

Perceptions of Course Effectiveness Among Different Class Years at Dartmouth College in the Remote Learning Environment

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Abstract

The COVID-19 pandemic continues to disrupt the lives of students who, due to campus closures, have no choice but to take their courses online. Dartmouth College's students are no exception to this rule, and the Dartmouth Center for the Advancement of Learning (DCAL) conducted the initial research that suggests that more than three-quarters of the spring term students felt disengaged in at least one of their courses, which is troubling because limited academic engagement has indicated to hinder course efficacy, a proxy for positive student learning outcomes. While research on this topic is limited, the theoretical frameworks of socialization and status inconsistency suggest that students' class year has the potential to impact perceptions of course efficacy, as both address inconsistencies in expectations for in-person learning and the reality of the remote-learning environment. For this reason, we seek to understand the relationship between class year and perceptions of course efficacy by running a one-way ANOVA and an OLS regression using DCAL's collected data. Contrary to our assumptions—that students with more years at Dartmouth will perceive their classes as increasingly less effective than students with fewer years at Dartmouth, or that seniors will perceive their courses as less effective than all other classes while perceptions among other class years will not vary—our results indicate that, in general, students of all class years at Dartmouth found their Spring and Fall 2020 courses to be highly effective, with very little variation among class years.

Keywords: course efficacy, remote learning, class year, undergraduate, student learning, online classes

COVID-19 and the Disruption to In-person Education

The COVID-19 pandemic has disrupted the lives of students across the United States, and Dartmouth College is no exception. At the end of Spring term of 2020, the Dartmouth Center for the Advancement of Learning (DCAL) fielded a student survey on their experiences with remote teaching and learning to better understand where students were finding successes, as well as challenges, in the new remote environment. Their findings suggest that more than three-quarters of the spring term students felt disengaged in at least one of their courses, which is troubling given that limited academic engagement has been indicated to hinder course efficacy, or in other words, positive student learning outcomes (DCAL, 2020, Arum and Roksa, 2011). While research substantiating this claim is robust, education scholars find that students of all class years, from colleges across the nation, are largely disengaged with their courses (Arum and Roska, 2011, Kuh et al., 2008).

One avenue that engagement influences student learning outcomes is through expectations. Student expectations are included within the definition of engagement and are found to be an important influence on the student experience (Kahu, 2014). Education scholars have found that, in general, people do better when more is expected of them and those expectations are internalized. For instance, students whose teachers expressed higher expectations about their future success are far more likely to have higher GPAs and graduate from college (Boser, 2014). Taking this into consideration, lower course expectations by students may result in a reduction of engagement and perceptions of course effectiveness.

Considering the discouraging data regarding contemporary student engagement and its influence on course effectiveness, and the lack of data addressing college year's influence, our study aspires to understand how class year influences perceptions of course effectiveness in the remote learning environment at Dartmouth College. The theoretical frameworks of socialization and status inconsistency suggest that students' class year has the potential to impact perceptions of course efficacy, as both address inconsistencies in expectations for in-person learning and the reality of the remote-learning environment. With these frameworks in mind, we hypothesized that students with more years at Dartmouth will perceive their classes as increasingly less effective than students with fewer years at Dartmouth, or that that seniors are likely to perceive their courses as less effective than all other classes while perceptions of course efficacy will not vary among other class years. In either case, we hypothesized that the relationship will persist when controlling for course-taking behavior.

Further research examining the effect class year has on remote learning satisfaction will strengthen our understanding of the relationship between the student and the classroom, promote the formulation of remote learning "best practices" at Dartmouth College and beyond, and ultimately increase the efficacy of courses taught online amidst widespread campus closures in the U.S.

Status Inconsistency and Socialization

Inspired by the notion that student expectations are a powerful determinant of learning outcomes, we formulated three hypotheses that are supported by two conceptual frameworks, status inconsistency and socialization, to help us understand why class year and perceptions of course effectiveness are related.

In higher education, socialization is the process of learning the normative practices of the institution and creating shared meaning (Weidman, 1997). According to Weidman (1997), individuals are normally thought of as participating in multiple social groups and structures (e.g., peer groups, clubs, organizations) simultaneously, each presenting discrete and distinct expectations for their behavior that link students with salient normative environments in higher education. One such environment is graduating class year, where prior to their entry into a higher education institution, students anticipate what might occur based on prior experience but incomplete knowledge. During their passage through academic programs, students encounter the normative influences of peers and faculty in both formal and informal settings (e.g., majors, peer groups, co-curricular activities), ultimately personalizing those experiences and continuously engaging with them (Tierney, 1997).

With these interpretations in mind, we constructed hypothesis 1, our socialization hypothesis, which predicts that the longer students are embedded at Dartmouth, the more they've internalized the expectations of what Dartmouth classes should look like. We predict that perceptions of course effectiveness will increase monotonically with each year, with seniors perceiving remote learning courses as least effective when compared to their normative understanding of in-person courses.

Socialization Hypothesis (Hypothesis 1): Students with more years at Dartmouth will perceive their classes as increasingly less effective than students with fewer years at Dartmouth.

In our study, we see the potential for status inconsistency to influence perceptions of course efficacy among seniors in particular. In a study of influences on student retention, Tinto (1975) asserts that engagement occurs as students develop attachments to persons and environments and, along with involvement, is a fundamental dimension of integration into the social and academic spheres. Through this engagement, personal communities with whom students continue to be in contact throughout the time they are enrolled in higher education (Weidman, 2006). One of such personal communities is class year, which students adopt as part of their identity and acts as a marker of status. Status inconsistency, when an individual's social position has inconsistencies with their social status, is an indicator of exposure to unpleasant or frustrating interactions that can lead to withdrawal from or dissatisfaction with interpersonal relations (Stryker and Macke, 1978). Zelditch and Anderson (1966) identified isolation, insulation, role differentiation, and reevaluation of a status as additional possible outcomes of status inconsistency. Sampson (1963) finds that when status inconsistency is expected, it does

not produce stress. This reasoning formulates the principle of expectancy congruence, which argues that people require a consistent set of expectations with which to meet their experience, and the disjunction between expectations and experience converts objective status inconsistency into stress, causing individuals dissatisfaction and disengagement. In their final year of undergraduate school, we typically have high expectations for the status of seniors. Status inconsistency, created by the sudden switch to remote learning, causes seniors to experience the largest gap between expectations and reality among all class years, which we hypothesize will translate to the lowest perceptions of course efficacy while that of other class years will show no differences, even when controlling for course-taking behavior.

Status Inconsistency Hypothesis (Hypothesis 2):

- a. *Seniors at Dartmouth are likely to perceive their courses as less effective than all other classes.*
- b. *The relationship between class year and perceived course efficacy will not vary between freshmen, sophomores, and juniors.*

Hypothesis 3: Controlling for differences in course-taking, we still anticipate that the relationship between class year and perceived course efficacy will persist.

Methods

We used data collected by the Dartmouth Center for the Advancement of Learning (DCAL) to conduct a quantitative analysis between class year and perceived class efficacy.

In our study, the independent variable is the class year of the student respondent. Our dependent variable, perceived efficacy, is coded to reflect the responses to a series of prompts regarding course effectiveness in the remote learning environment, parts 1-6 of Question 1 on DCAL's survey (see methodological appendix for more on Question 1). In order to control for at least one alternative influence on the relationship between class year and perceived course efficacy, we created a confounding variable to serve as a proxy for course-taking behavior. Our variable for course-taking behavior describes the different general areas of study that the course of interest falls under at Dartmouth College. The areas of study, or divisions, that make up this confounder are Arts & Humanities, Interdisciplinary, Non-divisional, Sciences, Social sciences. We control for course-taking behavior because the division a course categorizes into may significantly influence perceptions of course efficacy.

In order to increase the statistical accuracy of our research, we restricted our data. Before tailoring the data to our research question, the survey collected 10,181 class evaluations by Dartmouth students. We restricted our independent variable, class year, to reflect the typical undergraduate class at Dartmouth (four class years: freshmen, sophomores, juniors, and seniors). This dropped 977 cases leaving us with a sample of 9,204 and this variable had no missing data. Additionally, we restricted our sample to only Spring and Fall terms of 2020, so as not to be

affected by an influx of sophomores in the summer, a Dartmouth tradition. This restricted 666 cases. After making these two restrictions, we had 8,538 cases, and after dropping missing data in all three of our variables, we had our final number of cases: 8,018. In total, we lost 2,163 cases, in which 520 came from missing data.

To test competing hypotheses 1 and 2 (see methodological appendix), we used a one-way ANOVA test, or one-way analysis of variance, which is used to determine whether the mean of a perceived efficacy is the same in two or more unrelated, independent groups. For our third hypothesis, which is multivariate, we ran an OLS regression to predict the value of our dependent variable (perceived course efficacy) based on the value of our independent and confounding variables (class year and course-taking behavior). In order to reduce independence issues caused by the assignment of unique student response ID's per term, we clustered this variable for both the Spring and Fall 2020 terms so that multiple responses by the same student were averaged and reported only per term. To visualize these results, we used a margins plot of perceived efficacy by class year (see Figure 1 in results).

Results

Table 1

Table 1: Univariate Descriptive Statistics			
	Mean/Percent	Median	SD
Class Year			
1st year	23%		
2nd year	28%		
3rd year	24%		
4th year	25%		
Perceived Course Efficacy (1-4)	3.41	3.5	0.54
<i>1 = Strongly Disagree, 4 = Strongly Agree</i>			
Division			
Arts & Humanities	21%		
Interdisciplinary	18%		
Non-divisional	1%		
Sciences	32%		
Social Sciences	29%		
<i>Notes: N=8,018</i>			
<i>Source: DCAL Survey Data and Documentation</i>			

We display our univariate descriptive statistics in Table 1 depicted above. The key takeaway from Table 1 is that the average perception of course effectiveness among freshmen, sophomores, juniors, and seniors was 3.41. Furthermore, this means that on average, Dartmouth College's undergraduate student body perceived the courses they took as relatively effective (3.41 on a 1-4 scale) in terms of clarity of requirements, engagement opportunities, communication with professors (see more in Methodological Appendix, constructing our

dependent variable). Table 1 also describes our independent variable, class year—composed of four categories of students based on the number of years they have attended classes at Dartmouth—which also corresponds with undergraduate student class standing (i.e., freshman, sophomore, junior, senior). In 2020’s Spring and Fall terms at Dartmouth College, 23% of the course were taken by first years, 28% second years, 24% third years, and 25% fourth years. Out of the sampled student body, 21% of the courses taken categorized as Arts & Humanities courses, 18% as Interdisciplinary, 1% as Non-divisional, 32% as Sciences, and 29% as Social Sciences.

Table 2: One-way ANOVA Test Estimating the Association Between Class Year and Percieved Course Efficacy

Summary			
Percieved Course Efficacy			
	Mean	Standard Deviation	Frequency
Class Year			
1st Year	3.44	0.508	1,837
2nd Year	3.39	0.547	2,237
3rd Year	3.39	0.568	1,921
4th Year	3.43	0.549	2,023

Notes: $N=8,018$; $F=3.98^{***}$
 $^{***}p<.001$; $^{**}p<.01$; $^{*}p<.05$; two-tailed significance test; Standard Errors in Parentheses
Source: Dartmouth Center for the Advancement of Learning, Survey Data and Documentation

Table 2 represents our results following our run of a one-way ANOVA test estimating the association between class year and perceived course efficacy. Our key finding from Table 2 was that the relationship between class year and perceived course efficacy does not vary significantly between freshmen, sophomores, juniors and seniors. In the end, this means that our data does not support hypothesis 1 and hypothesis 2a, 2b. Furthermore, Table 2 compares perceptions of course efficacy among first-, second-, third-, and fourth-year students. Results indicate that on average, first-years have the highest perceptions of course effectiveness (3.44), followed by fourth-years (3.43), while both second (3.39) - and third-year students (3.39) have the lowest perceptions of course effectiveness of the sampled undergraduate student body. But as noted previously, these variations are insignificant and can not be used to tell differences between our population.

In the end, our data does not support hypothesis 1, the socialization hypothesis, because results indicate that students with more years at Dartmouth do not perceive their classes as increasingly less effective than students with fewer years at Dartmouth. Socialization implies that the longer students of each class year are embedded at Dartmouth, the more they've internalized expectations of Dartmouth courses in the typical, on-campus environment that affords more robust educational resources. The socialization framework assumes that as class year increases, perceptions of course effectiveness decrease due to the inability of expectations about the efficacy of typical Dartmouth courses to equalize with the reality of the efficacy of Dartmouth courses in

the remote learning environment. On average, fourth-year students found their courses to be more effective than second- and third-year students, but marginally so with a difference of only 0.04. Similarly, we do not find support for hypothesis 2a because fourth-year students reported their courses to be an average of only 0.01 points less effective than first-year students. With these small differences, we see that these differences are insignificant and can not describe our population at hand.

With such minor differences, our study suggests that increasing class year is not associated with perceptions of course effectiveness. Additionally, we do not find support for hypothesis 2b, which predicted that the relationship between class year and perceived course efficacy will not vary between freshmen, sophomores, and juniors, because our tests suggest that these mean differences are not statistically significant between class years.

Table 3: Results from OLS Regression Models Estimating Percieved Course Efficacy

	Model 1	Model 2
Class Year (ref = 4th Year)	Coef.	Coef.
1st Year	0.013 (0.022)	-0.003 (0.022)
2nd Year	-0.033 (0.023)	-0.038 (0.023)
3rd Year	-0.037 (.023)	-0.031 (.023)
Divison (ref = Arts and Humanities)		
Interdisciplinary Progam		-0.025 (0.019)
Non-divisional		-0.033 (0.06)
Science		-0.147 (-0.017)
Social Sciences		-0.121 (-0.018)
constant	3.427*** (0.016)	3.516*** (0.02)
R-squared	0.0015	0.014

*Notes: ***p<.001; **p<.01; *p<.05; two-tailed significanctest; N=8,018*

Standard errors reported in parentheses and adjuated for 2,541 clusters in RespondId

Source: Dartmouth Center for the Advancement of Learning, Survey Data and Documentation

Table 3 represents our OLS regression. The main finding here being that the association between class year and perceived course efficacy was found to be statistically insignificant. Only about 0.15% of the variation in perceived course efficacy was explained by Model 1, or our r-squared value. Given the statistical insignificance of our findings, we do not find support for hypothesis 2a, the status inconsistency hypotheses, which states that seniors at Dartmouth are likely to perceive their courses as less effective than all other classes. In other words, we do not see changes in senior perceptions of course effectiveness due to inconsistencies between the

expectations held by seniors about their final year as undergraduate students and the reality of campus life during the COVID-19 pandemic.

Table 3 uses two models to assess fourth-year students' perceptions of course efficacy to all other class years. Using fourth-year students as a reference group, Model 1's regression coefficient values represent the mean change in perceived course efficacy given a one unit change in class year, which will describe the relationship between class year and perceived course efficacy. According to Model 1, first-years students have a positive association with perceptions of course efficacy, meaning that as class year increases, it is predicted that perceptions of course efficacy also increase by about 0.013 points for first-year students when compared to fourth-year students. Concurrently, second- and third-year students are negatively associated with perceptions of course efficacy, meaning compared to fourth-year students, it is predicted that as class year increases, second- and third-year students' perceptions of course efficacy decrease by 0.033 and 0.037 points, respectively. Even though we see these small variations, we generalize that there is no true variation within these class years.

To account for any differences we might observe, we controlled for course taking behavior by focusing on division, however, like Model 1, all associations in Model 2 were found to be statistically insignificant. Only 1.4% of the variation in perceptions of course efficacy can be explained by Model 2. In other words, our study does not find a significant association between class year and perceptions of effectiveness of courses offered during the Spring and Fall of 2020 at Dartmouth College, even when controlling for course taking behavior.

Using courses taken in the Arts and Humanities division as a reference group, Model 2's regression coefficient values represent the mean change in perceived course efficacy given a one unit change in class year while controlling for course-taking behavior. Controlling for course-taking behavior, Model 2 indicates that first-, second-, and third-year students are negatively associated with perceptions of course efficacy, meaning compared to fourth-year students, it is predicted that as class year increases, first-, second- and third-year students' perceptions of course efficacy decrease by 0.003, 0.038, and 0.031, respectively. Compared to the Arts and Humanities courses, Interdisciplinary, non-divisional, science, and social sciences courses are associated with 0.025, 0.033, 0.147, and 0.018 less perceived course efficacy, respectively.

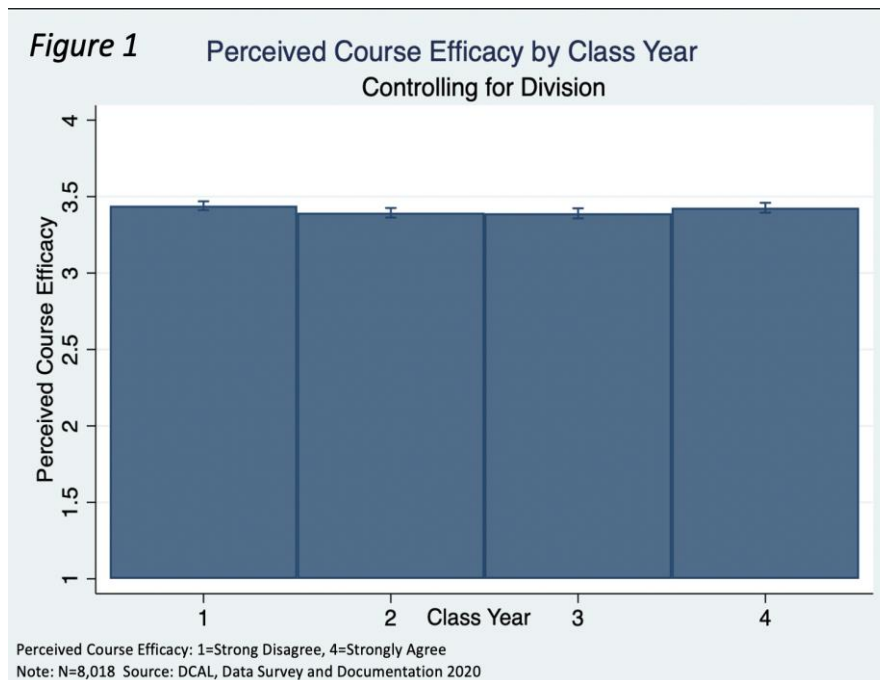


Figure 1 further emphasizes the lack of differences in the average perceptions of course effectiveness among the sampled first-, second-, third-, and fourth-year students at Dartmouth College. As we can see, perceptions of efficacy are high and non-varying regardless of class year, ranking 3.41 on a 4 point scale.

Discussion

As campus closures caused by the COVID-19 pandemic continue to disrupt the lives of students throughout the U.S., colleges and universities are struggling to decipher the efficacy of courses taught in the remote learning environment. Knowing that the theoretical frameworks of socialization and status inconsistency imply that students of different class years develop varying degrees of expectations about their college experience which may not align with our new reality. Our study sought to identify if perceptions of course efficacy vary among students of different class years at Dartmouth College. To approach this understanding, we hypothesized that students with more years at Dartmouth will either perceive their classes as increasingly less effective than students with fewer years at Dartmouth, or that seniors are likely to perceive their courses as less effective than all other classes while perceptions of course efficacy will not vary among other class years. In either case, we hypothesized that the relationship would persist when controlling from course-taking behavior.

After analyzing the results from our statistical tests, our study did not find support for our socialization hypothesis, which predicted that students with more years at Dartmouth would perceive their classes as increasingly less effective than students with fewer years at Dartmouth. Our status inconsistency hypothesis, which assumed that seniors at Dartmouth are likely to

perceive their courses as less effective than all other classes, and that the relationship between class year and perceived course efficacy will not vary between freshmen, sophomores, and juniors, was unsupported by our data as well. Given that we did not find a relationship between class year and perceived course efficacy, controlling for course-taking behavior was unnecessary. Our study asked if students' perceived efficacy of courses in the remote learning environment varies among students of different class years, and our results indicate that no, the marginal differences in perceptions of course efficacy were not explained by differences in class year. These findings imply that neither socialization or status inconsistency explain the mechanism that underlies the relationship between class year and a perceived course efficacy, which aligns with research in the past decade that has brought the weight of evidence against the status inconsistency hypothesis (Crosbie, 1979).

With the data provided, we were limited in our ability to track student responses over time. Examining data over time makes it possible to predict future frequencies and rates of occurrence, which could be useful if examining the extent to which switching to a remote learning environment affects student learning. Having the ability to track student attitudes over time also allows for research to be conducted identifying any improvements, or deteriorations, in student learning outcomes. Instead of assigning each student a unique response ID per term, we would suggest that a single student is assigned one ID so that their responses can be tracked over time.

While our data source did allow us to answer our research question, the components we used to construct our dependent variable did not amount to a very strong measure of perceived course efficacy. The most prominent limitations to our study were the survey questions. Instead of getting precise and in-depth answers that could help DCAL understand student attitudes and engagement with their courses, the questions merely asked if there were opportunities for engagement, if students could communicate with professors, or if course requirements were clear. The vagueness with which the questions were created, in addition to the 1-4 answer scale, exacerbated the issue of oversimplified responses that could not reveal accurate data on student attitudes.

If DCAL is interested in measuring the efficacy of courses in terms of student learning outcomes, we would suggest that they strengthen their survey by rewriting its questions to capture student attitudes with greater accuracy, and allow for written response to each question. Students should have the ability to identify what aspects of the course are the most important for them and elaborate on those aspects.

Our qualitative research partners were able to gather a more in-depth understanding of student perceptions of course efficacy by constructing a comprehensive interview. With the interview questions they constructed, the qualitative team was able to validate our findings and unintentionally uncover that expectations of remote learning may be more closely linked to satisfaction than course efficacy. Interestingly, while the sum of our research did not find a correlation between class year, expectations and perceived efficacy, the qualitative researchers identified engagement and resources as key factors that students associate with remote class

effectiveness. With this information in mind, DCAL can identify best-practices for how engagement and resources are implemented in a remote learning setting, and strategize ways that these implementations can be measured for efficacy in future surveys. If Dartmouth considers administering online courses in the future, even after the pandemic ends, the aforementioned considerations will be necessary.

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Methodological Appendix

RG1 Analysis, DO File

https://drive.google.com/file/d/1KTJV1xu6YSR_Bhei0yF4DbE0QFDeZbRy/view?usp=sharing

RG1 Analysis, Log File

https://drive.google.com/file/d/19NZpqwQYCbAmvXsetuqXDiI4qAlPW_Ex/view?usp=sharing

Constructing our Dependent Variable

Question 1, parts 1-6

Our dependent variable was coded to reflect the answers to Question 1, with sub-questions 1-6 on DCAL's survey. Each part of Question 1 was answerable on a 1 to 4 scale, where 1 = Strongly Disagree and 4 = Strongly Agree.

1. The requirements for earning credit in this course are clear.
2. I am able to access the course materials (lectures, readings, assignments, etc.)
3. There are opportunities to engage with other students.
4. There are opportunities to engage with my instructor(s).
5. I know where to get help if I need assistance with my coursework.
6. I am confident I can reach my instructor(s) if I have questions.

Tables and Figures

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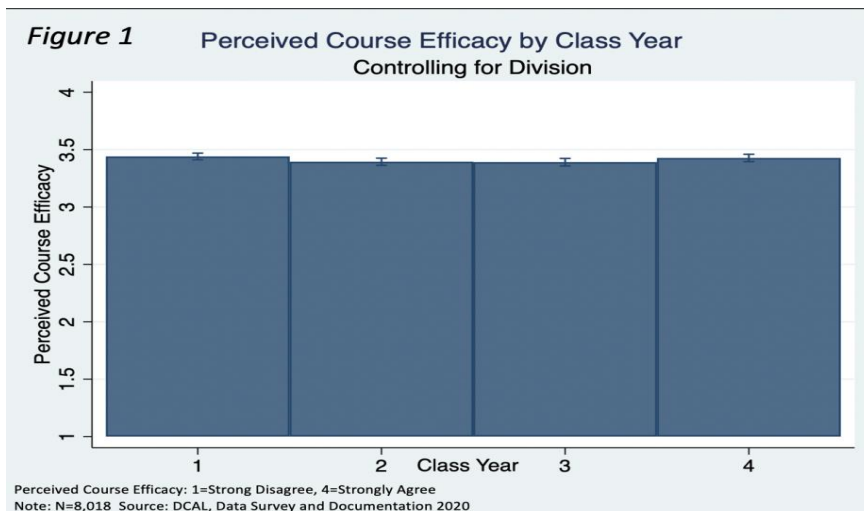
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Standard errors reported in parentheses and adjusted for 2,541 clusters in RespondId
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*Margins are statistics calculated from predictions of a previously fit model at fixed values of some covariates and averaging over the remaining covariates. Marginsplot graphs the results from margins.