

Methodology and Research Practice

# How Common Is Undergraduate Publication in Psychology? An Examination of Faculty Vitae From Top Colleges and Universities

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Despite extensive research on the benefits of faculty-undergraduate collaborative research, little is known about the outcomes of such collaborations, such as coauthored publication in peer-reviewed journals. To address this gap, we analyzed faculty curricula vitae from 60 top U.S. institutions (20 primarily undergraduate, 20 masters-granting, and 20 research-intensive) to obtain estimates of the prevalence of faculty-undergraduate coauthored publication in psychology. We sent email requests to 8 randomly-selected faculty members from each psychology department in this top 60 (or to the whole department if they had fewer than 8 members). In total, 157 of 459 faculty contacted (34.2%) responded with their full vita. Our results revealed that a substantial majority of faculty (83.4%) had coauthored at least one paper with an undergraduate, with an average of 7.5 coauthored publications (approximately 2 of which were first authored by an undergraduate). Moreover, these publications involved an average of 12.6 undergraduate coauthors (typically in the 2nd or 3rd author position) and accounted for almost 20% of faculty members' total publications. We also found that, even controlling for overall productivity, faculty of higher rank and those at primarily undergraduate institutions generally coauthored more undergraduate publications compared to faculty of lower rank and/or at masters-granting and especially research-intensive universities. Finally, an analysis of publication trends over time showed that undergraduate publication is becoming increasingly common in psychology, and that faculty are publishing with undergraduates earlier in their careers. We hope our findings inspire more faculty to publish with their undergraduate students.

For many faculty, attempting to publish with an undergraduate may seem a little like opening Pandora's Box. Upon opening her "never to open" gift from Zeus, a curious Pandora unleashed a torrent of misery onto the world, while hope was stuck under the lid. For curious faculty who decide to publish with undergraduates, there are certainly some hurdles and barriers that can make the process challenging. Nevertheless, hope springs eternal: Unlike Pandora's unauthorized box opening, faculty who open the undergraduate-publication box unleash many positive outcomes—for students, faculty, and institutions alike.

The most obvious beneficiaries of faculty-undergraduate research collaboration are students, who gain important skills, an appreciation for science, and graduate school and career preparation (Nolan et al., 2020). Undergraduate research has been shown to improve students' skills in all phases of the research process, from developing research ideas to conducting statistical analyses and interpreting data to communicating results in writing (Lopatto, 2004).

More generally, students develop critical thinking (Lei & Chuang, 2009) and communication skills (Denofrio et al., 2007; Hunter et al., 2007), problem-solving capacity (Nolan et al., 2020), self-confidence (Adedokun et al., 2013; Lopatto, 2004), and the ability to overcome challenges (Bauer & Bennett, 2003; Morales et al., 2017; Nolan et al., 2020). Undergraduate research experiences also have downstream effects: Participating students are more likely to pursue post-graduate education (Bauer & Bennett, 2003; Eagan et al., 2013; Nolan et al., 2020) and to be accepted into graduate programs (Davis & Warfield, 2011). For students entering post-graduate careers, those with collaborative research experience report being more likely to enter an occupation relevant to their degree and coursework (Bauer & Bennett, 2003) and note that their research experience played an important role in attaining their current job (Nolan et al., 2020). Importantly, the impact of faculty-undergraduate collaboration has been shown to be even stronger for students from traditionally underrepresented

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groups (Kinzie et al., 2008; O'Donnell et al., 2015; Slovacek et al., 2012).

Although the most salient advantages of undergraduate research are for the participating students (Lopatto, 2010), faculty who mentor undergraduate research reap benefits as well. Research consistently shows that the majority of faculty who mentor undergraduate research genuinely enjoy the experience (Potter et al., 2009; Shortlidge et al., 2016), including helping undergraduates develop into scholars (Chopin, 2002). Such collaborations can also help advance faculty members' teaching goals and research agenda when capitalizing on the synergistic relationship between the two (Elgren & Hensel, 2006; Nolan et al., 2020; Shortlidge et al., 2016). Indeed, a recent study of faculty in statistics who mentored undergraduate research reported that the collaborations promoted their teaching growth and advanced their own scholarship, in addition to providing valuable service to the university (Nolan et al., 2020).

Institutions also benefit from undergraduate research. In particular, both recruitment and retention have been shown to be positively correlated with undergraduate research experiences (Lopatto, 2004). As one example of a recruitment advantage, an increased number of students turned down more traditionally prestigious schools in favor of Texas Tech University after it launched a successful grant-funded undergraduate research program in biology (Blanton, 2008). Other studies have shown that students who participate in undergraduate research tend to be more engaged in their university community (Bauer & Bennett, 2003), which has been associated with higher retention rates and academic performance (Barclay et al., 2018), a "win" for both the university and the student.

Although there is a large body of research examining the benefits of faculty-undergraduate research collaboration (e.g., Nolan et al., 2020), far less is known about the professional outcomes of such collaborations, such as coauthored publication in peer-reviewed journals. Two studies outside of psychology have empirically investigated this question. One study demonstrated that approximately 10% of the papers produced by faculty at the top 10 universities in clinical medicine and pharmacy were coauthored by undergraduates (Gouda et al., 2016). A second found that, over a 10-year period, 15% of faculty-undergraduate collaborative research projects in chemistry and physics resulted in peer-reviewed publications (Mellis et al., 2018).

A more recent study in the field of psychology explored a variety of institutional and faculty predictors of coauthored undergraduate journal publications and conference presentations. Giuliano et al. (2022) surveyed a convenience sample of 244 faculty with experience conducting undergraduate research and found that these faculty had an average of 5 journal publications with undergraduates (1.5 of which had an undergraduate as first author); they also coauthored

an average of 2.8 conference presentations per year (1.69 of which had an undergraduate as first author). Interestingly, faculty at primarily undergraduate institutions were more likely to publish journal articles with undergraduates, whereas faculty at graduate-serving institutions were more likely to coauthor conference presentations with undergraduates. Moreover, both institutional and faculty factors predicted undergraduate publications—faculty at institutions with higher selectivity, more support for faculty-undergraduate research, and lower course loads produced higher numbers of undergraduate publications. Undergraduate publication was also more likely with faculty who were of higher rank, who had close collaborative relationships with undergraduates, and who perceived their undergraduates as high quality and well-trained. Although Giuliano et al.'s (2022) findings shed light on the predictors of faculty-undergraduate coauthored outcomes in psychology, they used a convenience sample of faculty highly invested in conducting research with undergraduates, and numbers of publications were self-reported. As such, little is known about the general prevalence of publishing with undergraduates in psychology and even less is known about whether the prevalence of publishing with undergraduates is changing over time (e.g., becoming more common).

## The Present Work: Overview and Predictions

The current study sought to provide a potential estimate for base rates of faculty-undergraduate coauthored publication in psychology, to measure faculty predictors of undergraduate-coauthored publication, and to understand trends in publishing with undergraduates over time. Because institution type had been shown to predict outcomes of faculty-undergraduate collaboration (Giuliano et al., 2022), we targeted faculty across three different institution types (based on *Carnegie Classifications*, 2018): primarily undergraduate institutions (PUIs), masters-granting institutions ("Masters"), and research-intensive universities (R1s). We were interested in obtaining the highest potential base rates for undergraduate publication in our field from faculty who publish regularly—and who presumably have the opportunity to publish with undergraduates. As such, we selected faculty from the Top 20 PUI, Masters, and R1 institutions (as ranked by US News & World Report, 2021<sup>1</sup>) as these faculty are likely to be among the highest in overall scholarly productivity in their respective school categories.

Based on Giuliano et al. (2022), we expected that faculty at PUIs would be the most likely to have published with undergraduates (overall, as coauthors, and as first authors), and that more senior faculty would be more likely than junior faculty to have published with undergraduates (in general, as coauthors, and as first authors). We also evaluated the role of psychology subdiscipline and the type of undergraduate institution faculty attended as potential

<sup>1</sup> It should be acknowledged that the US News and World Report rankings are not without controversy, given the heavy influence of name recognition and potential for inaccurate reporting.

exploratory predictors of coauthored undergraduate publication. Finally, we explored whether the frequency of publishing with undergraduates has changed over time. We expected that publishing with undergraduates is increasing over time and that scholars are publishing with undergraduates sooner in their careers.

## Method

### Participants and Procedure

We initially attempted to pull faculty vitae online from department websites, but we found that vitae were often missing, incomplete, not updated, and/or did not designate undergraduate coauthors. Thus, we decided to contact faculty directly to ask for their vitae.<sup>2</sup> In April of 2021, we emailed 459 tenured/tenure-track faculty members from the psychology departments at the Top 20 PUI, Masters, and R1 schools (a full list of schools and numbers of participants at each appears in the online appendix; see [https://osf.io/fm2es/?view\\_only=1ea2424ab-dea4e0a8e73d36b0f21311d](https://osf.io/fm2es/?view_only=1ea2424ab-dea4e0a8e73d36b0f21311d)). From department websites, we created lists of all tenure-track or tenured faculty at each school. From that list, we contacted either a random sample of 8 members of the faculty or, if the department had fewer than 8 faculty, all of the members of the department.<sup>3</sup>

In our email, we explained that we were contacting a sample of psychology faculty at top schools to determine the typical frequency of publication with undergraduates as well as publication rates by area of psychology. We asked faculty members to reply to our email with their most recent vita attached, and if they had peer-reviewed publications with undergraduates, to mark the undergraduates' names individually (e.g., by adding asterisks or highlighting). We specified that they should (a) mark only authors who were undergraduates at the time the research was conducted, and (b) ensure that these students were distinguished from other mentees, such as graduate students. We also explained that one responding faculty member from each department would be randomly selected to win a \$15 Amazon gift card.

In total, 157 of 459 faculty (34.2%) responded with their full vita. On average, 2.75 of the faculty within each department contributed their vita ( $Mdn = 3$ ;  $SD = 1.76$ ). [Table 1](#) presents the sample information for the 157 faculty respondents. Faculty in our sample earned their PhDs between 1963 and 2020—with the average faculty member receiving their PhD between 1999 and 2000 ( $SD = 12.87$ ). Because all information was coded from curricula vitae, we do not have demographic data such as age, race/ethnicity, or gender.

**Table 1. Description of Sample (157 Faculty from 60 Top Institutions)**

	N	%
<b>School Type</b>		
PUI	67	42.7
Masters	36	22.9
R1	54	34.4
<b>Subfield</b>		
Neuroscience	38	24.2
Clinical	29	18.4
Cognitive	27	17.2
Developmental	19	12.1
Social/Personality	31	19.7
Other (Evolutionary, General Experimental, I/O, Other)	13	8.4
<b>Rank</b>		
Assistant	30	19.1
Associate	40	25.4
Full	87	55.4
<b>Published with UGs</b>		
At Least Once	131	83.4
Never	26	16.6

### Measures

Faculty vita were coded for several outcome and predictor variables of interest. Because the primary outcome variables were a function of faculty members' total publications, we counted those first. For the present study, we focused on peer-reviewed journal articles (the gold-standard for publishing in the field of psychology) and did not include books, book reviews, edited books, abstracts, encyclopedia entries, abstracts, or conference presentations. We also counted only those articles that were already published or in press but did not count manuscripts in progress or under revision.

The second author was initially responsible for identifying peer-reviewed journal publications and for coding the data. When he was unsure on any coding, he consulted the other authors, who helped resolve the issue in joint consultation. When information was missing (e.g., undergraduate coauthors were not identified) or difficult to determine from faculty vitae alone (e.g., for some faculty, it was hard to discern their subfield), the first author emailed the faculty member who had submitted the vita. All questions about missing (or ambiguous) information were success-

<sup>2</sup> This project was deemed exempt from IRB review by the first author's university because faculty publications are generally considered public information and we were simply asking faculty to send us their vita.

<sup>3</sup> We chose to sample 8 faculty from each department because it represented the lowest count of number of faculty when we made the decision on sample size. However, we later realized that in our initial estimate, one of the department's faculty totals included lecturers, so the smallest department contained 6 faculty. Additionally, a few of the selected universities did not have psychology departments, and thus nobody from that university was contacted.

fully resolved. After a first round of coding, the second author recoded the entire set of faculty vitae from the beginning to ensure there were no errors. If any of the results mismatched from the first to second coding, we collectively coded the data again, consulting together about any questions or inconsistencies. All data and coding information can be found online at [https://osf.io/et2c8/?view\\_only=c584ef78260541149f1b77658bc7dba4](https://osf.io/et2c8/?view_only=c584ef78260541149f1b77658bc7dba4).

## Outcome Variables

**Total Publications with Undergraduate Authors and Undergraduate First Authors.** Faculty participants were asked to do one of the following when submitting their vitae for the study: (a) if they had publications with undergraduate coauthors (i.e., the coauthors were undergraduates at the time the research was conducted), faculty should distinguish undergraduate coauthors on their vita by using yellow highlight, bold font, or an asterisk, or (b) if they had no undergraduate publications, to attach their vita and reply to the email with the phrase “no undergraduate publications.” We counted each peer-reviewed journal publication with at least one undergraduate author to constitute total publications with undergraduate authors. We then counted the subset of these articles in which an undergraduate was listed in the first author position.

**Total Number of Undergraduate Coauthorships.** Next, we counted the total number of undergraduate coauthorships throughout a faculty member’s peer-reviewed journal articles. In some cases, the same undergraduate coauthor appeared on more than one publication; these were counted as separate coauthorships, just as they would count for two publications on that student’s vita. For example, a faculty member with one paper with five undergraduate coauthors received the same score (i.e., 5 undergraduate coauthorships) as did a faculty member that had 3 publications with 5 different undergraduate coauthors or a faculty member who had 5 publications with the same undergraduate coauthor.

**Proportion of Total Publications with Undergraduates.** To determine the proportion of a faculty member’s publications that included undergraduate coauthors, we divided the number of undergraduate peer-reviewed publications by the number of total peer-reviewed publications.

**Average Undergraduate Author Position.** Finally, we measured the level of undergraduate coauthor contributions for a given faculty member by assigning a number to each undergraduate coauthor to represent their authorship position (e.g., 1 = first author, 2 = second author) and then calculated the average author position for each vita.

## Predictor Variables

**Institution Type.** Each faculty member’s current institution was classified as one of three types (based on *Carnegie Classifications*, 2018): primarily undergraduate institution (PUI), masters-granting institution (Masters), or research-intensive institution (R1).

**Faculty Rank.** We classified faculty into one of three categories: “Assistant,” “Associate,” or “Full” Professors

(emeriti faculty were included in this category as all had reached Full Professor status prior to retirement).

**Subdiscipline of Psychology.** We originally coded for 10 subdisciplines (neuroscience, clinical, cognitive, developmental, social, personality, evolutionary, general experimental, I/O, and “other”), but because some subfields yielded too small of a sample on which to conduct analyses, they were either combined (as in the case of personality and social psychology) or moved into the “other” category (as with general experimental, evolutionary, and I/O). Thus, the 5 final categories used for analyses were as follows: personality/social psychology, neuroscience, clinical psychology, cognitive psychology, and developmental psychology. We did not analyze the “other” group in any analysis comparing groups as it was simply too small and incohesive to justify analyzing them as a whole.

**Undergraduate Institution Type.** Using the same Carnegie Classifications (2018) for current institution, we coded faculty undergraduate institutions as primarily undergraduate institutions (PUIs), masters-granting institutions (Masters), or research-intensive/doctoral-granting institutions (e.g., R1 or R2). We were able to code undergraduate institution for all but 14 faculty (9%; 13 whose institution was outside of the United States, and thus not defined by the Carnegie categories, and one who submitted a partial vita without their undergraduate institution and indicated that they did not have time to update their full vita for our study).

## Results

### Overview of Analyses

All of our publication variables are count-type variables and showed strong positive skew (e.g., most faculty have a small number of publications with undergraduates—75% have 10 publications or fewer—but a few faculty have many publications with undergraduates—up to 47). As such, we chose to use non-parametric statistics in our analyses of predictors of publishing with undergraduates. Specifically, when comparing non-categorical outcomes across groups, we used Kruskal-Wallis one-way ANOVAs (represented with an “H”, which compares between medians of groups). When Kruskal-Wallis tests suggested significant differences between groups, we used Dunn’s non-parametric tests to examine differences between groups (represented with a “z”). When comparing categorical outcomes across groups, we used chi-square tests. When examining correlations, we used Spearman’s rank order correlation (represented with a “ $\rho$ ”; the association between the rank-orders of variables). These are the non-parametric equivalents of the one-way ANOVA ( $F$ ), pairwise comparisons ( $t$ -test adjusted for multiple comparisons), and Pearson’s  $r$ , respectively—but do not assume normally-distributed error terms.

### Frequency of Publishing with Undergraduates

**Table 2** shows the descriptive statistics for the frequency of publishing with undergraduates. The majority of our sample (83.4%) had at least one peer-reviewed publication with an undergraduate student and over half the sample

**Table 2. Descriptive Data for Undergraduate Publications (Faculty from 60 Top Institutions)**

	M (SD)	Md	Range
# Publications	54.37 (59.93)	32	3-397
# Pubs with UG Coauthors	7.51 (8.57)	5	0-47
# Pubs with UG First Authors	1.88 (2.65)	1	0-16
# of UG Coauthors	12.60 (16.90)	7	0-111
Average UG Author Position	2.80 (1.09)	2.67	1-8
% Pubs Coauthored with UGs	18.85 (19.10)	12.5563	.00-75.00
% Pubs First Authored by UGs	5.05 (6.96)	2.1277	.00-31.82

**Table 3. Undergraduate Publications as a Function of Institution Type**

	Institution Type		
	PUI <i>n</i> = 67 <i>Mdn</i> [CI <sub>95%</sub> ]	Masters <i>n</i> = 36 <i>Mdn</i> [CI <sub>95%</sub> ]	R1 <i>n</i> = 54 <i>Mdn</i> [CI <sub>95%</sub> ]
# Publications with UGs	6 [5, 10] <sup>a</sup>	4 [3, 9] <sup>a</sup>	5 [4, 7] <sup>a</sup>
# Pubs First Authored by UGs	1 [1, 2] <sup>a</sup>	1 [1, 2] <sup>ab</sup>	0 [0, 0] <sup>b</sup>
Percentage of Pubs with UGs	22.31 [18.18, 30.77] <sup>a</sup>	18.33 [7.69, 28.57] <sup>ab</sup>	6.48 [3.45, 8.7] <sup>b</sup>
At Least One Publication with UGs	91.0% <sup>a</sup>	77.8% <sup>ab</sup>	77.8% <sup>b</sup>

Note: Medians with different superscripts in the same row differ significantly at  $p < .05$

(58.0%) had at least one publication on which an undergraduate was first author. On average, faculty had 7.51 publications with undergraduate authors ( $Mdn = 5$ ,  $SD = 8.57$ ; Maximum = 47), and 1.88 that were first authored by an undergraduate ( $Mdn = 1$ ,  $SD = 2.65$ ; Maximum = 16). Additionally, on average faculty had 12.60 undergraduate coauthorships on their papers ( $Mdn = 7$ ,  $SD = 16.90$ ; Maximum = 111), and undergraduate coauthors typically appeared in the second or third author position ( $M = 2.80$ ,  $Mdn = 2.67$ ,  $SD = 1.09$ ). On average, 18.9% of faculty member's publications were coauthored with undergraduates ( $Mdn = 12.6%$ ,  $SD = 19.1%$ ; Maximum = 75.0%), and 5.0% of their total publications were coauthored with undergraduates as first author ( $Mdn = 2.1%$ ,  $SD = 7.0%$ ; Max = 31.82%).

## Predictors of Publishing with Undergraduates

### Institution Type

Table 3 shows the median numbers of (1) publications with undergraduate coauthors, (2) publications with undergraduate first authors, and (3) the percentage of total publications coauthored with undergraduates as well as (4) the percentage of faculty with at least one publication with an undergraduate coauthor as a function of their institution type.

*Publications with Undergraduate Coauthors.* The vast majority of faculty at PUIs (91%) had published with an undergraduate at least once. This rate was 13% higher than that for faculty at R1s,  $\chi^2(1, N = 121) = 4.16$ ,  $p = .04$ ,  $\Phi = .19$  and Master's institutions (78% for both),  $\chi^2(1, N = 103) = 3.51$ ,  $p = .06$ ,  $\Phi = .19$ .<sup>4</sup> The percentage of faculty who had ever published with an undergraduate did not differ between Master's institutions and R1s,  $\chi^2(1, N = 90) = 0.00$ ,  $p = 1.0$ ,  $\Phi = .00$ . Although being at a PUI predicted a greater likelihood that someone had ever published with an undergraduate, the total number of publications with undergraduates faculty had with undergraduates did not differ as a function of institution type,  $H(2) = 2.67$ ,  $p = .26$ .

*Publications with Undergraduate First Authors.* The median faculty at an R1 university had never published with an undergraduate first author, whereas the median faculty member at both PUIs,  $z(1) = 20.80$ ,  $p = .009$ , and master's institutions had published with one undergraduate first author,  $z(1) = 16.90$ ,  $p = .07$ ; PUIs vs. Masters,  $z(1) = 3.89$ ,  $p = .66$ .

*Percentage of Publications including Undergraduate Coauthors.* In a pattern similar to that of publishing with undergraduate first authors, faculty at R1 universities had a significantly smaller percentage of their total publications with undergraduates compared to faculty at both PUIs,  $z(1) = 43.38$ ,  $p < .001$ , and those at Masters institutions,  $z(1) = 33.61$ ,  $p = .001$ —both of whom had nearly 3 times the

<sup>4</sup> The sample size for the latter comparison is smaller, leading the same effect size to fall outside the traditional statistical significance cutoff of  $p < .05$ .

**Table 4. Undergraduate Publications as a Function of Faculty Rank**

	Faculty Rank		
	Assistant <i>n</i> = 30	Associate <i>n</i> = 40	Full or Higher <i>n</i> = 87
		<i>Mdn</i> [ <i>CI</i> <sub>95%</sub> ]	
# Publications with UGs	1 [1, 4] <sup>a</sup>	4 [2, 6] <sup>b</sup>	7 [6, 10] <sup>c</sup>
# Pubs First Authored by UGs	0 [0, 0] <sup>a</sup>	1 [0, 1] <sup>a</sup>	1 [1, 2] <sup>b</sup>
Percentage of Pubs with UGs	8.01 [3.45, 11.76] <sup>a</sup>	13.22 [6.52, 22.22] <sup>ab</sup>	14.68 [10.64, 20.51] <sup>b</sup>
Have at least one pub with an UG	73.3% <sup>a</sup>	77.5% <sup>ab</sup>	89.7% <sup>b</sup>

Note: Medians with different superscripts in the same row differ significantly at  $p < .05$

proportion of their publications with undergraduate co-authors; PUIs vs Masters,  $z(1) = 9.77$ ,  $p = .30$ .

### Faculty Rank

Table 4 shows the median numbers of (1) publications with undergraduate coauthors, (2) publications with undergraduate first authors, (3) percentage of total publications that are coauthored with undergraduates and (4) percentage of faculty with at least one publication with an undergraduate coauthor as a function of tenure-track rank.

*Publications with Undergraduate Coauthors.* The vast majority of full professors (90%) had published with at least one undergraduate, a rate 16% greater than that of assistant professors,  $\chi^2(1, N = 117) = 4.79$ ,  $p = .03$ ,  $\Phi = .20$ . Associate professors' rate (78%) fell in between that of assistant professors,  $\chi^2(1, N = 70) = 0.16$ ,  $p = .69$ ,  $\Phi = .05$ , and full professors,  $\chi^2(1, N = 127) = 3.33$ ,  $p = .07$ ,  $\Phi = .16$ .

The median assistant professor had only 1 publication with an undergraduate, which was 3 fewer than that of the median for associate professors,  $z(1) = 21.82$ ,  $p = .046$ . Moreover, the median full professor had 7 publications with undergraduates, more than both assistant professors,  $z(1) = 47.21$ ,  $p < .001$ , and associate professors,  $z(1) = 25.40$ ,  $p = .003$ .

*Publications with Undergraduate First Authors.* A similar trend emerged for first-authored papers: Full professors were the only group for which the median professor had at least one publication with an undergraduate first author. Indeed, their publications with undergraduate first authors exceeded that of assistant professors—whose median was 0,  $z(1) = 31.40$ ,  $p = .001$ , and associate professors—whose median was 1 but with a 95% confidence interval that included 0,  $z(1) = 19.14$ ,  $p = .02$ .

*Percentage of Publications including Undergraduate Coauthors.* Full professors had a significantly greater proportion of their publications with undergraduate coauthors (15%) compared to assistant professors (8%),  $z(1) = 23.85$ ,  $p = .01$ . However, associate professors, who had 13% of their pub-

lications with undergraduate coauthors, did not differ from either group—full professors:  $z(1) = 11.55$ ,  $p = .18$ ; assistant professors:  $z(1) = 12.30$ ,  $p = .26$ .

### Subfield of Psychology

Table 5 shows the median numbers for the 5 subfields of psychology of (1) publications with undergraduate coauthors, (2) publications with undergraduate first authors, (3) the percentage of total publications that are coauthored with undergraduates, and (4) the percentage of faculty with at least one publication with an undergraduate coauthor. There were no significant differences between the subfields in having ever published with an undergraduate,  $\chi^2(4, N = 144) = 1.62$ ,  $p = .81$ ,  $\Phi = .10$ , the total number of publications coauthored with undergraduates,  $H(4) = 4.82$ ,  $p = .31$ , the number of publications first-authored by undergraduates,  $H(4) = 1.02$ ,  $p = .91$ , or the proportion of a faculty's publications that were coauthored by undergraduates,  $H(4) = 2.32$ ,  $p = .68$ . As such, we do not discuss subfield-specific statistics here.

### Trajectories in Publishing with Undergraduates

We analyzed publishing trajectories across time to answer two questions: (1) Is publishing with undergraduates becoming more common over time? and (2) When, on average, do faculty first publish with undergraduates, and is that number changing over time?

### Frequency of Publishing with Undergraduates Over Time

First, we examined whether the number of publications was increasing annually. Of course, with each passing year, the number of faculty publishing grows, so it makes sense that the raw total number of publications would rise over time. To control for this fact, we divided the total number of publications with undergraduates each year by the num-

<sup>5</sup> We also examined the correlation between the year when faculty started their first faculty position and each of the outcomes. More senior faculty had more publications with undergraduates in general,  $\rho(155) = -.28$ ,  $p < .001$ , with undergraduate first authors,  $\rho(155) = -.23$ ,  $p < .001$ . However, year when they started their first faculty position did not relate to whether they had published with an undergraduate at all,  $\rho(155) = -.09$ ,  $p = .27$ , nor to the percentage of their publications that included undergraduate co-authors,  $\rho(155) = -.10$ ,  $p = .21$ .

**Table 5. Undergraduate Publications as a Function of Faculty Subfield**

	Social/ Personality <i>n</i> = 31	Clinical <i>n</i> = 39	Cognitive <i>n</i> = 27	Developmental <i>n</i> = 19	Neuroscience <i>n</i> = 38
			<i>Mdn</i> [ <i>CI</i> <sub>95%</sub> ]		
N Publications with UGs	4 [2, 6]	4 [3, 9]	6 [5, 7]	5 [3, 7]	10 [4, 12]
N First Author UG Publications	1 [1, 3]	1 [1, 3]	1 [0, 2]	0 [0, 0]	1 [0, 2]
% of Publications with UG authors	11.86 [6.67, 19.05]	15.88 [8.7, 25.71]	14.89 [8.47, 20.51]	11.11 [6.52, 20]	19.09 [7.69, 30.77]
Have at least one UG publication	77.40%	86.20%	85.20%	89.50%	81.60%
			<i>M</i> [ <i>CI</i> <sub>95%</sub> ]		
Time to First UG Publication	5.63 [3.45, 7.8] <sup>ab</sup>	5.04 [3, 7.08] <sup>a</sup>	8.83 [5.44, 12.21] <sup>bc</sup>	10.82 [7.34, 14.31] <sup>c</sup>	5.97 [3.6, 8.33] <sup>ab</sup>

ber of people who had received their PhD by that year. For example, by 1994, a total of 46 people in our sample had received their PhD. That year 7 papers were published with undergraduates. Dividing the total number of publications with undergraduates by the number of people who had their PhD by that year suggests that there were 0.15 publications per post-PhD researcher that year.

We then examined the relationship between year and number of publications per researcher, modeling linear and quadratic trends. We opted to use only data from years that had at least 20 with a PhD, so that the estimate in any given year was not overly influenced by one person. For example, in 1968 there was one faculty in our sample who had already received their PhD and one publication; such a select sample would not be expected to represent the general state of the field in 1968—indeed, it would suggest every researcher had a publication with an undergraduate, on average. As a result of this strategy, we only used data from 1984 to 2020 (the last full year of data) for our overall model over time. [Figure 1](#) presents a scatter plot showing these trends over time.

Overall, there was a positive linear trend, suggesting that the frequency of publishing with undergraduates has increased over time, which explained about 57% of the variance in publication frequency,  $t = 6.81$ ,  $p < .001$ ,  $R^2 = .57$ . Adding a quadratic function improved the model's explanatory value to 75% and suggested that not only is publication with undergraduates increasing over time, but that it is doing so at an increasingly rapid speed,  $t = 4.95$ ,  $p < .001$ , total  $R^2 = .75$ ,  $\Delta R^2 = .18$ .<sup>6</sup>

### Time to First Undergraduate Publication

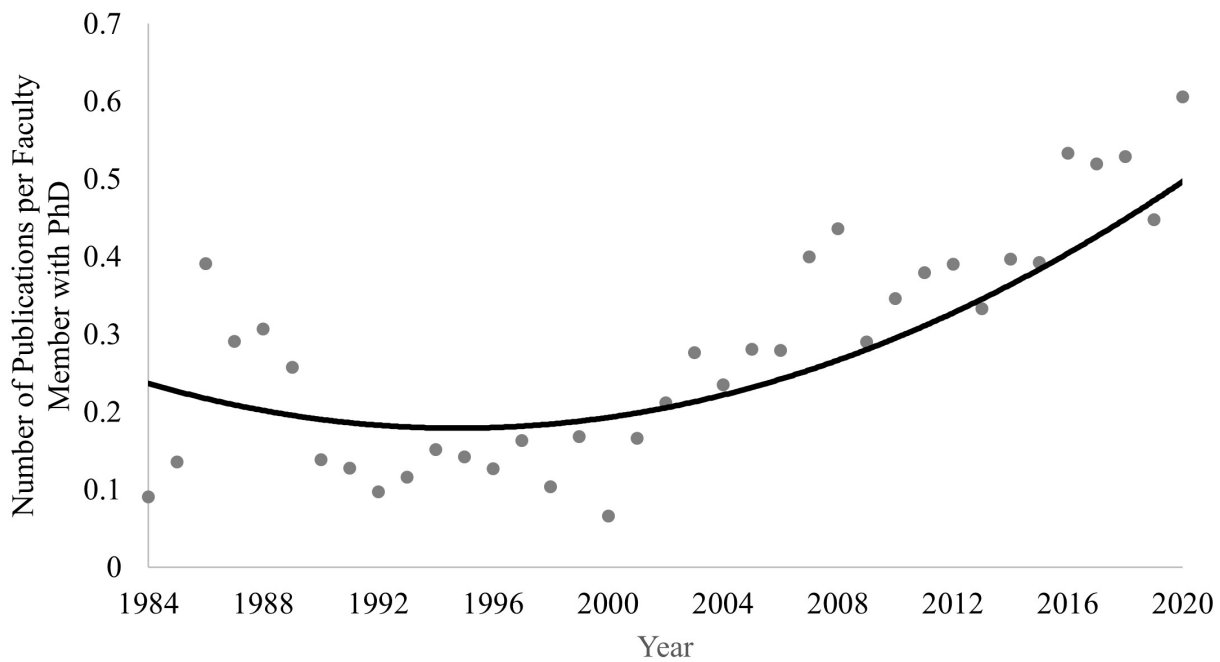
Next, we examined the publication year of each publication that included an undergraduate coauthor relative to when faculty authors earned their PhD. An examination of the time to first publication with an undergraduate revealed that the median faculty member published their first paper with an undergraduate 6 years after they received their PhD ( $Md = 6$ ,  $SD = 6.68$ ; Range = -4 to 31). The number of years to first publication did not differ as a function of institution type,  $H(2, 131) = 0.85$ ,  $p = .65$ . However, they did differ as a function of faculty rank,  $H(2, 131) = 6.16$ ,  $p = .05$ , such that full professors took more years, on average ( $M = 8.10$  years,  $SD = 7.08$ ) to publish for the first time with an undergraduate than did assistant professors ( $M = 4.82$  years,  $SD = 3.94$ ),  $z(1) = -18.74$ ,  $p = .04$ . Associate professors ( $M = 5.87$ ,  $SD = 6.79$ ), did not differ significantly from full professors,  $z(1) = -15.01$ ,  $p = .06$ .

Time to first publication also differed as a function of subfield,  $H(4, 120) = 11.95$ ,  $p = .02$ , as shown in the final row of [Table 5](#). Specifically, developmental psychologists had the longest duration to first publishing with an undergraduate coauthor (approximately 11 years), significantly greater than all disciplines except cognitive, which took approximately 9 years. Cognitive psychologists differed significantly only from the fastest discipline, clinical, which took an average of 5 years. Clinical, social/personality, and neuroscience faculty did not differ from one another in time to first undergraduate publication.<sup>7</sup>

We also examined whether publishing with undergraduates is becoming increasingly more common at an earlier career stage. We found that PhD year correlated signifi-

6 The results from the analysis are substantively identical when the divisor is the number of people with tenure-track jobs, rather than with a PhD, Linear:  $t = 7.05$ ,  $p < .001$ , total  $R^2 = .59$ , Quadratic  $t = 4.30$ ,  $p < .001$ , total  $R^2 = .73$ ,  $\Delta R^2 = .15$ .

7 The results from the analysis are substantively identical when years to first publication is calculated around the year one starts a tenure-track job, rather than when one earns a PhD. Institution type:  $H(2, 129) = 2.15$ ,  $p = .34$ ; Academic Rank:  $H(2, 129) = 9.57$ ,  $p = .008$ ; Subfield:  $H(2, 118) = 10.24$ ,  $p = .04$  (though the only differences were between clinical and developmental and neuroscience and developmental).



**Figure 1. Trajectory of Undergraduate Publication Rates Over Time**

cantly negatively with time to first publication with an undergraduate,  $\rho(131) = -.30$ ,  $CI_{95\%} = [-.45, -.12]$ ,  $p < .001$ , suggesting that those who received their PhD or started a tenure track job more recently were likely to have taken less time to publish their first article with an undergraduate.<sup>8</sup>

One might worry that this observed trend is a statistical artifact driven by a selection bias in junior faculty—that is, to be included in a time-to-publication analysis one must have published with an undergraduate, and junior faculty have necessarily been in the field a short time, restricting their possible range of years to publication. In other words, the junior faculty who will publish their first article with an undergraduate at, for example, 10 years post-PhD cannot be represented here. As such, we conducted the analyses considering only tenured faculty and replicated the PhD-year effect,  $\rho(109) = -.24$ ,  $CI_{95\%} = [-.45, -.05]$ ,  $p = .01$ .<sup>9</sup>

## Discussion

Our analyses of faculty vitae revealed several interesting findings. First, publishing with undergraduates is quite common: A substantial majority of faculty in our sample (83.4%) had coauthored at least one article with an undergraduate who typically occupied the second or third author position. Additionally, faculty had an average of 8 coauthored publications (approximately 2 of which were first-authored) that involved an average of 13 undergraduate

coauthors and accounted for almost 1 in every 5 of their total publications (first-author undergraduate publications accounted for 1 in 20). With respect to predictors of undergraduate publication: Institution type (faculty at PUIs produce the most) and rank (full professors produce the most) predicted coauthored undergraduate publications.

We also provided the first empirical data for a popular notion that seems anecdotally true, namely, that undergraduate publication is becoming more prevalent. Our analysis of publication trajectories over time revealed that coauthored undergraduate publication is not only becoming more common, but is increasing exponentially. We also found that faculty are becoming more likely to publish with undergraduates earlier in their careers.

To the best of our knowledge, only one study has empirically investigated undergraduate publication in psychology—Giuliano et al. (2022)—and they did so using a convenience sample and without intention to provide a representative estimate of base rates of publication in psychology. Faculty in their sample had an average of 5 coauthored publications with undergraduates (1.5 of them with an undergraduate first author). Our overall estimates based on our random sample of faculty from 60 top colleges and universities were somewhat higher, which is perhaps not surprising given that we (a) recruited faculty who were particularly likely to be publishing and (b) sought to attain

<sup>8</sup> Correlation between when one started their first tenure-track position and time to first publication (calculated from the year one starts a tenure-track job, rather than when one earns a PhD),  $\rho(129) = -.32$ ,  $CI_{95\%} = [-.47, -.15]$ ,  $p < .001$ .

<sup>9</sup> Correlation between when they started their first tenure-track position and time to first publication (calculated from the year one starts a tenure-track job, rather than when one earns a PhD),  $\rho(107) = -.24$ ,  $CI_{95\%} = [-.42, -.05]$ ,  $p = .01$ .



upper-bound estimates of how common publishing with undergraduates is in our field. We also extended Giuliano et al.'s (2022) findings by obtaining information about the number of undergraduate coauthors involved, their average author position, and the percentage of a faculty member's published work that included undergraduates.

We did replicate several findings from Giuliano et al. (2022) regarding predictors of publication with undergraduates: We found that both institutional (e.g., whether an institution serves only undergraduates or also graduate students) and faculty factors (e.g., rank) were related to the likelihood of undergraduates publishing with their faculty mentors. Interestingly, although Giuliano et al. (2022) found that faculty in neuroscience tended to publish more often with undergraduate coauthors (in general and as first author) compared to faculty in other areas of psychology, a similar trend in the current study did not reach statistical significance. Although neuroscience did rank highest numerically, the lack of significant differences in the current study could reflect a ceiling effect at the highest, most productive levels of faculty (i.e., those at the most prestigious universities); alternatively, the failure to replicate subfield differences could be due to an artifact related to the different subfield sample sizes. Future research intentionally recruiting faculty from multiple subfields is needed to determine if there are differences in undergraduate publication rates between subfields of psychology.

## Limitations

Our study's generalizability is limited in three ways. First, our sample was restricted to faculty at a subset of top colleges and universities in the United States. We chose to do so hoping to obtain upper-bound estimates for the metrics we examined here. Nevertheless, the spectrum of colleges and universities is much wider—with a host of other school types and faculty publishing environments—and thus obtaining a true base rate of undergraduate publication will involve future research recruiting a more comprehensive, representative sample (perhaps a cluster sample of all U.S. colleges and universities). Although undergraduate publication rates might be somewhat lower when all schools are considered, we would expect that undergraduate publication is still fairly common (and becoming more common) across all types of institutions.

A related concern is the relatively low response rate (i.e., 34.2%) from faculty participants. When we started the study, we hoped most data would be publicly available from faculty vitae on university websites. Nevertheless, the majority of faculty vitae were incomplete, out of date, or missing entirely. Rarely did faculty identify student coauthors, and when they did, they typically did not distinguish between graduate and undergraduate coauthors. As a result, we had to rely on faculty to respond to our email solicitation for participation. We recognize that faculty who responded may differ in some way (e.g., they may be more interested in, or successful at, undergraduate publication) from those who did not respond, and thus it is important that future research replicate the current study in a wider

sample. We do not anticipate that such a study would nullify the present relationships, but suspect that it might reduce the absolute numerical estimates of frequency of publication with undergraduates.

Of course, the person for whom participating in our study was easiest was the one with zero publications—as they simply had to forward their vitae and make no other effort. Indeed, the greatest amount of effort to participate was required by those who had the greatest number of publications with undergraduates. As such, we suspect the ease of response for those with zero or only a few publications likely kept our study from having an overly-inflated estimate of frequency. Additionally, to facilitate studies on undergraduate publication in the future, and to perhaps bring greater visibility and recognition to student publication itself, we hope to encourage our field to shift to a common practice of denoting student/trainee coauthors on their curricula vitae; for example, faculty could use a different superscript to identify undergraduates (“u”), graduate students (“g”), and postdoctoral fellows (“p”).

A final limitation is that the current study only counted articles published in peer-reviewed journals when considering undergraduate publications. The exclusion of other forms of publication (such as books, book chapters, reviews, and encyclopedia entries) was not meant to imply that other publications are not important or worthy; instead, for this first attempt to estimate base rates of coauthored undergraduate publication, we restricted ourselves to the most narrow definition (based on the gold standard in our field) of publication the way that many hiring, promotion, and tenure committees do. We believe this provides a clean test of the hypotheses without adding potential noise that might arise from including other forms of publication that might be non-peer-reviewed, have guaranteed acceptance for the authors, and/or be repetitions of identical content in multiple places. Nevertheless, we encourage future research in this area to include a broader definition of publication to gain an expanded picture of the role of undergraduates in publication.

## Suggestions for Future Research

In addition to replicating our results in a larger sample of colleges and universities and using expanded metrics, there are several promising avenues for future research. First, work should be conducted to determine how undergraduate publication rates and trends in psychology compare to those in other fields, such as the natural sciences (e.g., biology, chemistry) as well as other social science disciplines (e.g., sociology, economics, political science). Although there are no recent studies in other fields that we are aware of that describe undergraduate publication rates, there are some data (Gouda et al., 2016; Mellis et al., 2018) that suggest that publication rates and trends in other sciences could be similar to those in psychology, and anecdotally at least, undergraduate publication seems to be increasing in other social science fields as well. Ideally, future research would also attempt to identify potential factors responsible for this trend, such as institutional support and

recognition of scholarship, which has been shown to predict undergraduate publication rates (Giuliano et al., 2022).

Another focus for future research will be to study faculty who are particularly successful at coauthoring publications with undergraduates to glean insights from their methods, techniques, and mentoring approaches. Although some researchers have shared their “best practices” for engaging undergraduates in publishable research (see Giuliano et al., 2019), a more systematic empirical approach (such as an in-depth qualitative study of faculty who frequently publish with undergraduates) would increase our understanding of the institutional, student, and faculty factors that help or hinder undergraduate publication from the faculty perspective.

Third, it would be interesting to study the prevalence of undergraduate publication among undergraduates who conduct independent research. Although publishing with undergraduates appears to be something many faculty do in their careers, little is known about how frequently any one undergraduate research experience leads to publication. It is quite likely that, from the undergraduate student perspective, publishing is still very rare.

Relatedly, it would be worthwhile to study the impact of undergraduate publication from the student perspective; for example, does publishing as an undergraduate confer benefits above and beyond the benefits of simply conducting research (that does not result in publication) with a faculty member? And, if so, are such benefits stronger for underrepresented groups (as are the benefits of collaborative research in general; Kinzie et al., 2008; O'Donnell et al., 2015; Slovacek et al., 2012)?

## Conclusion and Implications

The current study indicates that not only is coauthoring journal publications with undergraduate students in psychology possible, but that it is quite common for faculty and becoming even more so over time. Importantly, coauthored undergraduate publication occurs across all types of institutions (whether they are primarily undergraduate, masters-granting, or doctoral-granting), which suggests that anyone can publish with undergraduates with the right combination of time, training, and resources. These trends are also promising because they imply that the known benefits of collaborative research for undergraduates, faculty, and institutions (e.g., Bauer & Bennett, 2003; Morales et al., 2017; Potter et al., 2009) are becoming more accessible and that faculty-student mentoring relationships are bear-

ing fruit in tangible ways, which likely produce additional positive downstream effects (e.g., undergraduates certainly can benefit in from the resume boost that a publication can bring). Although the forces driving this increase in undergraduate publication remain to be seen—perhaps colleges' interest in high impact practices, increased institutional support and recognition for publishing with undergraduates, and changing department norms all play a role—this change certainly seems like a positive and welcome one in our field.

In closing, we hope that our findings stimulate further research into the outcomes of faculty-undergraduate research in psychology and other fields. There remain important questions to address in order to increase our understanding of the optimal conditions under which undergraduates thrive and can publish, but we are confident that our findings demonstrate that when given the chance, undergraduates can be true collaborators and significant contributors throughout the publication process. In short, we encourage faculty to approach the process of publishing with undergraduates as one full of hope rather than as a Pandora's box.

## Author Contributions

Contributed to conception and design: TG, WH, JH  
 Contributed to acquisition of data: TG, WH, JH  
 Contributed to analysis and interpretation of data: JH, TG  
 Drafted and/or revised the article: TG, WH, JH  
 Approved the submitted version for publication: TG, WH, JH

## Competing Interests

The authors have no conflicts of interest.

## Data Accessibility Statement

The data, coding system, and supplemental analyses are available through the open-science framework at <https://osf.io/et2c8/>.

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## Supplementary Materials

### Peer Review History

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