AMERICAN PSYCHOLOGICAL ASSOCIATION

Scholarship of Teaching and Learning in Psychology

ISSN: 2332-2101

2020, Vol. 6, No. 3, 212–224
http://dx.doi.org/10.1037/stl0000219

Mentorship of Undergraduate Research Experiences: Best Practices, Learning Goals, and an Assessment Rubric

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Student engagement in research is a principle of quality undergraduate psychology education. Research experiences can take many forms, but they all should ideally lead students to achieve American Psychological Association (APA) undergraduate major goals and prepare them for the workforce and graduate study. Therefore, research mentors should ensure high-quality research experiences that yield positive outcomes. There is expert consensus on what constitutes best practices in mentoring undergraduate research experiences and quasiexperimental evidence that research experiences are associated with positive student outcomes. However, researchers have not directly established a relationship between mentorship best practices and student outcomes, nor have they aligned outcomes with APA undergraduate major goals. The absence of such research is attributable to the lack of a common outcome measure and the small number of students who engage in research at single institutions. To facilitate assessment and research on best practices, mentors require a common measure of learning that is specific to undergraduate psychology research. Thus, the current paper proposes a new analytic rubric that synthesizes best practices in mentorship and the APA undergraduate major goals. The rubric's design will allow for assessment of APA undergraduate major goals related to research. In addition, the rubric could become the foundational element in a national assessment effort to determine the impact of varied research experiences and to evaluate the efficacy of mentorship best practices.

Keywords: assessment, research mentoring, college teaching, psychology, undergraduates

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This paper summarizes work conducted by the Improving Undergraduate Research Taskforce of the Society for the Teaching of Psychology, which was instituted by Society President Richard L. Miller and Co-Chaired by Karen Z. Naufel and Manisha Sawhney (http://teachpsych.org/ImprovingUndergraduateResearch).

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Student engagement in research is a principle of quality in undergraduate psychology education (American Psychological Association [APA], 2011). Participation in research provides students with direct exposure to the methods of the discipline, thus reinforcing psychology as a science. By participating in research, students can develop basic proficiency with research methods, but experts have argued that undergraduate research should have additional benefits for students' critical thinking, ethical decision making, communication skills, and professional development (Brown, Daly, & Leong, 2009; Shanahan, Ackley-Holbrook, Hall, Stewart, & Walkington, 2015; Van Vliet, Klingle, & Hiseler, 2013). However, there is little objective evidence documenting such outcomes in psychology, and there is even less evidence documenting how mentors can best structure research experiences to produce positive outcomes. To objectively document the outcomes of research experiences in psychology, a common outcome measure is needed, but one has yet to emerge in the literature. As such, the purpose of this article is to define the expected learning goals of undergraduate participation in psychology research and propose a common rubric for use in assessment and the scholarship of teaching and learning. With a common rubric, research mentors can begin to systematically document the outcomes of undergraduate research in psychology and investigate effective methods for achieving those outcomes.

Undergraduate research experiences in psychology are both common and varied. Among the many examples of student research opportunities are course-based laboratories (Bangera & Brownell, 2014; Durso, 1997), independent research with faculty (Brothers & Higgins, 2008; Budruk, 2014), summer programs (Singer & Weiler, 2009), service-learning projects (Cejda & Hensel, 2009), and applied research in local communities (Cejda & Hensel, 2009). Although opportunities vary, research indicates that students at most undergraduate institutions have some option for research involvement. For example, one survey of undergraduate psychology curricula found that, in addition to almost universal research methods requirements, 90% of institutions offered independent study courses, 62% offered laboratory courses, and 44% offered honors theses (Stoloff et al., 2010). Given that most psychology programs are invested in providing research experiences to undergraduates, they should also be invested in assessing the outcomes of those experiences.

One reason why psychology programs should invest in assessing the outcomes of undergraduate research is because the experiences relate directly to the *APA Guidelines for the Undergraduate Psychology Major* (APA, 2013). Of course, the most direct relation is that interpreting, designing, and conducting psychological research is itself an outcome (Outcome 2.4) listed under the goal of scientific inquiry and critical thinking (Goal 2). It would be impossible for students to achieve that outcome without the availability of meaningful research experiences. More indirect relations between research and the APA goals exist as well. For example, participation in research can contribute to outcomes such as developing effective writing skills (Outcome 4.1), enhancing teamwork capacity (Outcome 5.4), and making ethical decisions (Outcome 3.1). Considering these wide-ranging effects, psychology programs that can document what students learn from research will have taken a significant step toward providing evidence that they are successfully fostering the APA's overall goals for the undergraduate psychology major.

Research experiences can also benefit students beyond the psychology curriculum. Undergraduate research is a high-impact educational practice that leads students to develop meaningful knowledge and skills that they can apply outside of the classroom and that prepare them to meet the needs of employers (Kuh, 2008). For students seeking immediate employment, the U.S. Department of Labor recognizes skills such as complex problem solving and use of scientific methods as critical to diverse occupations ranging from athletic trainers to zoologists (U.S. Department of Labor, n.d.a, n.d.b). Arguably, research experiences are of even greater benefit to students considering graduate studies. Participation in undergraduate research experiences can strengthen students' interests in pursuing graduate school and provide a realistic preview of graduate school activities and responsibilities (Russell, Hancock, & McCullough, 2007). Moreover, if students decide to pursue graduate education, research can be the most essential experience on their resume (Boyette-Davis, 2018). However, these profes-

sional benefits only occur if students' research experiences are effectively structured and mentored.

To summarize, research experiences are a frequent part of undergraduate psychology education, they provide an opportunity to help students achieve many goals within the psychology major, and they can impact students' careers after graduation. Given the central role research experiences play in the undergraduate curriculum, psychology educators should ensure the quality of research experiences and of the student learning that results from research experiences. To help ensure quality, this article provides several resources for psychology programs and research mentors. We begin by summarizing the best practices in research mentorship, including learning goals mentors should set for students and methods mentors should use for structuring research experiences that meet those goals. Then, we review empirical research about how and what students learn from research experiences and argue that objective evidence for the benefits of undergraduate psychology research is lacking. To promote the accumulation of that missing evidence, we propose a common rubric for the assessment of undergraduate research experiences in psychology that is aligned with best practices and the APA's (2013) undergraduate psychology major goals. We then conclude with a call to action for psychology programs to implement the rubric in assessment plans and for scholarship of teaching and learning projects across a variety of settings (e.g., 4-year and 2-year institutions) and across a variety of experiences (e.g., independent study, course-based laboratories).

Best Practices in Research Mentorship

Undergraduate research can take many forms, but there is some consensus on the best practices for their appropriate goals and mentorship (Table 1; Brown et al., 2009; Heesacker, Higley, & Elimelech, 2015; Johnson, Behling, Miller, & Vandermaas-Peeler, 2015; Lechago, Love, & Carr, 2009; Linn, Palmer, Baranger, Gerard, & Stone, 2015; Shanahan et al., 2015; Van Vliet et al., 2013). In this section, we outline the recommended goals and how they correspond to a diverse range of APA (2013) undergraduate program outcomes. In addition, experts recommend specific methods for structuring research experiences to best achieve learning goals, and we outline those mentorship practices as well.

Best Practice Learning Goals

Starting with the most fundamental of learning goals for research experiences, mentors should help students to develop research knowledge, skills, and habits of mind (Brown et al., 2009; Heesacker et al., 2015; Shanahan et al., 2015; Van Vliet et al., 2013). Because this goal is central to the psychology curriculum, it encompasses most of the APA undergraduate outcomes related to scientific inquiry and critical thinking (APA, 2013). Undergraduate researchers should be able to review the psychological

Table 1
Best Practices in Undergraduate Research Mentorship

Best practices
Learning goals
• Promote the development of research knowledge, skills, and habits of mind.
• Promote the development of research ethics.
• Promote team spirit and collegiality.
• Promote professional identity development.
• Encourage students to present research findings in professional settings.
Mentorship
• Plan the research experience before it starts.
• Scaffold research experiences so that expectations, ownership, and independence increase over time.
• Have regular research meetings.
• Provide opportunities for one-on-one mentoring.
• Assess the outcomes of research experiences.
• Provide regular feedback on performance.

literature, design studies, and conduct research procedures. They should also develop the ability to interpret and evaluate research like psychologists. Research mentors should encourage students to reach conclusions using theory and evidence rather than anecdotes, myth, or pseudoscience. In addition, students should learn to identify logical flaws, consider alternative views, and be appropriately tentative in their conclusions. These critical habits of mind can benefit students both inside and outside of the laboratory.

Although scientists strive for objectivity in their thinking and their methods, values are an inescapable part of conducting psychological research. Thus, undergraduate research mentors should also set a goal for students to develop research ethics and values (Brown et al., 2009; Shanahan et al., 2015). Research ethics correspond to APA undergraduate outcomes related to ethical and social responsibility (APA, 2013). Specifically, undergraduate researchers should be able to evaluate the consistency of research practices with the APA's ethical guidelines and follow ethical research practices.

Successful research culminates when researchers share results in a public forum, and mentors should set a goal for students to present research in professional settings (Heesacker et al., 2015; Shanahan et al., 2015). Presentation of research occurs in many formats ranging from informal colloquia, to research conferences, to journal publications. No matter the format, presenting research is an opportunity for students to work toward the APA's effective communication outcomes (APA, 2013). For oral presentations of research, mentors should help students learn how to deliver coherent messages that integrate psychology research, oral communication skills, and visual aids. For written presentations of research, mentors should help students learn how to craft clear and concise arguments using APA style.

Science rarely occurs in isolation, and mentoring undergraduates in research inherently places students on a team of investigators. Because collaboration is an essential part of professional activities, including science, undergraduate research mentors should set a goal for students to develop team spirit and collegiality (Shanahan et al., 2015). The APA undergraduate outcomes recognize the importance of learning to function on teams (APA, 2013). Students should be able to complete research tasks, large and small, in collaboration with others. In doing so, they should be able to understand the perspectives and needs of team members with diverse viewpoints and backgrounds.

The ultimate purpose of undergraduate research goals is to incorporate students into the field of psychology. Thus, the final goal is to promote students' professional identity development (Brown et al., 2009; Lechago et al., 2009; Linn et al., 2015; Shanahan et al., 2015; Van Vliet et al., 2013). Not all undergraduate researchers will go on to become psychologists, but the experience should help them determine their career goals, which is one of the APA's (2013) undergraduate outcomes for professional development. To foster the professional identities of undergraduate researchers, mentors can incorporate activities into the undergraduate research experience such as building a curriculum vita or resume, exploring graduate schools or careers, and networking.

Best Practices in Mentorship

As novice researchers, undergraduates need a structured experience to achieve learning goals. Thus, the best practices for how to mentor undergraduate research begin with planning the research experience before it starts (Shanahan et al., 2015). During the planning phase, mentors should develop the research project. When developing projects, mentors should account for undergraduates' abilities and available time. Ideally, projects will match the knowledge and skills of the students, taking advantage of their prior knowledge but not setting expectations they are unlikely to reach. Mentors should also consider the amount of work and time needed to complete the project. Using these estimates, mentors should consider the amount of time per week undergraduate researchers will need to commit to the project and the duration of that commitment (e.g., number credits hours, number of semesters). Depending on the project and goals for learning, short research experiences may be insufficient for the project or learning goals (Cox & Andriot, 2009).

Once the research experience begins, the goal is to improve students' skills, allowing them greater independence. Thus, another best practice is to scaffold the research experience such that expectations, ownership, and independence

increase over time (Brown et al., 2009; Shanahan et al., 2015; Van Vliet et al., 2013). Mentors can scaffold research experiences by assigning novice researchers tasks that require basic skills and by offering training for skills that students do not already possess. Mentors should offer extensive training and structure at the beginning of projects and then allow more independence as the project progresses and students master skills. Scaffolding projects in this manner allows the undergraduate researchers to take increasing responsibility for meaningful research tasks (Brown et al., 2009; Shanahan et al., 2015), ultimately allowing them to become fully committed to the project, and perhaps to research itself. In the case of students with proven skills and commitment to research, mentors can assign them responsibility for designing and conducting independent research projects or mentoring their peers (Whiteside et al., 2007).

Students do not develop research skills in isolation, so another best practice is to have regular research meetings (Lechago et al., 2009; Shanahan et al., 2015). Research meetings are useful for motivating students to make progress on research tasks, but their more important function is as an opportunity to foster the achievement of learning goals. Regular meetings allow mentors to offer instruction on research skills, methods, and techniques. Ethics are another topic for research meetings, and mentors can use meetings to both introduce general principles and evaluate ethical issues that emerge during the project. Most research projects have lulls in activity, and mentors can devote meetings during these times to professional development activities such as building curriculum vitae or resumes, exploring graduate schools, or mock interviews (Lechago et al., 2009). Finally, regular research meetings can help to facilitate team spirit and collegiality, reminding everyone—from undergraduate research assistants to the principal investigator—that research does not happen in isolation (Brown et al., 2009; Lechago et al., 2009; Shanahan et al., 2015).

Most research meetings will include multiple undergraduate students, but mentors should also provide opportunities for one-on-one guidance. Periodic meetings with individual students accomplish many of the same learning goals as team meetings, but providing one-on-one opportunities for mentorship is a separate best practice because the mentor can tailor the interaction to the students' unique needs, goals, and skill level (Brown et al., 2009; Lechago et al., 2009; Shanahan et al., 2015). Although regular team meetings are necessary for progress on research and learning goals, one-on-one mentoring is also necessary to provide extra, individualized opportunities for guidance and support (Johnson et al., 2015; Shanahan et al., 2015). One-on-one interactions are a unique opportunity for mentors to develop supportive, collegial relationships with students.

The final two best practices both involve assessment. Specifically, mentors should assess the learning outcomes (Johnson et al., 2015), and they should provide undergraduate researchers with regular feedback (Lechago et al., 2009). Before the project begins, mentors should plan how they will assess student performance and progress toward the learning goals throughout the project and at its conclusion. It is important to keep the assessment demands manageable for the mentor and to not let it interfere with the research experience itself (Johnson et al., 2015). As such, a rubric that outlines the learning goals for the research experience, like the one we propose in this article, can help make the process simple, reliable, and useful. After conducting the assessment, one-on-one meetings with students are an opportune time to provide researchers with formative feedback on their performance of research tasks and their achievement of learning goals. Mentors could even conduct formal performance reviews at the mid and end points of research experiences, which students may find highly relevant to their professional development (Lechago et al., 2009).

In summary, expert consensus suggests that mentors have the responsibility of establishing both learning goals for the research experience and mechanisms via which undergraduate researchers can meet those goals. Additionally, student learning extends beyond the standard knowledge, skills, and values to include professional development and collegiality. All of these components of research experience align with APA's (2013) goals for the undergraduate psychology major. Therefore, to ensure that students appropriately meet these goals, mentors must plan scaffolded learning experiences and provide feedback to students through both reg-

ular meetings and assessment processes. A common metric for assessment that aligns with APA guidelines could therefore help mentors enhance the quality of their mentorship abilities.

Research on Undergraduate Research Experiences

Experts suggest that certain undergraduate research experiences and mentorship practices lead to lofty outcomes, and cross-disciplinary research outside of psychology provides empirical support for the claims. When considering large, multi-institution studies, there is strong correlational evidence supporting the association between undergraduate research experiences and achievement of learning goals. For example, one survey of undergraduates (N = 1,135) from 41 institutions asked them to report the benefits gained from research experiences (Lopatto, 2004). Students self-reported gains across 20 domains, including understanding the research process, development of research skills, and becoming part of a learning community. Another notable study sampled over 10,000 undergraduates (Russell et al., 2007). Similar to the first study, students self-reported increased research skills and professional development stemming from research experiences. Although these large studies offer the most generalizable findings, a host of smaller studies from various disciplines also provide evidence for the beneficial effects of undergraduate research (see Linn et al., 2015, for a review).

The cross-disciplinary literature supports experts' assertion that undergraduate research should produce significant learning, but it provides less support for expert claims about the best practices in research mentorship. Many studies have described the typical procedures of research mentorship (Linn et al., 2015), but valid evidence for the effectiveness of various mentorship approaches requires systematic assessment of the impact of variations in mentorship on student outcomes. The previously mentioned large-scale study of undergraduate researchers and mentors failed to identify reliable predictors of student outcomes among mentorship characteristics (Russell et al., 2007). However, many students in the study stated that better mentorship would be a method for improving the research experiences, suggesting that the mentorship role is important, but perhaps more complicated than the survey questions could detect. In general, more research is needed to explore how variations in mentorship characteristics, especially those that are varied systematically, predict positive student experiences.

Although cross-disciplinary results are important, examining the outcomes of undergraduate psychology research is also essential. Within the psychology literature, a similar picture emerges of the benefits of undergraduate research. The small research literature in psychology indicates that undergraduate research experiences relate to students' scientific and critical thinking (Kardash, 2000; Landrum & Nelsen, 2002; Seymour, Hunter, Laursen, & Deantoni, 2004; Tan, 2007), communication skills (Tan, 2007), and professional development (Davidson & Lyons, 2018; Hunter, Laursen, & Seymour, 2007; Landrum & Nelsen, 2002; Seymour et al., 2004; Tan, 2007; Zydney, Bennett, Shahid, & Bauer, 2002). These outcomes relate to APA (2013) undergraduate major goals 2, 4, and 5, respectively.

The literature on undergraduate research experiences is broadly informative, but it suffers from some critical limitations. The methods for assessing student outcomes is a primary limitation (Linn et al., 2015). Researchers have relied upon self-report measures completed by students to assess learning outcomes (e.g., Lopatto, 2004; Russell et al., 2007). Students' perceptions of how much they benefited from an educational experience is useful information, but it is a questionable predictor of actual learning (e.g., Deslauriers, McCarty, Miller, Callaghan, & Kestin, 2019; Wesp & Miele, 2008). Students may be biased in their self-evaluations, or they may lack the perspective needed to provide an accurate assessment of their current abilities. In addition, there are no agreed-upon standards for what students should be learning during research experiences. Definitions of student success may not overlap between studies. For example, one set of researchers may focus on methodological skill while another set of researchers focuses on professional identity. It is difficult to reliably study the effects of research experiences or evaluate the effectiveness of various approaches to mentorship without first establishing agreed-upon learning goals. Finally, the psychology studies may not be generalizable across samples and settings. Large-scale,

multi-institution studies of undergraduate psychology research experiences are needed.

Future research on the effects of undergraduate research in psychology would benefit from a common outcome measure that can be implemented across varied research settings but that is still aligned with meaningful learning outcomes. There are standardized self-report measures of research outcomes (e.g., Weston & Laursen, 2015), but they are too general to map meaningfully onto psychology-specific learning outcomes. Also, because of the varied formats and goals associated with undergraduate research, the measure would need to be flexible. Rubrics are flexible like self-reports but offer a more direct form of learning assessment. Using a rubric, research mentors could provide authentic and accurate ratings of student achievement across shared domains of learning associated with undergraduate research experiences.

Several existing rubrics could be implemented in the assessment of undergraduate researchers, but each one has limitations. The Association of American Colleges and Universities' VALUE rubrics (Valid Assessment of Learning in Undergraduate Education) are an authentic assessment method for undergraduate outcomes that are designed for implementation across institutions (https://www.aacu.org/value). Most of the 16 VALUE rubrics assess learning outcomes that pertain to undergraduate research (e.g., critical thinking, written communication, problem solving, ethical reasoning), but they have the disadvantage of being neither research-specific nor psychology-specific. Within psychology, the Rubric for Learning, Teaching, and Assessing Scientific Inquiry in Psychology provides a tool for assessing research experiences across 27 skill domains and five levels of performance (Halonen et al., 2003). However, the comprehensiveness of the rubric makes it more suitable for program-level evaluation rather than student-level assessment, and it is not aligned with the APA's (2013) undergraduate goals. Within psychology, the standard definition of what students should learn is the APA's (2013) undergraduate major goals. As such, the APA's goals are an ideal criterion for operationalizing the domains of learning on a common rubric.

In summary, there is broad research support for the positive effects of undergraduate research, but empirical support for specific outcomes and specific mentorship practices is lacking, especially in psychology. To foster assessment and research, in the sections that follow, we outline a rubric that is aligned with the APA (2013) undergraduate goals, as well as best practices in research mentorship, and we suggest a plan of action for implementing the rubric in assessment programs and the scholarship of teaching and learning.

The Best Practices in Undergraduate Research Rubric (BPURR)

To promote the effective mentorship and evaluation of undergraduate research experiences, we propose the implementation of the Best Practices in Undergraduate Research Rubric (BPURR, pronounced *bee-purr*, see Table 2). The rubric stems from the Society for the Teaching of Psychology Taskforce on Improving of Undergraduate Research (STP Improving Undergraduate Research Taskforce, 2020). Members of the taskforce reviewed the literature to synthesize recommendations for mentoring undergraduate research and concluded that the absence of a standardized outcome measure has hampered assessment of learning outcomes and the accumulation of knowledge about effective mentorship. Based on their review of the literature and the APA's (2013) undergraduate learning goals, taskforce members created the rubric to fill the assessment gap.

Mentors can use this analytic rubric to guide their approach to undergraduate researcher experiences, to assess the learning outcomes, and to operationally define research variables in the scholarship of teaching and learning. The rubric we propose synthesizes best practices in research mentorship and the APA's (2013) learning goals for the undergraduate psychology major. Specifically, each of the learning goals we previously identified as a best practice corresponds to one APA undergraduate psychology major goal and one of the learning outcomes associated with that APA goal. As such, each row of the rubric represents (a) an APA undergraduate learning goal, (b) an APA learning outcome, and (c) a best practice in mentoring undergraduate research. In total, the rubric includes four of the APA's five undergraduate major goals and 10 corresponding learning outcomes. These diverse outcomes illustrate the

Table 2
The Best Practices in Undergraduate Research Rubric (BPURR) and Its Alignment With Learning Goals

Learning goals		Rubric			
APA goal and baccalaureate indicator	Best practice goal	Not assessed	Beginning	Intermediate	Advanced
Goal 2: Scientific inquiry and critical thinking					
2.1 Use scientific reasoning to interpret psychological phenomena (2.1A–2.1E)	Promote the development of research knowledge, skills, and habits of mind.	Not assessed	Cannot reliably explain psychological phenomena using evidence, theory, and appropriate levels of complexity. Succumbs to flaws and fallacies in explanations.	Explains psychological phenomena using evidence, theory, and appropriate levels of complexity most of the time. Mostly avoids flaws and fallacies in explanations.	Explains psychological phenomena using evidence, theory, and appropriate levels of complexity. Avoids flaws and fallacies in explanations.
2.2 Demonstrate psychology information literacy (2.2A–2.2E)	Promote the development of research knowledge, skills, and habits of mind.	Not assessed	Cannot reliably locate relevant scholarly sources. Not able to read, interpret, or evaluate scholarly sources.	Locates relevant scholarly sources unsystematically. Able to read, interpret, and evaluate some types of scholarly sources.	Strategically locates relevant scholarly sources. Reads, interprets, and evaluates most types of scholarly sources.
2.3 Engage in innovative and integrative thinking and problem solving (2.3A–2.3C)	Promote the development of research knowledge, skills, and habits of mind.	Not assessed	Cannot consistently produce problem-solving strategies.	Creates, evaluates, and selects problem-solving strategies that are not optimal.	Creates, evaluates, and selects optimal problem-solving strategies.
2.4 Interpret, design, and conduct basic psychological research (2.4A–2.4G)	Promote the development of research knowledge, skills, and habits of mind.	Not assessed	Can conduct few basic research procedures or analyses, has difficulty interpreting and evaluating research-based claims.	Can competently conduct basic research procedures and analyses, as well as interpret and evaluate research-based claims with some accuracy.	Can skillfully conduct basic research procedures and analyses, as well as accurately interpret and evaluate research-based claims.
2.5 Incorporate sociocultural factors in scientific inquiry (2.5A–2.5D)	Promote the development of research knowledge, skills, and habits of mind.	Not assessed	Cannot reliably recognize sociocultural factors in research.	Can recognize sociocultural factors in research designs and results.	Can evaluate sociocultural factors in the design and results of research and design research to effectively address the factors.
Goal 3: Ethical and social responsibility in a diverse world					
3.1 Apply ethical standards to evaluate psychological science and practice (3.1A–3.1D)	Promote the development of research ethics.	Not assessed	Unaware of ethical practices or unable to follow ethical research practices.	Can follow basic APA Ethics Code policies.	Can use the APA Ethics Code to guide and evaluate research practices.
Goal 4: Communication					
4.1 Demonstrate effective writing for different purposes (4.1A–4.1G)	Encourage students to present research findings in professional settings	Not assessed	Can craft written communications that show basic awareness of APA style.	Can craft written communications that are mostly consistent with APA style and that include arguments and data.	Can use APA style to craft clear, concise written communications that include persuasive arguments and data.

(*table continues*)

Table 2 (*continued*)

Learning goals		Rubric			
APA goal and baccalaureate indicator	Best practice goal	Not assessed	Beginning	Intermediate	Advanced
4.2 Exhibit effective presentation skills for different purposes (4.2A–4.2E)	Encourage students to present research findings in professional settings	Not assessed	Can deliver oral presentations that attempt to integrate visual elements, psychological literature, format constraints, and responses to questions.	Can deliver coherent oral presentations that somewhat effectively integrate visual elements, psychological literature, format constraints, and responses to questions.	Can deliver coherent oral presentations that effectively integrate visual elements, psychological literature, format constraints, and responses to questions.
Goal 5: Professional development					
5.4 Enhance teamwork capacity (5.4A–5.4F)	Promote team spirit and collegiality	Not assessed	Cannot reliably use perspective taking, problem solving, organizational strategies, or cross-cultural competencies. Cannot reliably collaborate on group projects.	Sometimes uses perspective taking, problem solving, organizational strategies, and cross-cultural competencies to collaborate with some success on group projects.	Can effectively use perspective taking, problem solving, organizational strategies, and cross-cultural competencies to collaborate successfully on complex group projects.
5.5 Develop meaningful professional direction for life after graduation (5.5A–5.5F)	Promote professional identity development	Not assessed	Cannot formulate career plans, has not engaged in career self-assessments or evaluations of work/graduate school settings. Is unaware of career competencies.	Career plans are underdeveloped or not based on self-assessment and evaluation of work/graduate school settings. Is aware of the career competencies that belong on a resume or CV.	Can formulate career plans based on self-assessment and evaluation of work/graduate school settings and document career competencies using a resume or CV.

Note. A copy of the rubric and a scoring sheet are available on the Open Science Framework (https://osf.io/u8jpk/).

integrative nature of undergraduate research experiences.

Columns on the rubric represent the levels of performance achieved by undergraduates. The APA's (2013) baccalaureate-level indicators form the operational definitions of the performance levels. Each level of performance represents how completely students have achieved the baccalaureate-level indicators as they relate to research. For example, the first row of the rubric assesses Baccalaureate Indicators 2.1A through 2.1E from the learning outcome "use scientific reasoning to interpret psychological phenomena," which falls under the learning goal of "scientific inquiry and problem solving" (APA, 2013, p. 20). The three levels of performance on the rubric are nonoverlapping categories that generally describe undergraduate performance before engaging in research experiences (beginning), after research experiences have led to partial achievement of outcomes (intermediate), and after advanced research experiences have led to complete achievement of outcomes (advanced).

Research mentors can use the rubric to assess the outcomes of undergraduate research across a range of experiences at the associate and baccalaureate levels. Independent or collaborative research conducted under the supervision of a professor may be the ideal experience for students to reach the advanced performance levels, but the rubric could also be implemented in research methods classes with applied components or in content-based courses with required laboratories. Mentors can share both the rubric and results of evaluations with students to help them understand what they should be gaining from research experiences. Not every research experience will address all 10 learning outcomes, which is why there is an option to select "not assessed." However, if a research experience does not relate to learning outcomes on the rubric, that may encourage research mentors to expand learning opportunities for students, or it may signal to students that they need to pursue further research activities.

Conclusion and Recommendations

According to the best practices established by experts, undergraduate research should consist of planned experiences that include scaffolded learning opportunities, regular contact with a research team and mentor, and systematic assessment and feedback on student learning. As a result of these experiences, students should develop content knowledge and skills related to research, communication, and professional development, each of which is related to specific learning goals for the psychology major (APA, 2013). Despite expert consensus on best practices, direct empirical support for them is weak, especially as it relates to undergraduate research in psychology. To allow the empirical knowledge base surrounding undergraduate research in psychology to grow, we created a rubric that aligns best practice learning goals with the APA (2013) learning goals, and we propose that teachers, mentors, and researchers implement the rubric to overcome the limitations of previous studies.

Scholarship on undergraduate research experiences in psychology and its effective mentorship is limited by methodological flaws. Studies on the topic tend to be based on self-report measures of learning and small, single-institution samples. A rubric offers a more direct measure of learning and addresses the overreliance on student self-report measures in the literature. In fact, it may be the most direct measure feasible because there are simply too many learning goals associated with research to assess them all directly. In addition, the availability of a common rubric will allow researchers to collaborate in collecting larger, more representative samples. Scholarship on research mentorship is difficult because of the small number of students who participate in undergraduate research experiences on any given campus. To address this difficulty, researchers should collaborate across institutions with this rubric as their shared outcome measure. Ideally, a large, multisite study should occur in which mentors report student performance using this rubric in conjunction with the extent to which they utilized the aforementioned best practices. Such a design would yield informative data on the relation between mentorship practices and the acquisition of certain skills.

In addition to its research utility, the rubric is a useful tool for closing the assessment loop. Model teachers engage in the assessment process by setting clear learning goals before the start of an educational experience, systematically assessing student achievement of the goals, and then reflecting on the outcomes of the

assessment to make improvements (Richmond et al., 2014). By using the new rubric, teachers have a readymade assessment plan when mentoring research. The goals are preset, the assessment method is perfectly aligned with the goals, and outcomes are associated with a clear metric on which to judge student learning. Mentors should use the rubric to set performance benchmarks before the learning experience begins. They should also create a plan to gather data on student learning using the rubric. For example, summative rubric scores collected at the end of each research experience could be the basis for tracking student learning, or multiple administrations of the rubric across a research experience could document student growth. Whatever data is collected, the key step is for mentors to reflect on the outcomes and plan ways that they could move more students to higher levels of performance on the rubric.

To illustrate the rubric's utility in closing the feedback loop, consider a teacher who evaluates students working in their research lab using the rubric and finds them to be at the advanced level for the scientific and critical thinking goals but at the beginning level for the communication goals. Upon reflection, the teacher may realize that the undergraduate researchers have extensive experience conducting research procedures but are never privy to the outcomes of that research or resulting publications. In response, the teacher could require students to present at an undergraduate research conference and then reassess using the rubric.

The rubric could also benefit program-level psychology curricula. Just as with individual research mentors, psychology programs could also implement the rubric as an assessment of major outcomes. The rubric's alignment with APA (2013) undergraduate goals makes it particularly useful for assessment of outcomes within the major. In addition, programs could use the rubric in planning course goals and sequences. Faculty could select what courses align with what goals on the rubric, and they could determine performance expectations for students at different course levels. For example, faculty might set an expectation that students in an introductory research methods course be at the proficient level for the scientific and critical thinking goals, and they might set an expectation for students in a capstone research course to be at the advanced level for those same goals. Ultimately, the ideal is for students to achieve all of the APA (2013) goals, but use of the rubric may provide additional structure for ensuring that psychology curricula reach that ideal.

The purpose of this article is to propose the rubric as an assessment tool, and future research is needed to establish the rubric's practical utility. Pilot studies are needed to demonstrate that the rubric is equally useful across varied institutions and research experiences. For example, the mission of community colleges often results in a curriculum focused on lower-level courses and a limited research infrastructure. As such, there is a need to establish fit between the outcomes on the rubric and typical research experiences available at community colleges. The rubric likely fits best with the prototypical research experience of a faculty member providing mentorship to students outside of the classroom. To ensure its applicability across other models of mentorship, the rubric should be piloted using other research models such as courses with laboratories, capstone courses, internships, and paid research assistantships.

Research is also needed to further establish the rubric's validity. The content validity of the rubric is inherently strong due to relation to the APA (2013) undergraduate goals. In contrast, researchers need to document its construct validity. Just as self-reports by students may be biased, research mentors may not be able to objectively evaluate students. For example, mentors may inflate their evaluations because of favoritism toward the students or because negative evaluations would reflect poorly on their mentorship abilities. To address these possible limitations, researchers could document associations between the rubric and other known measures of the APA (2013) undergraduate goals, such as the measures housed in the APA's Project Assessment website (http://pass.apa.org/). Research assessing the rubric's criterion validity is also needed. For example, the scores might be used to predict criteria such as research productivity, graduate school acceptance, and career success.

In conclusion, it seems obvious to state that undergraduate research is a beneficial part of psychology students' education. However, empirical evidence supporting that statement is sparse. Moreover, even less empirical evidence is available to inform the effective mentorship

of undergraduate research. To bolster effective research mentorship and its assessment, we have proposed a set of best practices for research mentors and a method for evaluating the outcomes of undergraduate research experiences. With these tools, it will be easier for teachers, mentors, and researchers to produce the empirical evidence needed to document the positive effects of undergraduate research experiences in psychology.

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Received January 30, 2020
Revision received April 24, 2020
Accepted June 24, 2020 ■