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Why Can't a Student Be More Like an Average Person?: Sampling and Attrition Effects in Social Science Field and Laboratory Experiments

By
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In the social sciences, the use of experimental research has expanded greatly in recent years. For various reasons, most experiments rely on convenience samples of undergraduate university students. This practice, however, might endanger the validity of experimental findings, as we can assume that students will react differently to experimental conditions than the general population. We therefore urge experimental researchers to broaden their pool of participants, despite the obvious practical difficulties this might entail with regard to recruitment and motivation of the participants. We report on an experiment comparing the reactions of student and non-student participants, showing clear and significant differences. A related problem is that differential attrition rates might endanger the effects found in long-term research. We argue that experimental researchers should pay more attention to the characteristics of participants in their experimental design.

Keywords: experimental research; participants; students; attrition

The majority of experimental laboratory research in the social sciences is based on convenience samples. Most of these studies recruit among undergraduate university students. Undergraduates are a convenient target population for researchers, as course credits are often used to render students' participation compulsory. The use of convenience samples and the overrepresentation of undergraduate students have raised some concerns about the external validity of experimental results (Kam, Wilking, and Zechmeister 2007; Levitt and List 2007). Although there might be several research questions for which a student sample is appropriate, research has found that concerns remain about the generalizability of the results to off-campus populations. Moreover, to answer some specific research questions might simply require the inclusion of non-student populations.

In this essay, we make a case for the inclusion of non-student samples in field and laboratory experiments. We particularly focus on the recruitment of people with lower socioeconomic

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status (SES), a group that is largely underrepresented in most research, particularly in experimental projects. In addition, we show that the inclusion of non-student samples can affect the results and implications of the research. Yet our experience shows that recruitment among non-student groups creates new methodological challenges (i.e., recruitment strategy, setting of the experiments, random assignment, incentives, attrition) that are of interest for researchers who intend to include non-students in their experimental design.

An associated problem for experimental researchers is that of attrition of participants. Including different populations such as students and non-students might result in different dropout rates, and thus require different strategies to maintain the motivation of participants. Long-term exposure to experimental manipulations is often rendered difficult because of the tendency of specific groups within the population to drop out of the experiment. As a result, researchers tend to concentrate on effects of a relatively brief exposure, but these can be practically and theoretically less relevant. Retaining participants in a long-lasting experiment, however, is at least as serious a challenge as recruiting a non-compulsory audience for the experiments in the first place.

The Role of Student Samples in Experimental Research

The rise of experimental studies in the social sciences raises an intrinsic problem of sampling strategy. Students are a popular recruitment ground for various social science research projects. In the *Journal of Consumer Research*, for example, college students were increasingly used as subjects in published experimental and non-experimental studies, with a jump from 23 percent to 86 percent of studies over the last twenty-five years (Peterson 2001). In political science research, where experiments have become a favored method of social science

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inference, reliance on student samples is less of a problem. In the top-tier general-interest journals,¹ during the period 1990-2006 about a quarter of the reported field or laboratory experiments were based solely on student samples. Whereas the majority of studies use adult samples for experiments, many of them are simply integrated in nationally representative surveys (*ibid.*). The proportion of student samples for randomized field or laboratory experiments in specialized political science journals,² however, is much higher, hovering around 70 percent (Kam, Wilking, and Zechmeister 2007, 5). Druckman et al. (2006), who distinguish between survey experiments and laboratory experiments, conclude that particularly in laboratory settings, students remain the preferred convenience sample.³

Of course, the use of undergraduate samples has many advantages. Students are easily targeted; they are familiar with the laboratory environment; and their recruitment is facilitated by extra course requirements, credits, and bonus systems. The use of such convenient samples should thus not be discouraged. In fact, Kam, Wilking, and Zechmeister (2007) argue that undergraduate student sampling is a suitable solution for various situations. First, student sampling makes sense when the focus of the research is on a first test of a causal statement for its internal validity. Second, inferences about students are obviously useful when the overall population to which the findings are applied is students, for example, in education research or research on learning.

Other usages of student samples, however, are often more tenuous and usually involve making a leap of faith about the validity of the findings in the general population. Clearly, students differ from the general population in various ways. First, they are young and thus impressionable and open to stimuli. As Sears (1986, 515) noted two decades ago, compared with non-students (and especially older adults), “college students are likely to have less-crystallized attitudes, less-formulated senses of self, stronger cognitive skills, stronger tendencies to comply with authority, and more unstable peer group relationships.” Because of such possible differences, Sears concluded that by relying heavily on what he termed a “narrow database of college students as research subjects,” research might have produced systematic biases (Sears 1986, 515; Peterson 2001, 451). These biases endanger the external validity of any findings as a result of these experiments (Cook and Campbell 1979). One of the conclusions thus was that potential mobilization effects might be simply more pronounced among students solely because of their stage of the life cycle.

By itself, however, this problem is not insurmountable. It makes sense that a research design is developed in such a manner that one tries to detect the effects where they are most likely to occur. During laboratory experiments, participants are exposed to all kinds of stimuli that are usually quite brief and that are not embedded in real-life circumstances. Furthermore, the participants do not decide themselves that they are exposed to these stimuli. For all these reasons, it is highly unlikely that we would detect any effects in the first place. Partly this can be compensated for by conducting experiments with young respondents, who are more likely to respond to stimuli. The fact that students might be more easily impressed than the average population is therefore not a sufficient reason to abandon the use of student convenience samples. The main concern is not only

that students might react more strongly but also that they will react differently to the stimuli than we would expect in the general population. Therefore, even if we would like to understand the effects of a treatment among young people only, students might not be the optimal group from which to sample. The underlying problem is that undergraduate students exhibit systematically higher levels of socioeconomic resources, skills, and interests and potentially higher levels of political knowledge compared with the average population. In particular, being used to getting clues from textbooks and lectures, students might utilize more cognitive effort to get the “right answer” and thus respond to stimuli and related survey questions very differently than other young people would. An additional bias might be that research conducted at top research campuses will get published more easily, while we know that students at these highly selective institutions have specific characteristics, compared to the overall student population. Therefore, we might be led to arrive at conclusions about the effects of stimuli even when the transfer of results from the student to the non-student population is not warranted. This is especially the case if we expect or observe differential effects in various groups of the population. When the variables of interest interact with the target population, it is important to be able to test these differences (James and Sonner 2001; Woloshin, Schwartz, and Welch 2007).

Research by Bellemare and Kröger (2007) provides a telling example of such threats to the external validity. Students behaved significantly differently in various social capital-building experiments than older or less well-educated citizens, as they had a different propensity to invest in common goods. This result made clear that their findings could be validated only by using a general population sample, not by limiting themselves to students only. Furthermore, in a meta-analysis of experimental and non-experimental consumer studies comparing the results of college students with those of non-student samples, Peterson (2001) found that statistical effects of a range of variables were more pronounced in the student samples. Although the effect sizes were larger for students than for non-students, Peterson also noted significantly different results for the two sample types in half of the investigations. There are thus good reasons for concern when utilizing student samples.

The generalizability of laboratory findings to the outside world is, by itself, a perennial concern with regard to experimental research (Levitt and List 2007). To some degree, these problems could be alleviated by broadening the variation within the student sample itself, for example, by including part-time students or by reaching out to community colleges or other institutions. A more radical solution, however, would be to systematically include non-student populations in laboratory experiments.

Limitations of Student Samples: Research on Youth Mobilization

In addition to all the doubts about the exclusive use of student samples, there are obviously specific research questions that require non-student sampling. As an example from our own research experience, we are interested in declining

turnout across established democracies. Much of this decline can be explained by generational replacement. The problem is that this generational effect is most visible among the young and the socially underprivileged groups, such as the unemployed (Bennulf and Hedberg 1999; Hooghe and Stolle 2004; Tam Cho, Gimpel, and Wu 2006; McDevitt and Kioussis 2006). For example, since the 1993 Canadian federal election, turnout in the youngest generation has dropped over 30 percent among high school dropouts and some 15 percent among those who have completed high school and/or some college, but it has held steady among young university graduates. Similarly, in Europe, young socio-economically disadvantaged citizens with low levels of education and higher levels of unemployment are disproportionately turning out less to the polls (Bennulf and Hedberg 1999). Clearly, efforts to foster political engagement need to target young people who are not college-bound (Pasek, Kenski, and Romer 2006).

Field and laboratory experiments are vital here because they make it possible to isolate the effects of different ways of mobilizing young people, free of other confounding factors. Some of the few experiments that have been conducted do not use a full experimental design including pre- and post-test and the inclusion of a control group, or do not study long-term effects (Pinkleton 1998; Addonizio 2004; Hansmann et al. 2005). Among the few exceptions are the quasi-experimental study with randomly assigned students by Bernstein and Meizlish (2003), which includes a longitudinal analysis three years after the treatment, and the study by Phillips (2004), with mobilizational treatments of high school juniors. Most important, though, these studies have typically focused either on high school or university students (Bernstein and Meizlish 2003; Hansmann et al. 2005; Niemi and Junn 1998; Smith 1999). As a result, the policy prescriptions that emerge do not adequately address the alarming decline in political participation on the part of those who are leaving school with only a ninth- or tenth-grade education or those who come from socioeconomically disadvantaged backgrounds or who are young unemployed. Moreover, many strategies that are effective for university-bound adolescents may not work for young people who lack equivalent literacy and other political skills (Nickerson 2006; Tedesco 2007). The theoretical issue and policy puzzle here, then, is about finding generalizable political mobilization strategies that work for young people but that at the same time allow us to address the specific circumstances and needs of populations from a lower socioeconomic background.

In our experiments, we examined the comparative mobilizational potential of face-to-face versus online campaigns developed around the themes of climate change. Because we expect differential results from university students and non-college-bound youth, we sampled participants from high- and low-SES backgrounds. All of the roughly 400 participants, ages 18-25, were exposed to the same mobilization content besides the control group. The non-college-bound population was reached in three different ways in disadvantaged neighborhoods: vocational/professional schools, work and employment programs, and continuing education schools. All participants were exposed to one manipulation tool as well as to one pre-test and two post-tests (immediately after the manipulation and three months following the experimental condition).

Challenges of Including Non-student Samples

Sampling from a non-student population for laboratory or field experiments is not an easy undertaking. The main concern is how to entice people to come to the laboratory setting at the research institute. Our experience shows that just getting respondents with lower education levels to the university campus can be considered a serious challenge in the absence of strong material incentives that are usually not available for social science research. Only a quarter of the scheduled participants showed up to the pilot study in our labs, possibly because of the inconvenience of distance travel to our campus, a general lack of interest in research, or a lack of familiarity with the campus environment.

A more successful approach was creating a “movable” laboratory by bringing all of our equipment and tools into a setting that was more familiar to the potential participants. More concretely, as citizens with a low SES will usually rely on specific social and government services in the community, such as continuing education schools and programs, employment services, conversations with social workers, engagement in the community center, food banks, and youth centers, it is advisable to link mobilization strategies to those activities and places (Callahan 1998; Jupp 2008). Thus, many of our low-SES groups experienced their experimental treatments within the framework of their educational or training classes and programs.

Besides the recruitment difficulties and new strategies to compensate for non-response, participation of respondents from low-SES backgrounds also requires mobilization techniques that use concrete, hands-on, and local examples and information, as this group has fewer political skills available to process information and less scientific knowledge that can serve as background information (Verba, Schlozman, and Brady 1995; Callahan 1998). We relied here on the work of Niemi and Junn (1998), who emphasized that the focus on local politics and neighborhood involvement in civics courses results in a stronger retention of civic knowledge and thus in higher political interest and participation. This proved to be a particularly useful strategy for participants with low education levels. Not only should the mobilization issues and examples be concrete, real, and hands-on—they should also be presented in suitable and accessible language without much scientific or academic jargon (von Trotha and Brown 1982). In addition, mobilization of non-college-bound young adults should heed the issue of the attention span for mobilizing activities. Shorter activities of mobilization are essential here as these participants have been out of school for a while and will usually have a shorter attention span and a harder time concentrating, as our own experience from interviews with pedagogical staff at educational centers shows. However, since the substantive interest was to detect a generalizable mobilization strategy for young people, and possibly a comparison of the effect of mobilizational modes between the less well-educated and student populations, we had to walk a fine line between adapting the experimental treatment to the non-student sample, while still leaving it as generally applicable to young people overall. This proved to be a difficult but not impossible undertaking.

One important aspect of our experiments was to test the differential effects of a mobilization experiment within a sample of youth from low socioeconomic backgrounds and compare them to the reaction of university students in Belgium (Vissers et al. 2008; Hooghe et al. 2009). Particular attention was paid to the distinct consequences of traditional (face-to-face) and modern (Web site, interactive Web site) incentives for mobilization, testing the arguments used in the intensive debate about the transition toward Web-based political communication. A recurring assumption in this debate is that new communication tools might be highly effective for highly educated citizens but that they have weaker effects on those with lower schooling levels.

The experimental design was set up to have an impact on knowledge, behavior, and attitudes toward global warming. For both environmental knowledge and the salience of the environment the results suggest that there was no significant difference in the reaction of students and low-SES samples. However, we did encounter significant differences between the two groups with regard to behavioral change, as the non-student sample reacted more strongly to the incentives than the student sample. This is particularly interesting as actors with lower education levels usually score significantly lower on environmental participation. The results indicate that particularly those with the lowest participation scores gained most during the course of the experiments. Furthermore, low-SES groups and undergraduate students differed significantly on which mode of mobilization was most successful. For both environmental knowledge as well as environmental participation (although not for issue salience), we found that low-SES groups benefit significantly more from face-to-face tools compared to the Web, while for the student sample the relation was inverse.

This result is important in a number of ways. First, it shows that young low-SES groups do indeed benefit from different types of mobilization strategies compared to their more educated and affluent counterparts. Recent research thus far was unable to uncover such differences, leading scholars to conclude that mobilization techniques for students are just as efficient for a variety of population groups. Our results challenge these previous findings, and they manifest the need for more experimental research with participants from diverse backgrounds, and other than student populations.

Furthermore, we found a medium-term effect for environmental participation, a behavioral pattern that is usually not easily changed and affected. We believe that the mobilization was so influential for the environmental participation level of less well-educated respondents because all mobilization tools that were used included direct and concrete suggestions of how to participate. These suggestions worked best for low-SES groups and not as much for students, once more confirming that different mobilization strategies are necessary for these groups. Given that our experiments were single-shot events, to which participants were exposed only once, in group sessions of about one hour, we believe that this behavioral change after four months is indeed impressive. It confirms that there is some room and opportunity to mobilize political engagement among tuned-out youth. A student-only sample would not have told the same story.

Clearly, the participation of low-SES samples in experiments leads to higher costs and more effort, particularly for recruitment and experimental design. Our argument, though, is that this strategy is still called for when the research question requires scholars to look beyond effects on student samples. What we do not know is whether the disproportionate efforts of recruitment might change the makeup of the low-SES sample compared to other population groups, which might lead to differences in the local average treatment effects. Another potential threat to external validity is that the adjusted experimental and survey design yields mobilization effects that are more valid for low-SES populations than for other groups of the population.

Attrition

Using a broader recruitment pool would ensure a more diverse sample of participants at the outset of an experiment, but still this offers no guarantee that this level of diversity can be maintained throughout the experiment, as some groups have a stronger propensity to drop out than other groups. These differential attrition levels might especially endanger the validity of the results of long-term effect experiments. Attrition is a well-known problem not only in long-term panel surveys, but also in experimental designs. This time factor in long-term experiments raises an extra problem that does not exist in classical experiments, in which subjects have to participate only once (Housman and Wise 1979). Attrition occurs when subjects drop out of the experimental study, for instance after the pre-test or after the first post-test. This can have several causes, which may have consequences for the internal validity of the experiment and the interpretation of the results. Attrition by itself does not invalidate experimental results (Cook and Campbell 1979; Fitzgerald, Gottschalk, and Moffitt 1998). It is only a serious problem when it is non-random, because then it may erode the initial experimental design and the random assignment across the treatment groups (Housman and Wise 1979). If participants drop out of the study for reasons that are not related to the subject of the study, it is very likely that attrition will be less of a threat to internal validity. For instance, when a subject does not show up for the second experimental session or does not answer follow-up questionnaires because of medical reasons, we might still assume that this condition might be randomly spread across the sample. It might also be that the researchers lost track of the participant and that they are unable to contact him or her anymore, for example, if the participant moved. However, if attrition is in some way related to the (in)dependent variable or the experimental treatment, this poses a serious challenge for the validity of the experimental results. Therefore, it is of crucial importance to test intra-treatment attrition, that is, to compare the dropout rates across the different treatment groups, including the control group; and in the past, some statistical techniques have been developed to counter the effects of non-random attrition (Horowitz and Manski 2000). For instance, attrition might be higher among participants who were not interested in the subject in the first

place, or to the contrary, when they are not triggered sufficiently. Returning to the example of the mobilization experiments, we could expect higher attrition rates among the two extreme participant groups: the respondents for whom global warming was not a topic of great concern, on one hand, and the respondents who were initially already very interested and engaged in the environmental issue, on the other. If a person is very knowledgeable about the substantive mobilization topic, this might have a negative effect on the motivation to continue to participate in the experiment, as he or she is insufficiently triggered by the information provided during the experimental condition. In our experiments, for the respondents with less formal education, we found indeed a significant negative relation between self-indicated understanding of global warming in the pre-test and attrition. Another expectation might be that there would be attrition differences between the treatment and the control groups, as the latter were exposed to a treatment that normally does not make sense. In our own experiment, however, we did not encounter any significant differences in attrition rate between control and treatment groups. In some experiments, attrition bias can be countered by relying on independently collected information about behavioral outcomes of the experiment (e.g., official registers about whether a citizen participated in voting or not).

It is also important to be aware of possible attrition effects as a result of the different treatments. For instance, participants with lower levels of Internet skills might be more likely to drop out of the experimental groups where the mobilization is Internet-mediated. The same mechanism could be at stake for individuals with lower levels of civic skills in the interactive role-play treatment group. One should be extremely careful when different groups of respondents are included in the experiment, for instance students and non-students. Students and non-students have different characteristics, and this implies they will need different incentives to stay in all three waves of the study. Our experiments suggest that attrition is substantially higher for the low-SES population. We can observe a substantial difference in the dropout rates between the student and non-student populations from the first wave to the second wave, but these differences become most apparent in the long term. Financial and other incentives may reduce this problem to some extent. In order to boost the response rates of the non-student population for the third wave, we organized extra reminder calls and financial incentives between the second and the third waves. Especially in long-term exposure experiments and experiments with different target populations, (non-randomized) attrition is a serious challenge. This is probably one of the many reasons why long-term exposure experiments are so rare in social sciences, where the financial resources to conduct experimental studies are very limited in comparison with the biomedical sciences. However, we would like to defend the necessity of more experiments. In situations where money is a scarce good, researchers should be creative in developing other incentives to motivate their participants in order to conduct experiments on the effects of long-term exposure.

Conclusion

In recent years, there has been a call within medical research to diversify the participants of medical experiments. The main reason is that some effects might be found, for example, among white males, but that there is no reason to assume that the new experimental drug will be just as effective among other groups, such as white women, African Americans, or Asians. For some specific drug trials, pharmaceutical companies now increasingly rely on diverse populations (Epstein 2007). Our call is to venture in the same direction with social science experiments. In various cases, the results we obtain with our standard convenience samples of undergraduate students simply cannot be generalized toward other population groups. Whenever possible, it is indeed important to move beyond the narrow base of undergraduate participants. This might be a serious challenge for conducting the field work, but it might lead to more reliable results from the experiments being conducted.

Recently, List (2008) called for efforts to arrive at more robust findings from experimental research by combining different research strategies. Given all the caveats associated with experimental research, it would be unwise to arrive at firm conclusions based on the results of just one research design. Based on our own experience, therefore, we agree with List in arguing for mixed-method research efforts, combining various settings and methods in order to arrive at more reliable findings. While research on undergraduate students might be a very good start for various research questions, we also have to keep in mind that undergraduate students are not average citizens, and that they might have specific characteristics that limit the possibility to generalize findings on this group toward the whole population. Self-evidently, it still makes sense to use specific student samples as a first step in order to determine the occurrence of a causal relation, or to study a phenomenon that is limited to this group. But when we want to study a broader social phenomenon or specific effects in other population groups outside the university campus, clearly student samples can tell us only part of the story. Efforts to corroborate experimental findings—for example, with results from survey research, or from specific small experiments among different target groups—might be used to strengthen the validity of our findings.

Notes

1. These journals include *American Political Science Review* (APSR), *American Journal of Political Science*, and *Journal of Politics* (Kam, Wilking, and Zechmeister 2007).

2. Specialized journals include *Political Behavior* and *Political Psychology*, 1990-2006 (Kam, Wilking, and Zechmeister 2007)

3. Druckman et al. (2006) indicate that 64 percent of the articles published in the APSR reporting laboratory experiments relied exclusively on students. Only 17 percent relied on a mix of students and non-students.

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