn more about the realities involved in achieving their career goals in psychology or if they are affected by these negative stereotypes, it is possible that they may decide to no longer pursue a degree in psychology. As is observed in the workforce, people are likely to gravitate to

positions commensurate with their abilities (e.g., Wilk, Desmarais, & Sackett, 1995), as would be the case given differences in skill level and earnings across different disciplines as well as across subdisciplines in psychology.

However, although past research has demonstrated that lower SES students are more likely than higher SES students to choose majors in more lucrative fields such as STEM and business (Leppel et al., 2001; Ma, 2009; Porter & Umbach, 2006), we found a larger proportion of lower SES students (compared with higher SES students) in psychology than in the overall college or STEM groups. In this case, it is possible that SES is not a main driver of whether students would choose to major in psychology. In addition, if students have information about lucrative subfields within psychology, they may be more likely to stay and be more effectively prepared for those subfields. Further research would be called for to improve our understanding of degree and career goals within psychology beyond the simple degree goal analysis possible in the current study.

The investigation into possible differences between high- and low-SES students and genders revealed relatively few differences in terms of the overall pattern. That is, although there tends to be a higher proportion of female students and lower SES students in psychology than male and higher SES students, neither gender nor SES appears to have an effect with respect to academic preparation, college goals, or college performance variables. Past research has shown that SES is weakly positively related to academic performance (Sackett, Kuncel, Arneson, Cooper, & Waters, 2009; Westrick, Le, Robbins, Radunzel, & Schmidt, 2015) and that females tend to perform better academically than males (Conger & Long, 2010). However, Conger and Long (2009) also noted that some of the gender performance gap could be attributed to differences in course taking and major selection; male students often take courses or majors characterized by lower average college GPAs. In such a case, a comparison by gender within psychology would restrict the possible differences in course taking, providing at least a partial explanation for why the lack of subgroup differences are observed.

Limitations

It should be noted that psychology-major choice exists within a broader system of choices among all college majors. The decision students make about whether to enter, leave, or persist in psychology is dependent not only on students' interests, abilities, or beliefs about psychology but also on the other majors involved in their major-choice considerations. A limitation of the data used in the current study is that transfer students

who entered a given college in the second year or later are not included. Therefore, these findings reflect major choice for students who entered a given college in the first year (i.e., as freshmen), and we do not draw conclusions beyond this subset of college students.

Another limitation that warrants consideration is that even though an archival data set provides a wealth of information, it does limit analyses to what is available in the data. These analyses were conducted with the caveat that some results may likely not be fully understood without further research. However, we believe that it is more beneficial to the development of our field to have conducted these analyses and presented these findings than to not have done so at all. Although our results are largely descriptive, we have provided a number of hypotheses about why certain patterns were observed. These findings can hopefully serve as a basis for continued research into the educational pipeline of our field.

Conclusions

It is clear that the composition of student characteristics in psychology majors is affected by students entering and leaving the major and that these patterns shift over the 4 years of college. The current study provides a comprehensive examination of individual differences in psychology majors, nonpsychology majors, and students who persist, enter, or leave psychology, and a number of mechanisms have been discussed to explain why certain student characteristics are more likely to be observed in psychology-major choice. Our results suggest that interest and ability in psychology may motivate students to major in psychology. However, better-performing students may eventually leave for majors that represent more lucrative or stable careers, such as STEM majors. Although further research will be needed to examine the extent to which these mechanisms contribute to psychology-major choice, these results suggest that psychology programs and the field of psychology as a whole need to address the real possibility that although some of the brightest minds may initially have been interested in psychology, a number of factors may eventually turn them away.

Appendix A: Study Variables

Demographics. For gender, students were categorized as either male or female on the basis of demographic questionnaire information. For race/ethnicity, students were categorized as Asian/Pacific Islander, Black, Hispanic, White, or other minority. For the subset of students with at least intended-major-choice information available, 54.83% of the students were female. American Indian

students were grouped with the other-minority category because of low sample size. Asians/Pacific Islanders represented 10.57% of the sample, 8.47% were Black, 9.79% were Hispanic, 680.01% were White, and 3.17% identified as other minority.

Major choice. College major choice was examined at three points: intended major at the time students took the SAT, second-year college major, and fourth-year college major. This captured major-choice intentions, initial major, and major at (or near) graduation. Fourth-year major was used instead of actual graduation major because of sample-size concerns and because few changes occur after the fourth year. At each point, majors were categorized into 1 of 22 major categories on the basis of the Classification of Instructional Programs coding scheme (National Center for Education Statistics, 2002).

High school GPA (HSGPA). Colleges reported HSGPA for their students on the basis of their own calculations from students' high school transcripts.

SAT scores. SAT scores on the three sections—Reading, Writing and Language, and Math—were analyzed as separate variables. A composite SAT score for each student was also computed by summing their three scores.

AP psychology. AP Psychology Exam grades were examined for (a) students who had these grades reported and (b) as a dummy-coded variable, where 0 = *student did not take the AP Psychology Exam* and 1 = *student did take the AP Psychology Exam*.

Psychology course exemption. At the time they took the SAT, students indicated whether they intended to apply for exemption from one or more psychology courses. This variable was dummy coded as 0 = *did not intend* and 1 = *intended to apply for exemption*.

College grade point average (GPA). Colleges reported GPA for their students at the end of each academic year. GPAs for first- and second-year college students were examined for all students in the sample, whereas GPAs for third- and fourth-year college students were examined for the subset of the sample for which these data were available.

Degree goal. At the time they took the SAT, students indicated the highest level of education beyond high school that they intended to complete. This was coded according to the number of years of postsecondary education typically required to attain the degree, ranging from 1 for a specialized training or certificate program to 9 for a doctoral-level degree.

Socioeconomic status (SES). At the time they took the SAT, students reported their father's education, mother's education, and parental income. Parental income was converted to its natural logarithm. These data were combined into a standardized composite SES score corrected to the national SAT-taking population using a method described by Sackett et al. (2009).

Appendix B: Method

Using a large, national, longitudinal data set of U.S. college students, individual differences in college students who major in psychology were compared with those with a nonpsychology major. In addition, the dynamic aspect of major choice was accounted for by examining persistence, entry, and attrition in psychology majors between students' intended, initial, and final majors. Ultimately, identifying student characteristics common to psychology can improve our understanding of the reasons students major in psychology and can help to inform policy planning in undergraduate psychology education.

Students' major choices were grouped into higher level categories as described in Appendix A. Other majors and undeclared majors were included as additional categories. Because of low within-major sample sizes, the library sciences, military sciences, and vocational majors were rolled into the "other" category. Liberal arts majors were also included in the "other" category because of the broad nature of this category. In addition, given contemporary interest in scientific, technical, engineering, and math (STEM) majors, any STEM major that was not selected for further analysis was grouped into an "other STEM" category and then included in this analysis. Students were considered to have selected a STEM major if they chose a major in any one of the following major categories: biological sciences, computer sciences, engineering, math and statistics, and physical sciences.

Analyses of psychology major-choice stability or change were made on the basis of two comparisons of Time 1 and Time 2: intended major versus second-year major and second-year major versus fourth-year major. Identical analytical procedures were applied to both comparisons. For these comparisons, students were categorized into three groups (listed in parentheses): those who chose a psychology major at both Time 1 and Time 2 (persist group), those who chose a nonpsychology major at Time 1 and a psychology major at Time 2 (enter group), and those who chose a psychology major at Time 1 and a nonpsychology major at Time 2 (leave group). For each analysis, only students with data at both time points were retained for analysis. Descriptive statistics and Cohen's *d* were computed for all study variables to quantify differences between each group at each time point of comparison. Overall patterns of results were similar between the intended versus second-year major and second-year versus fourth-year major analyses. Therefore, to consolidate and simplify our findings, the figures present results only from the intended versus second-year major analysis given that it provides the maximal sample size and is more proximal to the academic preparedness variables in the analysis (SAT and HSGPA), with the exception of third- and fourth-year college GPA results, which are obtained only from the second- versus fourth-year major analysis.

Appendix C: Sample Statistics

Table C1. Descriptive Statistics for Continuous Variables for All Psychology and Nonpsychology Majors

Variable	Intended major						Second-year major						Fourth-year major					
	Psychology			Nonpsychology			Psychology			Nonpsychology			Psychology			Nonpsychology		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
SAT verbal	39,054	551	91	876,880	555	95	28,492	560	89	508,863	560	94	14,774	564	89	264,936	563	94
SAT math	39,054	540	92	876,880	573	97	28,492	557	91	508,863	580	96	14,774	564	91	264,936	583	94
SAT writing	38,991	544	92	874,992	548	96	28,452	557	92	508,160	553	95	14,743	562	91	264,207	557	94
SAT composite	38,991	1,636	247	874,992	1,677	258	28,452	1,676	245	508,160	1,694	255	14,743	1,691	244	264,207	1,704	252
AP psych grade	9,109	3.42	1.31	88,354	3.45	1.32	7,252	3.64	1.26	65,291	3.43	1.32	3,234	3.70	1.23	28,446	3.43	1.31
High school GPA	21,588	3.42	0.49	450,214	3.50	0.47	16,535	3.48	0.51	284,995	3.50	0.49	6,794	3.50	0.44	122,209	3.52	0.45
SES	38,090	-0.11	1.01	855,938	0.08	0.96	26,898	0.01	0.99	482,516	0.11	0.95	13,627	0.14	0.99	245,817	0.21	0.94
Degree goal	31,831	7.01	1.97	715,279	6.34	2.00	21,467	6.84	2.04	387,780	6.31	2.00	10,434	6.93	2.00	192,121	6.36	1.98
First-year college GPA	—	—	—	—	—	—	34,558	3.04	0.66	636,250	3.04	0.69	—	—	—	—	—	—
Second-year college GPA	—	—	—	—	—	—	32,712	3.10	0.70	596,795	3.05	0.72	—	—	—	—	—	—
Third-year college GPA	—	—	—	—	—	—	—	—	—	—	—	—	16,540	3.19	0.67	287,382	3.14	0.67
Fourth-year college GPA	—	—	—	—	—	—	—	—	—	—	—	—	16,034	3.28	0.68	279,070	3.22	0.68

Note: SES = socioeconomic status.

Table C2. Descriptive Statistics for Categorical Variables for All Psychology and Nonpsychology Majors

Variable	Intended major			Second-year major			Fourth-year major					
	Psychology		Nonpsychology	Psychology		Nonpsychology	Psychology		Nonpsychology			
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%		
Gender: Female	31,089	79	476,254	54	26,858	77	345,217	54	13,845	74	173,703	52
Race: Asian ^a	2,798	07	92,472	11	2,279	08	48,498	10	1,211	08	25,010	10
Race: Black	4,979	13	71,709	08	2,696	10	35,248	07	1,217	09	15,975	06
Race: Hispanic	5,002	13	83,606	10	3,288	12	47,855	10	1,536	11	23,707	09
Race: White	24,328	63	590,007	68	18,739	67	352,854	71	9,794	69	183,914	72
College psych course exemption	12,973	33	291,290	33	9,334	27	167,864	26	4,516	24	82,931	25
Taken AP psych exam	9,109	23	88,354	10	7,252	21	65,291	10	3,234	17	28,446	09

^aThis category includes Asian and Pacific Islander.

Transparency

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