What do Undergraduate Students Learn from Participating in Psychological Research?

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Abstract

Researchers often rely on undergraduate students to participate in psychological studies and so ethical guidelines state that there must be educational value to their participation. In previous studies that have asked undergraduates if they felt they learned something new from participating in research, students have generally said yes. However, we know relatively little about what specifically they are learning. The current study aimed to extend previous research by asking undergraduate participants (N = 479), who had all taken part in at least one psychology study, to indicate *if* and *what* they learned about the research process, themselves, or other people as a result of their participation. Participants were also asked to recommend ways to make participating in studies more educational. Our findings suggest that the majority of participants are learning from their participation; most often about the design or process of research, but also sometimes about their own psychology or that of other people. Based on students' feedback, we provide specific recommendations for further improving the educational potential of studies.

Keywords: Undergraduate students; Research participation; Educational value

Introduction

Recruiting individuals to participate in research can be time-consuming and costly. As a result, faculty members and graduate students in psychology have frequently relied on recruiting undergraduate students – who often participate in exchange for course credit – for their studies. For instance, Arnett (2008) examined all studies published in the Journal of Personality and Social Psychology (JPSP) in 2007, finding that 67% and 80% of publications from the US and from other countries, respectively, used undergraduate students as their sample. More recently, Anderson et al. (2018) examined samples of studies published in JPSP, Personality and Social Psychology Bulletin, and the Journal of Experimental Social Psychology, in 2005, 2010, and 2015. Although the proportion of studies using undergraduate students declined over that time – reflecting the rise of online crowd-sourcing participation platforms such as Amazon Mechanical Turk (MTurk) – approximately 44% of studies published in those three journals in 2015 still used undergraduate samples.

Despite the recent decline in their use, undergraduate participant pools are likely here to stay. There are certainly clear limitations to the over-reliance on undergraduate samples in psychology, however, such as the resulting over-representation of people from so-called WEIRD (Western, Educated, Industrialized, Rich, and Democratic) countries (Henrich et al., 2010; Peterson, 2001), and the corresponding lack of generalizability to people from non-WEIRD countries. Additionally, in some of their obvious benefits, such as convenience, undergraduate participant pools have been outstripped by online recruitment sources such as MTurk. However, undergraduate samples are still relatively convenient, cost-effective, and – despite their limitations – can assist us in answering some important research questions (e.g., VanWormer, Jordan, & Blalock, 2014), including, notably, those addressed by the Scholarship of Teaching

and Learning. Given these benefits, the use of undergraduate samples is unlikely to completely halt in the near future.

Clearly then, undergraduate participant pools still hold value to researchers, but what is their value to the undergraduate participants themselves? The American Psychological Association (APA) has argued that it is important for undergraduate students to benefit from their research participation experience. Specifically, undergraduate participation in research must have educational value (Sales & Folkman, 2000). Accordingly, the present study examined if and what students learned from their participation in psychological research, and had three specific aims: 1) to replicate previous literature that suggests that students perceive their participation in such research as educational; 2) to extend the literature by identifying what *specifically* students believe they are learning from their participation; and 3) to provide recommendations to academic institutions to ensure undergraduate students receive educational benefits from their participation.

Undergraduate Students' Perceptions of Participating in Psychological Research

Previous research has consistently shown that undergraduate students perceive their experience of participating in psychological studies as educational, positive, and beneficial to them (Bowman & Waite, 2003; Darling, Goedert, Ceynar, Shore, & Anderson, 2007; Elliot, Rice, Tradimow, Madson, & Hipshur, 2010; Landrum & Chastain, 1995; Rosell et al., 2005; VanWormer et al., 2014). For example, VanWormer and colleagues (2014) found that undergraduate students reported increased understanding of, and interest in, research after participating in studies. In fact, 71% of their participants reported that they learned more about the research process by participating in a study compared to attending a classroom lecture.

Bowman and Waite (2003) asked 774 undergraduate students about their perceptions of participating in psychological studies and found that students who had participated in at least one study reported more positive perceptions of research, a stronger understanding of research procedures, and a higher interest in the field of psychology compared to students who had not participated. They acknowledged, however, that their cross-sectional design limits our ability to make a causal connection between participating in research studies and these positive outcomes. That is, rather than research participation fostering positive perceptions of research and greater interest in psychology, it is possible that undergraduate students who held more favorable attitudes to research and psychology in the first place were simply more likely to sign-up to participate in one or more research studies.

To attempt to overcome this limitation, Rosell and colleagues (2005) implemented a repeated measures design, assessing 212 participants' knowledge of scientific methodology used in psychological studies at three different time points: (1) during the first week of the term; (2) after an introduction to psychological research methods in their classroom, and; (3) at the end of the term. Between the first week of the term and the research methods class, students' knowledge of the ethics and methodology involved in psychological research did not improve. But between the research methods class and the end of the term – the period during which students began to participate in psychological studies – their knowledge of research processes, such as participants' ethical rights, improved (Rosell et al., 2005). These findings suggest that participating in psychological studies, in addition to learning research methods in the classroom, is an educational experience for undergraduate students.

Taken as a whole, these studies provide consistent support for the suggestion that universities that require undergraduate psychology students to participate in research are

successfully adhering to the APA guidelines in ensuring that research has educational value. A limitation of these studies, however, is that the full range of possible benefits that students might derive from research participation has not been examined. Instead, the benefits previous studies have examined have been mostly limited to understanding the *processes* of research. Although undoubtedly important, asking students open-ended questions about their research participation might potentially uncover other benefits, such as students learning about the specific *content* involved in research studies. For instance, students might learn more about the psychological characteristics of people in general – such as learning that people can be susceptible to false memories from taking part in a study of the fallibility of eyewitness testimony – or of themselves – such as learning that they themselves are susceptible to false memories from taking part in the same study.

So, although students seem to reliably self-report that they learn about the process of research from their participation in research, there are other largely-unexplored possibilities for what exactly students might learn from research participation. To highlight one famous example of such possibilities, we note that Milgram (1964) reported that 74% of the participants in his obedience studies indicated that they learned something "of personal importance" (p. 849) from their participation; one year after participating, one participant stated, "this experiment has strengthened my belief that a man should avoid harm to his fellow man even at the risk of violating authority" (Milgram, 1964, p. 850). Milgram's experiments were no doubt powerful learning experiences for his participants, and it is unlikely that the average psychology study today would have such dramatic effects on participants' self-knowledge. But given that all psychology studies share the broad goal of revealing the reasons why people think, feel, and act the way they do, it surely remains possible that research participants learn something about their

own psychology or that of other people from their participation, even if it is just that they happen to score highly on this or that personality dimension.

A study by Darling and colleagues (2007) provides some suggestion that students might learn about more than just the process of research from participating in research studies. In response to open-ended questions, they asked undergraduate students to write about what they gained from participating in studies. In line with previous research, some wrote that they gained a better understanding of the process of conducting a study (22%) but some also reported better understanding of the psychological content of a study (18%). Unfortunately, Darling et al.'s paper contains few details – and no examples – of what students were referring to when claiming that they had learned about psychological content from their participation. Therefore, we still have a limited understanding of how undergraduate students are specifically benefiting from their participation in psychological studies beyond learning about the process of research. In addition, it would be beneficial to ask undergraduate student participants themselves how their experiences in participating in psychological studies could be improved.

Current Study

The current study aimed to address these gaps in the existing literature. Specially, in this study, we aimed to: 1) replicate previous research by surveying undergraduate students' perceptions of participating in psychological studies; 2) extend previous research by using open-ended questions to identify the specific benefits students say they receive from participating in research studies; and 3) identify undergraduate students' recommendations for enhancing the educational value of participating in research. By understanding these specific benefits and recommendations, researchers can better understand the educational value of students'

participation in psychological studies, and potentially tailor aspects of their studies to incorporate components that students identify as particularly beneficial to their learning experiences.

Method

Participants

Participants were 509 undergraduate students at a Canadian university who were enrolled in a first-year psychology course. At this university, undergraduate students enrolled in introductory psychology courses can earn up to 3% course credit from participating in research studies. The credit that students can earn for each study is dependent on the study time length; students earn 0.5% credit for every 30 minutes they participate, with individual studies ranging from 30 minutes to two hours. To sign up for participation, students access an online website with a list of available studies and timeslots, through which they are provided with a description of each study, including the type of tasks and/or questions it involves, the area of psychology the study represents, the expected time commitment, and the risks and benefits of participation. They are also informed about the location of the study (i.e., online or in a lab), and the amount of course credit they will receive for participation in each study. To earn the 3% course credit, students must sign up for these studies; however, they are informed about their right to withdraw at any point and/or participate in a walk-through where they learn about the study procedure without their data being collected. In both cases, students still receive credit for their participation. To maximize the chances that participants had taken part in at least one research study prior to participating in ours, we surveyed participants either: (1) near the end of their first semester of introductory psychology, or (2) during their second semester of introductory psychology. Participants who indicated they had not participated in any previous psychological studies were removed from analyses. The final sample consisted of 479 participants. The largest

groups of our participants majored in Social Work (16.5%), Psychology (14.8%), and Child and Youth Care (14.4%), with the rest of the sample comprising other majors such as Biology, Nursing, English, and Criminology. Participants' age ranged from 17 to 56, $M = 20.02$, $SD = 4.28$. Our sample was predominantly female (85.1%), with 12.7% identifying as male, 0.6% identifying as Transgender, and 0.6% identifying as 'Other'.

Materials

Perceptions of participation: The HSP-Attitudes Scale (Miles, Cromer, & Narayan, 2015). The original measure is a 39-item self-report questionnaire that identifies students' perceptions of participating in research studies. Of the questionnaires' original four sections, the current study used three. The first section assesses perceptions of the costs of research participation (10 items) such as "I became stressed trying to finish the required hours;" the second section assesses perceptions of the benefits of research participation (9 items) such as "I am part of the new knowledge that is being built;" and the third section assesses perceptions of the educational value of research participation (12 items) such as "I better understand research methods." Participants responded to each item using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Miles et al. (2015) reported good internal consistency for the costs scale ($\alpha = .80$), the benefits scale ($\alpha = .87$), and the education scale ($\alpha = .87$). The current study also reported good internal consistency for all three scales ($\alpha = .79$, $\alpha = .92$, $\alpha = .92$, respectively).

Knowledge-testing questions. We asked participants to answer a series of six multiple-choice questions, with four choices for each question, to assess their level of knowledge about process components of psychological research (see Appendix). Following each question, we asked participants whether they learned this information during their participation in a

psychological experiment and/or during a lecture. These multiple-choice questions were created by the researchers.

Specific benefits of participation. We asked participants to think about a specific study that they had participated in and that they felt they had learned something from. Open-ended questions asked participants to write about what, if anything, they learned about the research process, themselves, or about other people from taking part in that study. Participants were informed that if they "felt like they did not learn anything from the study" then they could indicate that. These open-ended questions were created by the researchers.

Enhancing the educational value of research participation. In a final open-ended question we also asked participants for their recommendations as to how we could "make psychological studies more educational and informative for psychology students."

Demographic questionnaire. We asked participants to indicate their age, gender, program they were enrolled in at the university, overall GPA, and final grade in their psychology class. We also asked participants to indicate how many studies they had participated in overall, and how many of those were completed online versus in the lab.

Procedure

After providing consent, participants completed the thirty-minute study online. Participants first answered the six knowledge questions and the HSP-Attitudes Scale. Following this, they provided responses to the open-ended questions assessing whether they learned anything specific about the research process, themselves, or anyone else and gave their recommendations for improving the educational benefits of participation. They finished by

providing demographic information. Participants were then debriefed and received course credit for their participation.

Results

Available Studies

There was a total of 19 studies that students in our sample could have potentially participated in. Of the 19 studies, a broad range of areas were represented such as social, forensic, neuroscience, cognitive, health, and clinical psychology. Participants indicated that they completed a minimum of 1 and a maximum of 9 studies, $M = 3.57$, $SD = 1.12$. Participants were more likely to have participated in online studies, $M = 2.68$, $SD = 1.4$, rather than in-lab studies, $M = 0.89$ $SD = .91$.

Perceptions of Participation

Participants' mean score on the HSP-Attitudes scale assessing the costs associated with participation, $M = 2.36$ $SD = .73$, was significantly lower than the mid-point of the scale, $t(478) = 19.29$, $p < .001$, indicating that on average, participants were more likely to disagree than agree that their participation was costly. Participants' mean score on the scale assessing the benefits associated with participation, $M = 3.77$, $SD = .70$, was significantly higher than the mid-point of the scale, $t(478) = 23.97$, $p < .001$, indicating that on average, participants were more likely to agree than to disagree that there were benefits to their participation. Participants' mean score on the scale assessing the educational component associated with participation, $M = 3.71$, $SD = .65$, was significantly higher than the mid-point of the scale, $t(477) = 24.26$, $p < .001$, indicating that participants were more likely to agree than to disagree that they obtained something of educational value from their participation.

Knowledge-Testing Questions

Of the six multiple-choice questions assessing knowledge of aspects of the research process, the overall correct number of answers ranged from 0 to 6, with a mean of 4.41, *SD* = 1.33, indicating participants have, on average, a good understanding of the research process. Participants were more likely to correctly answer questions related to the purpose of deception in an experiment (97.1%), the definition of a hypothesis (87.9%), and the informed consent process (75.6%). Participants were less likely to correctly answer questions related to the definition of a dependent variable (64.3%), an independent variable (60.1%), and the debriefing process (56.4%). Overall, participants reported learning the information needed to answer these questions more often during lectures (with between 61.2% and 90% of participants giving lectures as the source of the information) than during their participation in research studies (ranging from 14.8% to 36.7% of participants citing participation as the source).

Specific Benefits of Participation

To assess specific benefits of participation, we asked participants to think about one specific study they had participated in and to indicate whether they learned anything from their participation in three areas: (1) the research process, (2) something about themselves, and (3) something about other people. Only 47 (9.8%) participants indicated they learned nothing about either the research process, themselves, or other people from their participation. Open-ended responses from the other 432 participants who said they learned something about at least one of those things were analyzed using a thematic analysis approach (Braun & Clark, 2006). Using an inductive approach to analyze responses, themes were assimilated as they emerged. The first and second authors independently conducted analyses on the responses, and all discrepancies were resolved by discussion. Interrater-reliability between authors' ratings for each theme was

assessed by calculating Cohen's kappa; reliability between authors was excellent (McHugh, 2012) for the three themes associated with the specific benefits participants obtained from participation ($\kappa = .90$ for "the research process"; $\kappa = .90$ for "themselves"; $\kappa = .93$ for "other people").

The research process. Participants were asked whether they learned anything new about the research process from their participation. Out of 479 participants, we received 475 responses. Responses to this question were initially coded as yes or no. Of the 475 responses, 209 participants (44%) indicated that they did not learn anything new about research, and 266 participants (56%) indicated that they did learn something new about research. We coded "yes" responses as either specific or general; that is, we coded whether participants explained what specifically they had learned about the research process (i.e., specific; 177 responses) rather than just simply stating *that* they had learned something about research (i.e., general; 89 responses). The 177 specific responses revealed three main emerging themes. The first theme "Research Design" represents participants ($N = 84$) who wrote that they learned something new about the methods or materials that researchers use to answer a research question. For example, participants stated, "*I learned many of the factors in the experiment are controlled for and are very particular for researchers in any study;*" and "*I learned that some of the researchers used surveys that have been created by somebody else years ago, I always thought each researcher had to create their own survey.*" The second theme, "Research Process" represents participants ($N = 81$) who described that they learned something new about the steps or procedures involved in conducting a study. For instance, participants stated "*yes, the process is tedious, time consuming, lots of consent is needed;"* and *"Yes, I wasn't told the true purpose of the study until after participating. It was interesting to see how not disclosing that information can affect*

participants and their answers." The last theme, "Research Setting" represented participants (*N* = 29) who described that they learned something new about the physical environment associated with conducting a study. For example, participants described that "*Yes, I learned what the environment is like when you are a participant in a study (i.e., left alone in a quiet room with nothing but a computer and a trash bin)."*

Themselves. Participants were asked whether they learned anything new about themselves from participating in research. Out of 479 participants, we received 471 responses. Responses to this question were initially coded as yes or no. Of the 471 responses, 324 participants (68.8%) indicated that they did not learn anything new about themselves, and 147 participants (31.2%) indicated that they did learn something new about themselves. We coded "yes" responses as either specific or general; that is, we coded whether participants explained what specifically they had learned about themselves (i.e., specific; 135 responses) rather than just simply stating *that* they had learned something about themselves (i.e. general; 18 responses). The 135 specific responses revealed two main emerging themes; the first theme, "Individual Characteristics" represents participants (*N* = 107) who explained that they learned something about their own personality or cognitive characteristics, or the situational factors that may influence their thoughts, feelings, or behaviour, during their participation. For example, participants specified that "*My self-image (perfectionism) is more affected by the media's portrayal of women than I thought;*" and "*I learned that I might be susceptible to pressure to sign a false confession.*" The second theme, "Future Directions" represented participants (*N* = 28) who indicated that they learned that they wanted to pursue either psychology or research in the future. For example, participants stated, "*I enjoyed being a participant and would welcome*

the opportunity to conduct research;" and "*The studies were fun to participate in and had me thinking if this is an area of psychology I would like to explore."*

Other people. Participants were asked whether they learned anything new about other people from participating in research. Out of 479 participants, we received 477 responses. Responses to this question were initially coded as yes or no. Of the 477 responses, 357 participants (74.8%) indicated that they did not learn anything new about other people, and 120 participants (25.2%) indicated that they did learn something new about other people. We coded "yes" responses as either specific or general; that is, we coded whether participants explained specifically what they had learned about other people (i.e., specific; 90 responses) rather than just simply stating *that* they had learned something about other people (i.e., general; 30 responses). Only one main theme emerged from the 90 specific responses. Participants indicated that they learned "General characteristics"; the personality or cognitive characteristics and/or situational variables involved in everyone's thoughts, feelings, and behaviour. For example, participants stated they learned that "*we are all biased and can be persuaded when given new information; we also trust the information given to us (without asking to see evidence) when it is from a figure of authority*;" and "*I learned that although people claim social media does not affect them, subconsciously, we are all affected by it to some degree."*

Enhancing the Educational Value Associated with Participating in Research

Participants were also asked to explain if and how psychological studies could be more educational and informative for psychology students. Of the 479 participants, we received 436 responses. Responses were initially coded as yes or no. Of the 436 responses, 58 participants (13.3%) indicated "no"; that nothing was needed to make studies more educational or informative. Coding responses as general or specific was not appropriate for this question, as all

"yes" responses were specific recommendations. Of the 394 "yes" responses, four themes emerged. Inter-rater reliability for these four themes was good (ranging from $\kappa = .74$ to $\kappa = .88$). The first theme "Debriefing" represents participants (*N*= 93) who indicated that a more thorough debriefing session was required, including the recommendation that researchers give participants the results of the study when the study is finished. For example, participants stated that "*Letting the participants have access to the results (even just a summary of findings) would be helpful - both to see how their participation did contribute to the research, and to actually learn about the study/findings."* In addition, one participant explained that researchers should "*Maybe have a description of what their research findings could result in. How they could potentially help if their theory is confirmed."*

The second theme to emerge, "Availability," encompasses participants' (N = 108) concerns with the availability and diversity of studies being offered to them; specifically, participants indicated that researchers should *"Have more experiments offered. Would help students find experiments they are more interested in and more likely to learn more from them if they are truly interested in them."* Participants also suggested *"Perhaps by giving a wider range of studies for students to participate in, that way they can learn about the different ways which psychological studies are conducted."*

The third theme to emerge, "Connecting the Research" refers to participants' (N = 107) recommendations that researchers make a stronger connection between the studies that participants take part in and their class content and everyday life. For example, one participant suggested that "*the studies should relate more to the content learned within the lectures. Although the foundations are there, it feels as though it is a pointless part of the curriculum"* Another participant recommended that researchers create studies that are "*more geared to our*

age group (more on social issues and how our social location could affect our behaviours/mental health status, less on just the mental health status alone."

The fourth theme to emerge, "Engaging," represents participants (N = 70) recommendations that researchers make the studies more interactive and engaging to keep participants' attention. For example, participants recommended that researchers should create studies that are "*more interactive rather than Q and As (Videos, simulations...)*" and include "*more of new technology*" and "*game related concepts so students will be more eager to participate*." Specifically, one participant stated,

> The study I completed in the lab was actually conducted on a computer. Therefore, it was exactly like doing an online study but inside the Psychology Building. I think if students have to go to the lab to participate, the study should be more like the videos of experiments we see in class.

Discussion

Our goals were to contribute to and extend previous research examining undergraduate students' perceptions of, and their learning from, participation in psychological studies. Although previous research has demonstrated that undergraduate students have positive perceptions toward participating in research, and report learning something from their participation, the majority of these studies only asked participants to indicate *if* they had learned something, rather than to expand on *what* they had learned (e.g., Bowman & Waite, 2003; Darling et al., 2007; Elliot et al., 2010; Rosell et al., 2005; VanWormer et al., 2014). Similar to previous studies (e.g., Miles et al., 2015), our undergraduate students were more likely to agree than to disagree that there were benefits and educational value to their participation and were more likely to disagree than to agree that there were significant costs. Our knowledge questions revealed that participants' knowledge of the research process was high, with the majority of our participants answering the

questions correctly, and – depending on the question – a significant minority indicating that this knowledge was at least partly learned from their research participation.

We further asked participants to think about one specific study they participated in, and to indicate *if*, and *what* they had learned about the research process, themselves, or other people from the study. Encouragingly, 90% of our sample reported learning something from at least one of these three categories from their participation. Our results are thus consistent with previous research suggesting that participants are learning from their participation in psychological studies. Moreover, we identified several different categories of specific things that participants learned from research participation. In particular, just over half of our participants reported learning something about the research design, process, or setting as a result of their participation. In addition, just under a third of our participants also indicated learning something about their own psychology, while approximately a quarter learned something about other people's psychology. A healthy minority of students thus reported that participating in a research study taught them something about the personality, cognitive, or situational variables that affect their own or other people's thoughts, feelings, or behaviour.

The above notwithstanding, there does seem to be room for improvement. We asked participants to provide recommendations for making studies more educational. Although some of the students' recommendations about making studies more educational may not be feasible or desirable (e.g., providing a study's results immediately at debriefing), we believe it is worth considering their perspectives on what makes research participation more or less educational. Participants believed that there was room for improvement in four key areas: 1) availability of the studies; 2) ensuring the studies are engaging; 3) improving the debriefing process; and 4) connecting the research to class content.

Availability and Engagement

Although participants commented that they wanted a greater range of studies to choose from, the students in our sample had a total of 19 studies available to participate in. These came from a broad range of areas within psychology such as clinical, health, cognitive, social, and forensic psychology. However, it is possible that it is not necessarily the number of studies or the particular areas of psychology that were represented that students were concerned about; instead students may have been interested in participating in studies with a more diverse, and engaging, set of methods. Our participants were much more likely to participate in online studies compared to studies conducted in a lab. As reflected in students' comments, many of these studies consisted of questionnaires (just "Q and A's") and this may have contributed to the perception that the studies were not engaging. To remedy this, students recommended incorporating more audiovisual aids, game-related concepts, videos, and virtual environments, into the research studies. Although it may be more time-consuming and effortful for researchers to ensure that students are fully engaged in a study, students may pay more attention to their responses when engaged, and therefore yield more reliable data. Researchers have not yet examined participants' perceptions of the research methodologies that engage them, but we hypothesize, given literature on engaging students in a lecture, that similar strategies would yield beneficial results. For example, active learning techniques – such as problem-based learning and using technological devices – have positive impacts on student engagement in the classroom (e.g., Blasco-Arcas, Buil, Hernández-Ortega, Sese, 2013; Savin-Baden, 2016). Perhaps there are lessons to be learned from the classroom that might be used to create more engaging research studies.

Debriefing and Connecting to Class Content

Our participants also recommended that debriefing sessions could be improved, to include more information about the study. Full debriefing of participants has been established as an ethical principle by the APA's (2017) *Ethical Principles of Psychologists and Code of Conduct* in Section 8.08. The extent to which researchers adhere to this principle, however, remains unknown; only 32.4% of authors who published in JPSP from 2006 to 2007 reported in their articles that participants were debriefed (Sharpe & Faye, 2009). Although it is likely that many of the other 77.6% did conduct a debriefing, there was a small proportion of authors who reported not doing so (Sharpe & Faye, 2009). These findings suggest that undergraduate research participants might benefit from the development of a more standardized debriefing process for researchers to follow.

Brody, Gluck, and Aragon (2000) examined students' perceptions of the debriefing process and reported that 29% of their participants believed the debriefing was unclear, and 12% indicated the session was not long enough. Qualitative responses from their undergraduate participants varied, suggesting that researchers are conducting the debriefing process idiosyncratically (Brody et al., 2000). The same is likely to be true of the debriefing experienced by our participants, because debriefing is an individual process that may vary in length, method, and content between researchers. Brody and colleagues found that poor debriefing sessions were characterized as unclear, short, leaving unanswered questions, and not situating the research in a larger context. In contrast, good debriefing sessions were characterized by clearly stating the hypotheses and expected results, connecting the research to the real world, and the experimenter being friendly and appreciative (Brody et al., 2000).

Based on our results, we recommend researchers conduct debriefing sessions in line with Brody et al.'s suggestions to improve the educational value of research. It is important to note, however, that not all students are interested in receiving a comprehensive debriefing, as some are just interested in receiving their course credit (Brody et al., 2000). Perhaps one solution would be to offer participants the option between two different debriefing sessions: a traditional debriefing and a more thorough debriefing. A traditional debriefing should be a conversation between the researcher and participant(s) to ensure they understand the rationale of the study, the different conditions, and expected results. A more thorough debriefing session could be longer and focused on allowing the participant to reflect on their experience and ask questions about the study. In a thorough debriefing, participants could also be informed of previous literature, the independent and dependent variables in the study, the hypotheses, and the connection of the research to real-world implications. In addition, a proportion of our participants recommended connecting the research studies to class content. Not every study will necessarily address research questions that directly map onto the substantive theories and concepts that students are learning about in class. However every debriefing could refer to, and provide concrete examples of, aspects of research design that students are learning about (e.g., "In your intro psych class, you will have learned about independent and dependent variables. In this study, the independent variable was…").

Our participants also suggested that receiving a copy of the results of a study after their participation would increase its educational value. One solution would be for departments to create an online repository of brief summaries of studies that have been completed, detailing the method, results, and implications for undergraduate students to read. Doing this would allow participants to more easily understand how their participation contributed to the discipline of

psychology. In addition to this, another solution could be informing participants that if they are interested in the results of the study, they can give their email address to the researcher, and the researcher can send them a summary of the results following completion. With this option, we suggest the email address is kept separately from the participants' data to ensure anonymity and confidentiality.

Both of these options require students to wait to receive the results from a study until all participants have completed it and the study is over. One way to provide more immediate feedback is for each participant – where possible – to receive some automated, personalized feedback from their own participation. This feedback can be provided upon the participants' completion of the study, for them to review privately, prior to any meeting with the experimenter for debriefing. Arslan, Walther, and Tata (2019) recently built open-source software ("formr") that allows researchers to design survey studies that can automatically provide participants with interactive, graphical forms of just this sort of individualized feedback. For instance, Arslan, Schilling, Gerlach, and Penke (2018) used this software to automatically calculate and display for participants' their sub-scores on each of the Big Five personality traits, showing them, for example, whether they were more or less extraverted than average. The automated calculation and presentation of these scores after participation, but before debriefing, allows participants to review some individualized results from a study without the experimenter being present (to allay privacy concerns). Participants would obviously still have to wait to access a study's full results regarding the overall sample (perhaps via the email or departmental repository options outlined above), but this method provides participants with at least some of their own results from the study immediately upon finishing it.

This personalized approach to providing participants with study results is likely not feasible for all studies. It might even be inadvisable to provide such individualized feedback for any measure where the results could be sensitive or easily be misconstrued as a psychological diagnosis of some sort. Thus, the ethical implications of providing automated individual feedback would need to be thought through carefully on a study-by-study, measure-by-measure basis, and safeguards for ensuring that participants do not misinterpret this information would need to be in place. However, allowing participants to see their own summary scores on any not-especially-sensitive personality or attitudinal scales, or on a cognitive task, or to see how they responded to an experimental manipulation, might encourage them to engage with and reflect on their participation more thoroughly; it might also help them take away some meaningful new information about themselves.

From a pedagogical perspective, providing undergraduate students with the opportunity to participate in psychological studies can be viewed as a form of experiential learning (Kolb, 1984). Experiential learning often results in positive benefits for students' learning as it addresses diverse learning preferences and allows students to make connections with class content (Wright, 2000; Warren, 2012). Kolb's theory of experiential learning (1984) posits that there are four stages that an individual must engage in to effectively learn. The second stage, specifically, reflective observation, refers to the learner reflecting on their new experience, which could be something prompted by an effective debriefing session. Kolb (1984) stated that a learner must interact with all four stages to complete the learning process and have a successful educational experience. Given our participants were least likely to correctly answer the question about debriefing compared to the other knowledge questions, coupled with their recommendations to improve the debriefing process, it is possible that our undergraduate

students were not fully engaging in the reflective stage, and therefore inhibiting their learning process, and lowering the educational value of participating in psychological studies. More effective debriefing practices would likely help students to reflect on, and learn from, their participation in research studies.

Conclusion

The students in our sample had generally positive views of participating in research. Moreover, the majority were able to describe something specific that they learned from their participation, including learning about research design and/or processes, or about themselves or other people. Nevertheless, our research participants still saw room for improvement. Participants' recommended that researchers can improve the educational value of research participation by increasing the diversity of studies offered, ensuring the studies are engaging, and improving the debriefing process. These specific recommendations can perhaps offer researchers ways to adapt their research design and process to ensure we are meeting the APA (2000) ethical guidelines in conducting psychological studies that are not only beneficial to us, but are also educational for undergraduate students.

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