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Examining Engagement, Note-Taking, and Multitasking in Podcast-Based Learning

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Abstract

In this follow-up study, we examined mode of accessing assigned podcasts (listening to podcast audio, reading the transcript, or both), relative to exam performance while explicitly measuring note-taking and multitasking. We collected data between Fall 2020 and Spring 2022 at two midwestern regional public universities and conducted bivariate cross-tabulations as well as multivariate logistic regression analyses. We found mode of access less important for exam performance than students' engagement with the material. Some types of notes conferred advantages, while multitasking disadvantaged students relative to exam performance. Still, students who listened to assigned podcasts were the least likely to take notes and most likely to multitask, meaning mode of access was not entirely unimportant. Additionally, note-taking and multitasking were connected: notetakers were less likely to multitask. As suggested in previous research, offering students multiple modes of access and instructing students how to best engage with assigned content remain best practices.

Keywords

podcasts, note-taking, multitasking, student engagement, student learning

Podcasts have grown in popularity among the general public and as a teaching tool in recent years. For example, *Teaching Sociology* now publishes podcast reviews that highlight how instructors might use the content for class (e.g. Cali 2024; Mirance 2024). They are often freely available for download as digital audio files, sometimes accompanied by transcripts, and offer up-to-date coverage of important topics. This makes them much more accessible when compared with other learning tools like books and journal articles (Teckchandani and Obstfeld 2017).

Given their accessibility and timeliness, they are easily adoptable to meet the needs of face-to-face, hybrid, or online teaching modalities, and can offer engaging content during uncertain times when course modalities may switch unexpectedly (Prince 2020). They allow instructors to incorporate diverse voices in their courses, decentering their own authority and bringing in experts on a variety of topics (Greenberg 2021; King and Kusch 2024).

In a recent study, we examined students' preferences for audio vs. print content and exam performance when professionally produced podcasts were assigned as course "reading" (Oslawski-Lopez and Kordsmeier 2021). We found that most students reported completing the assigned listening / reading assignment, demonstrating engagement with the format. Students most often listened to the podcast, rather than reading the transcripts. That said, students appreciated having options and some switched modalities between assignments to fit their needs. Lastly, listeners, especially those that reported multitasking, showed depressed exam performance.

The results of our previous study (Oslawski-Lopez and Kordsmeier 2021) led us to suggest the following best practices for using podcasts as "readings" in sociology courses. First, we recommended that instructors provide students with both audio and transcript formats of the content. Additionally, we suggested that instructors teach their students how to best engage with podcasts. Students might have prior experience with podcasts in their personal lives, where podcasts are a pleasant diversion while doing chores, driving, or exercising. Instead of leisurely consuming podcast content assigned as "reading," students should either read the transcript (either by itself or in tandem with the audio) or listen to the podcast without multitasking. Although we could not test the possibility directly, we presumed that note-taking might matter as well; studies of how students engage with recorded class lectures suggest that note-taking can be

a key variable in student success. This echoes the suggestions of other authors (Greenberg 2021; King and Kusch 2024), that students need additional signposting to improve identification and recall of key material when listening to podcasts for class.

Past literature suggests that note-taking is positively (McKinney, Dyck, and Luber 2009; Salame and Thompson 2021) and multitasking negatively (Kraushaar and Novak 2010; Burak 2012; Junco 2012; Demirbilek and Talan 2018; May and Elder 2018; Waite et al. 2018; Bergdahl et al. 2020) correlated with academic performance, although the bulk of this research is not specific to assigned podcasts or listening to audio more generally. That being the case, we collected data on mode of accessing podcast content, note-taking, multitasking, and exam performance during the Fall 2020, Spring and Fall 2021, and Spring 2022 semesters at two midwestern regional public universities to assess our previous findings and suggested best practices (Oslawski-Lopez and Kordsmeier 2021). To continue the inquiry from our initial study (Oslawski-Lopez and Kordsmeier 2021), we investigated the following questions.[i] What are the potentials and pitfalls of assigning podcasts as "readings" in college-level Sociology courses? Does students' chosen mode of accessing podcast content (i.e., listening to audio vs. reading transcripts) link to exam performance? Alternatively, do students treat the two modes as qualitatively distinct, making students' chosen mode of accessing podcast content a proxy for other behaviors like note-taking or multitasking, factors that are strongly linked to academic performance in past literature? What relationships exist between mode of accessing podcast content, note-taking, multitasking, and exam performance? And finally, what best practices can we discern from this more nuanced analysis?

LITERATURE REVIEW

In a recent study, we examined how students accessed podcasts (e.g., listening to podcast audio

and/or reading transcripts) and whether the mode correlated with exam performance when professionally produced podcasts were assigned as course "readings" (Oslawski-Lopez and Kordsmeier 2021). We found students most often reported listening to the podcast, rather than reading the transcripts. Like others (Teckchandani and Obstfeld 2017), we found that students reported finding podcasts engaging. That said, students appreciated having options and some switched modalities between assignments to fit their needs. We also found that listeners, especially those that reported multitasking in open-ended questions that asked why students enjoyed listening to podcasts, showed depressed exam performance. By multitasking, we meant students who attempted to engage in multiple activities simultaneously, which involves, as Kraushaar and Novak (2010:241) define it, "switching their cognitive focus back and forth between tasks that are directly related to the [academic] material and tasks that are not directly related to the [academic] material." This suggested to us that if we systematically asked students about multitasking, we might better understand the impact that listening had on exam performance. We wondered if it was possible that listeners were more likely to try to multitask when listening to podcasts than reading their transcripts. We also wondered if how the students consumed the podcast affected how they multitasked. The research on multitasking suggests that both might be a factor in depressed exam performance.

In general, the consensus on multitasking is that it is harmful to student learning (Kraushaar and Novak 2010; Burak 2012; Junco 2012; Demirbilek and Talan 2018; May and Elder 2018; Waite et al. 2018; Bergdahl et al. 2020). This is true whether looking at the comprehension of a particular concept or at larger measures of student learning like exam scores or GPA. Many students believe that they can multitask based on their familiarity and felicity with technology, but rapidly switching between cognitive tasks tends to be overwhelming and

decrease comprehension (May and Elder 2018). Not all forms of multitasking are necessarily equally harmful to comprehension. For instance, some forms of multitasking might be "productive" like note-taking or looking up unknown terms (Kraushaar and Novak 2010). Junco (2012) found that while social media use had a negative impact on learning, texting and emailing did not. It should be noted, however, that other studies (Kraushaar and Novak 2010; May and Elder 2018) did find those kinds of multitasking to be detrimental to student learning.

Besides its effects on attention and cognitive load, multitasking may also be detrimental to student learning in another way: by making it so students are less likely to take notes. Waite et al. (2018) found that quality of notes of non-texters was much higher than those who had texted through a presentation. These correlated, in turn, with higher exam performance, suggesting that note-taking may be a mediating factor in understanding the relationship between multitasking and exam performance. The interconnectedness between multitasking and note-taking runs in both directions. Students who take digital notes have a similar academic performance to those who take hand-written notes, as long as the digital notetaking takes place under circumstances in which there are no other distractions (Voyer, Ronis, and Byers 2021).

Note-taking habits are strongly correlated with student performance, with assiduous notetakers having higher academic performance than those who take fewer notes (Salame and Thompson 2021). Indeed, as we noted in our research (Oslawski-Lopez and Kordsmeier 2021), differences in note-taking and multitasking likely account for the seemingly contradictory findings in the literature on the effects of podcast listening on academic performance. Daniel and Woody (2010), who found podcast listeners scored worse than readers, also found listeners were significantly less likely to sit and study than readers. On the other hand, McKinney et al. (2009) found that podcast users scored better than those that attended a traditional lecture on the same

topic. In this case, they found that students who listened to podcasts were more likely to take notes, even going so far as to go back and re-listen to key ideas that they might have missed. Taken together, these two studies suggest that understanding student behavior beyond the modality in which they encounter the podcast is important to fully understand differences in exam performance. If there are differences in learning outcomes by multitasking and note-taking, these outcomes may reinforce the best practices we offered in our previous research (Oslawski-Lopez and Kordsmeier 2021), namely, formally instructing students how to interact with podcasts in an academic setting.

METHOD

Data

We collected data on mode of accessing podcast content, note-taking, multitasking, and exam performance during the Fall 2020, Spring and Fall 2021, and Spring 2022 semesters at two midwestern, regional public universities. Regional public universities and colleges educate a large portion of degree-seeking undergraduates in the U.S. Research conducted by the Alliance for Research on Regional Colleges estimates that "47 percent of bachelor's-degree-seeking students attending four-year public institutions" do so at "regional public universities and colleges" (Orphan, Wetherbee, and Duncan 2022:5). Other estimates including private and for-profit universities and colleges place the percentage of undergraduates attending regional publics just slightly lower at 43 percent (Selingo 2015). Although lesser studied and highly variable in form, regional publics and other state comprehensive universities have been called "the people's university," and made higher education accessible for those historically left out (Henderson 2009). This being the case, our sample of regional public undergraduates is more representative than some might expect.

Specifically, to gauge representativeness, we can compare enrollments at Oslawski-Lopez's and Kordsmeier's universities to national averages. Across the years studied (2020-2022)[ii], Oslawski-Lopez's and Kordsmeier's universities enrolled fewer (about 21 percent and 31 percent respectively) non-traditionally aged students (ages 25 and older)[iii] and fewer students of color (both at about 18 percent) as compared to average enrollments across the U.S. (about 33 percent non-traditional and 29 percent students of color) (Indiana University Institutional Analytics, n.d.; U.S. Census Bureau 2021). That said, both universities enrolled more female students (about 65 percent / Oslawski-Lopez and 62 percent / Kordsmeier) as compared to average enrollment across the U.S. (about 57 percent) (Indiana University Institutional Analytics, n.d.; U.S. Census Bureau 2021). Lastly, both universities enrolled about 30 percent first-generation college students, a statistic higher than the 24 percent of U.S. college students whose parents have no secondary education as estimated by the Center for First Generation Student Success (Indiana University Institutional Analytics, n.d.; RTI International 2019). While not exactly "average," both universities included in this study enroll sizable proportions of diverse students.

Table 1 displays the courses from which the data for this study was collected. Data collected from Oslawski-Lopez's institution came from eight *Introduction to Sociology* courses, one held during Fall 2020, two held during Spring 2021, two held during Fall 2021, and three held during Spring 2022. Two of Oslawski-Lopez's *Introduction to Sociology* classes were delivered entirely online. Data collected from Kordsmeier's institution came from two upper-level Sociology courses, one held during Fall 2020 and one held during Fall 2021. One of Kordsmeier's classes was delivered entirely online, the other was delivered in a hybrid modality.

We asked students to complete an ungraded survey for podcast "reading" assignments (See Appendix A. Ungraded Survey). Assigned podcasts included the following: *Give Theory a Chance* - "Jaclyn Wypler on Learning to Love Theory" (Green 2020), *Office Hours* - "Lisa Wade on American Hookup: The New Culture of Sex on Campus" (Powell and Nobles 2017), *Office Hours* - "Victor Rios on Policing Black and Latino Boys" (Shannon 2015), and NPR *Hidden Brain* - "Lost in Translation: The Power of Language to Shape How We View the World" (Vedantam 2018). Not all podcasts were assigned in every class. Rather, podcasts were assigned as appropriate for course format and instructional needs.

[TABLE 1 ABOUT HERE]

Also shown in Table 1 is the number of podcasts assigned in each class. Two of the 10 classes were asked to complete three ungraded surveys, five of the 10 classes were asked to complete two ungraded surveys, and three of the 10 classes were asked to complete one ungraded survey. In these ungraded surveys, students reported how they accessed the assigned content: if they read the transcript, listened to the podcast, listened to the podcast AND read the transcript, or did not listen to the podcast OR read the transcript. Students reported why they chose they mode of access that they did: "Why did you choose to listen to and/or read the transcript of the assigned podcast?" Students also had the opportunity to share "anything else they wanted to share about the listening/reading assignment."

Additionally, we wanted to know if listeners and readers were more or less likely to take notes and multitask, if notetakers were more or less likely to multitask, if listeners, readers, and notetakers reported different types of multitasking, and how these behaviors correlated with exam performance. To this end, in our survey instrument, we incorporated questions that directly assessed students' note-taking and multitasking behaviors. Specifically, regarding note-taking,

we asked students: "How did you engage with what you were listening to and/or reading? (Check all that apply)" with possible responses including "I took notes," "I highlighted the text," and "None of the above (I only read and/or listened to the podcast)." From open-ended responses provided for the multitasking question "Other [please specify]" response described below, we coded respondents who said that they were working on homework, most often homework associated with the podcast listening assignment in Oslawski-Lopez's classes, as taking notes.

Regarding multitasking, we asked students: "Other than taking notes, what other activities did you engage in while listening to and/or reading the transcript of the podcast? (Check all that apply)" with possible responses including "Watching TV," "Talking with Someone," "Texting," "Using Social Media," "Working Out/Walking/Running," "Working for Pay," "Working Around the House," "Driving," "Other [please specify]," and "None of the above." From the open-ended responses provided in the "Other [please specify]" response, we also created codes for "Listening to Music," "Eating," and "Getting Dressed/Ready." Lastly, we added students who said that they were using the Internet to the "Using Social Media" category, making the new category representative of those who were "Using Social Media or the Internet" while listening to the assigned podcast.

We tested exam performance for each podcast "reading" assignment by including a common multiple-choice quiz / or exam question on our course assessments (See Appendix B. Multiple-Choice Quiz/Exam Questions). Lastly, we collected additional demographic data from the course and institutional records. Specifically, we created a dichotomous variable for *assumed gender*, using course rosters, students' LMS photos, and students' LMS pronouns, set equal to one for women.[iv] We created a dichotomous variable *humanities or social science students* set equal to one for those with declared humanities or social science majors. We controlled for *first-*

year-student status with a dichotomous variable set equal to one for first-year students. We created a dichotomous variable set equal to one for students enrolled in *upper-level courses.* We also controlled for mode of course delivery with a dichotomous variable set equal to one for students enrolled in *online courses*.

Sample

In the 10 classes included in this study, 243 students enrolled and 155 participated in at least one ungraded survey, making the overall response rate 63.79 percent. That said, 20 students withdrew from their respective courses after enrollment. Removing withdrawn students from the number of students enrolled (N=223) and dropping six survey responses from withdrawn students (N=149) made the response rate slightly higher at 66.82 percent.

We also dropped cases (N=4) for those who said they "did not listen or read" the podcast content for two reasons. First, students who did not complete the listening/reading assignment would not help us assess the main research questions of this study about note-taking and multitasking. Second, with such a small sample of students who "did not listen or read" the podcast content, we could not use these students as a comparison group. Lastly, we dropped all cases with missing data. Our sample in these analyses included 145 students with 210 completed ungraded surveys.

The sample size of this follow-up study was larger (N=145 students, 210 completed surveys) than our previous study (Oslawski-Lopez and Kordsmeier 2021) (N=45 students, 78 completed surveys), for which data was collected during the Fall 2019 semester (prior to the COVID-19 pandemic). The larger sample size of the follow-up study reflects the longer data collection period (four semesters vs. one semester) and incorporation of more classes (10 classes vs. two classes) in the data collection effort.

That said, the response rate of this study (66.82 percent) was much lower than our previous study (86.54 percent) (Oslawski-Lopez and Kordsmeier 2021). The reduced response rate of our study likely reflects the challenges faced by instructors and students during the COVID-19 pandemic. Especially during the Fall 2020 and Spring 2021 semesters before vaccines became widely available to adults in the United States, course modalities switched frequently, reducing in-person contact even for face-to-face courses. Instructors and students were encouraged to isolate or quarantine if they were exposed to or infected with the COVID-19 virus, reducing the number of classes taught or students were able to attend face-to-face. And both instructors and students dealt with other, more personal, pandemic challenges related to working, caretaking, or personal health. Given this situation, we are not surprised that fewer students opted to participate in the ungraded surveys that constitute this study. For instance, instead of asking students to complete the ungraded surveys during limited face-to-face class time as we did in our previous research (Oslawski-Lopez and Kordsmeier 2021), we often opted to share the survey opportunity in LMS announcements, allowing students to participate in their own time. Not surprisingly, students in the current study were stronger performers on exams and final grades as compared to our previous, more inclusive initial study (Oslawski-Lopez and Kordsmeier 2021), an issue we discuss more fully in our findings and conclusions.

Analytical Strategy

To assess the findings previous findings in the literature, we begin by investigating (RQ1) how students accessed the podcast content, and (RQ2) if mode of access influenced exam performance. Next, we turn to questions about note-taking and multitasking. We begin by investigating if (RQ3) note-taking varied by mode of accessing the podcast content, and (RQ4) if note-taking correlated with exam performance. Then, we examine rates and types of multitasking

(RQ5), and if multitasking varied by mode of accessing the podcast content (RQ6) or by note-taking (RQ7), and (RQ8) if multitasking correlated with exam performance. Lastly, we (RQ9) assess the relationship between exam performance and mode accessing podcast content, note-taking, and multitasking, while controlling for important demographic variables in multivariate logistic regression analyses.

We used Stata 18.0 to conduct statistical analyses of the quantitative data, focusing on how students accessed the podcast content as well as their notetaking and multitasking behaviors (StataCorp 2023). In addition to reviewing descriptive statistics, we paired bivariate cross-tabulations with chi-square tests to examine and test for statistically significant group differences. Cross-tabulations allow for the examination of group differences in categorial data. The chi-square test indicates if the observed group differences vary from those expected "if the null hypothesis of no difference were true" (Levin and Fox 2004:190-91).

Lastly, where appropriate, we examined the same group differences that we tested in the bivariate analyses using multivariate logistic regression analyses, an appropriate form of regression analysis for dichotomous dependent variables (Long 1997). Turning to multivariate regression analysis allowed us to examine the effect of mode of access, note-taking, and multitasking on exam performance simultaneously, and if the bivariate relationships held when also controlling for demographic variables. Lastly, in the multivariate regression analyses, we controlled for the fact that some students completed more than one ungraded survey by clustering the data. Students who completed more than one ungraded survey represented more than one data point in the analysis, data points that might be more similar than those representing unique students (McCullagh and Nelder 2019).

Initial coding of the qualitative data was completed by the second author and a student research assistant, using codes presented in our previous study (Oslawski-Lopez and Kordsmeier 2021). Inter-rater reliability at this stage was about 69 percent. The researchers noted all codes that applied to each open-ended comment (i.e., a response could be coded for multitasking and interesting content). Where there was disagreement between the second author and the undergraduate research assistant, or when the second author noted that new codes were needed, the first author assessed the qualitative data, both coder's interpretations and assigned final codes. We discuss the qualitative data in the Conclusion and Discussion as it informs the quantitative findings.

FINDINGS

Descriptive Statistics

Table 2 shows the descriptive statistics from our research. In total, 145 students completed 210 ungraded surveys after completing podcast listening / reading assignments. A majority of respondents were first-year students (61.38 percent) and women (78.62 percent). On the other hand, only a minority of students who completed the ungraded surveys were enrolled in an upper-level course (8.97 percent) or declared majors within the humanities or social sciences (24.14 percent).

[TABLE 2 ABOUT HERE]

As we found in our initial study (Oslawski-Lopez and Kordsmeier 2021), the modal way of accessing the assigned podcast content was through listening to the podcast audio (60.48 percent). Other students either listened to the podcast audio AND read the podcast transcript (20.95 percent), or simply read the podcast transcript (18.57 percent).

Only one-third of students reported taking notes (33.33 percent), a figure that grew slightly when we recorded those who said they were working on homework associated with the podcast reading/listening assignment as notetakers (39.05 percent). Not surprisingly given that so many students listened to the assigned podcast content, only a small percentage of students reported highlighting as a form of notetaking (3.81 percent). Taken together, 40.95 percent of students reported engaging in at least one form of note-taking (note-taking, working on associated homework, or highlighting).

A majority of students (69.05 percent) engaged in some form of multitasking while completing their podcast listening/reading assignment, with some students reporting multiple forms (mean = 1.26, with a range of zero to seven forms of multitasking). In order of their frequency, 25.24 percent of students texted, 20.48 percent used social media or the Internet, 20.48 percent worked around the house, 12.86 percent talked with someone, 10.48 percent worked out, 10.48 percent drove, 8.57 percent watched TV, 6.19 percent worked for pay, 4.76 percent listened to music, 3.81 percent ate food, and 2.38 percent got dressed / ready.

As we began to discuss under the "Sample" heading, students in this follow up study performed quite well on multiple-choice exam questions associated with the podcast listening/reading assignments. Specifically, 81.43 percent of students answered associated multiple-choice exam questions correctly, a statistic quite higher than the 71.51 percent of students who correctly answered associated exam questions from our initial, more inclusive study (Oslawski-Lopez and Kordsmeier 2021).

Mode of Accessing Podcast Content

As discussed when reviewing the descriptive statistics, listening to the podcast content remained the modal way of accessing the podcast content just as in the initial study (RQ1). That said, the

findings in *Table 3. Correct Exam Questions by Mode of Access* reveal patterns unlike those from our initial study (Oslawski-Lopez and Kordsmeier 2021). Specifically, in the initial study, students who read the podcast transcript or listened to the podcast audio AND read the transcript were more likely to answer associated exam questions correctly than those who only listened or did not listen OR read. In short, mode of access correlated with correctly answering exam questions.[1] In this follow-up study, we find little difference in correctly answering exam questions by mode of access (RQ2). Among students who listened to the podcast audio 81.89 percent correctly answered exam questions, among those who read the podcast transcripts 79.49 percent answered correctly, and among those who listened AND read 81.82 percent answered correctly.

[TABLE 3 ABOUT HERE]

In our previous study (Oslawski-Lopez and Kordsmeier 2021), we hypothesized that mode of access may have correlated with exam performance, at least in part, because it served as a proxy for note-taking and multitasking behaviors. The additional data we gathered for this follow up study allow us to test this assumption. That said, we also know that this study had a lower response rate, which was likely related to the challenges of the COVID-19 pandemic. Due to the lower response rate, the sample likely missed lower-performing students, omitting variation in exam performance from the data. We cannot directly test this assumption about why mode of access did not correlate with correctly answering exam questions in this follow up study, but the descriptive findings and social-historical context of the COVID-19 pandemic

[1] Although mode of access correlated with correctly answering exam questions in our initial study (Oslawski-Lopez and Kordsmeier2021), this finding was not statistically significant.

provide some support.

Note-Taking

We turn next to our third and fourth research questions investigating if (RQ3) note-taking varied by mode of accessing the podcast content and (RQ4) if note-taking correlated with exam performance. *Table 4. Note-Taking by Mode of Access* displays how note-taking behaviors varied by mode of accessing the podcast content. Students who both listened to the podcast content and read the podcast transcript were the most likely to report taking notes (40.91 percent) as compared to those who listened only (30.71 percent) or read only (33.33 percent). Listeners AND readers remained the most likely to report note-taking when considering those who took notes or worked on homework associated with the assigned podcast content, with a noticeable increase in note-taking for listeners only (37.80 percent) and listeners AND readers (47.73 percent) as compared to the first measure that did not include doing homework as note-taking. Not surprisingly given the nature of audio content, only readers (5.13 percent) and listeners AND readers (13.64 percent) reported highlighting, group differences that were significant at the $p < .01$ level. Taken together, listeners AND readers were the most likely to engage in any type of note-taking behavior (including taking notes, doing homework, or highlighting) with over half of listeners AND readers (54.55 percent) reporting these behaviors. Listeners (37.80 percent) and readers (35.90 percent) were about as likely as each other to report any type of note-taking behavior.

[TABLE 4 ABOUT HERE]

In *Table 5. Percent of Students Correctly Answering Exam Questions by Note-Taking*, the results of four bivariate chi-square tests are displayed. In the first test, we find little difference between notetakers (82.86 percent) and non-notetakers (80.71 percent) in correctly answering

exam questions. The next test that includes those who completed homework as notetakers reveals slightly more difference between notetakers (84.15 percent) and non-notetakers (79.69 percent) in correctly exam questions, but this difference does not reach statistical significance. In the third test, we find statistically significant difference ($p< 0.05$) between highlighters, who were less likely to correctly answer exam questions (50 percent) than non-highlighters (82.67 percent). That said, given that only eight of 210 students reported highlighting, this result should be read cautiously. Lastly, we examine all notetakers, including those who took notes, did homework, or highlighted as compared to non-notetakers and find small, but statistically insignificant differences between the groups with 82.56 percent of note-taking students correctly answering exam questions and 80.56 percent of non-notetakers doing so.

[TABLE 5 ABOUT HERE]

Multitasking

Next, we turn to our research questions about multitasking, first examining rates and types of multitasking (RQ5). Next, we ask if multitasking varied by mode of accessing the podcast content (RQ6) or by note-taking (RQ7). Thirdly, we investigate if multitasking correlated with exam performance (RQ8).

Overall rates and types of multitasking are displayed in *Table 2. Descriptive Statistics* and described under the "Descriptive Statistics" subheading. *Table 6. Multitasking Behaviors by Mode of Access* is sorted by the overall rates and types of multitasking and displays rates and types of multitasking by mode of accessing the podcast content, with statistically significant group differences noted on the type of multitasking. Those who listened (71.65 percent) or listened AND read (70.45 percent) were more likely to report multitasking as compared to readers (58.97 percent). Listeners were the most likely to report the following types of

multitasking as compared to the other groups: using social media or the Internet (21.26 percent), working out (12.60 percent), working for pay (8.66 percent), and getting dressed / ready (3.15 percent). Readers were the most likely to report the following types of multitasking as compared to the other groups: talking with someone (23.08 percent, $p < .10$) and listening to music (17.95 percent, $p < .01$). Finally, listeners AND readers were the most likely to report the following types of multitasking as compared to other groups: texting (31.82 percent), working around the house (27.27 percent), driving (13.64 percent), watching TV (11.36 percent), and eating (6.82 percent).

[TABLE 6 ABOUT HERE]

Table 7. Multitasking Behaviors by Note-Taking, also sorted by overall rates and types of multitasking, displays rates and types of multitasking by note-taking, with statistically significant group differences noted on the type of multitasking. Overall, notetakers (56.98 percent) were significantly less likely to report any type of multitasking behavior than non-notetakers (77.42 percent) ($p < .01$). Non-notetakers were more likely to report the following types of multitasking behaviors as compared to notetakers: texting (27.42 percent), using social media or the Internet (25.81 percent, $p < .05$), working around the house (23.39 percent), working out (14.52 percent, $p < .05$), driving (11.29 percent), and working for pay (8.06 percent). On the other hand, notetakers were more likely than non-notetakers to report the following types of multitasking behaviors: talking with someone (13.95 percent), watching TV (11.63 percent), listening to music (6.98 percent), eating (4.65 percent), and getting dressed / ready (3.49 percent).

[TABLE 7 ABOUT HERE]

We examine the bivariate relationship between multitasking and correctly answering exam questions in *Table 8. Percent of Students Correctly Answering Exam Questions by*

Multitasking. The results show that multitaskers were significantly less likely to correctly answer exam questions (76.55 percent) as compared to students who did not multitask (92.31 percent, $p < .01$).

[TABLE 8 ABOUT HERE]

Multivariate Regression Analysis

Lastly, we assess our final research question, examining the relationships between exam performance, mode accessing podcast content, note-taking, and multitasking while controlling for important demographic variables in multivariate logistic regression analyses (RQ9). *Table 9. Logistic Regression of Correctly Answering Exam Questions* displays exponentiated coefficients, also known as odds ratios. When interpreting odds ratios, results over 1 indicate more likelihood to answer the exam question correctly and results under 1 indicate less likelihood to answer the exam questions correctly.

[TABLE 9 ABOUT HERE]

In the first "Mode of Access" model, we test the relationship between mode of accessing the podcast content on the dependent variable, correctly answering exam questions. We include two dichotomous variables indicating if the student read the podcast transcript or both listened to the podcast audio and read the podcast transcript. Only listening to the podcast audio is the omitted comparison group. Just as we found in the bivariate analysis (see *Table 3. Correct Exam Questions by Mode of Access*), we found no statistically significant differences in correctly answering exam questions by mode of accessing the podcast content. That said, readers are slightly less likely to have correctly answered exam questions than listeners (odds ratio = 0.86), while listeners AND readers just as likely as listeners to correctly answer exam questions (odds ratio = 1.00).

The second "Took Notes" model adds a dichotomous variable indicating if students took notes to the equation. In this model, notetakers have slightly higher odds of correctly answering exam questions than non-notetakers (odds ratio = 1.16) although this finding is not statistically significant. This finding once again mirrors the results of the bivariate analysis (see *Table 5. Percent of Students Correctly Answering Exam Questions by Note-Taking*).

The third "Took Notes / Homework" model replaces the dichotomous variable indicating if students took notes with the dichotomous variable indicating if students took notes or did homework. Just as in the bivariate analysis (see *Table 5. Percent of Students Correctly Answering Exam Questions by Note-Taking*), this iteration of the note-taking variable showed a slightly stronger positive association with answering exam questions correctly (odds ratio = 1.35), however, the relationship remained insignificant.

The fourth "Highlighted" model adds a dichotomous variable indicating if students highlighted as a form of note-taking to the equation. Again, as in the bivariate analysis (see *Table 5. Percent of Students Correctly Answering Exam Questions by Note-Taking*), highlighting is significantly and negatively correlated with correctly answering exam questions correctly (odds ratio = 0.17, $p < .05$). Again, given that only eight of 210 students reported highlighting, this finding should be interpreted cautiously.

The fifth "Multitasking" model adds a dichotomous variable indicating if students multitasked. Not surprisingly given the bivariate findings (see *Table 8. Percent of Students Correctly Answering Exam Questions by Multitasking*), multitaskers were significantly less likely to correctly answer exam questions (odds ratio = .26, $p < .05$).

The only demographic variable to reach significance in the sixth "Full Model" was the dichotomous variable for *first-year students*, who were less likely to correctly answer exam

questions (odds ratio = .41, $p < .10$). Although the other demographics did not significantly relate to correctly answering exam questions, the exponentiated coefficients suggest that women, humanities and social science students, and students enrolled in upper-level courses were more likely to correctly answer exam questions, while students enrolled in online students were less likely to correctly answer exam questions.

DISCUSSION AND CONCLUSION

The results of this follow-up study confirm some findings from our previous study (2021) and clarify others. To start, just as in the first study, students in this follow-up study most frequently reported listening to the podcast content, demonstrating the students' preferences for audio content. That said, mode of accessing the podcast did not correlate with differences in exam performance as it did in our previous study (Oslawski-Lopez and Kordsmeier 2021). As we suspected in our previous study (Oslawski-Lopez and Kordsmeier 2021), mode of access may have been at least in part a proxy for note-taking and multitasking, questions we address directly in this study. That we found no difference by mode of access like we did in our first study (Oslawski-Lopez 2021) might suggest that multiple-choice questions, which have the possibility of being answered correctly just by chance, and which good test-takers may be able to guess, are not always the strongest measure of learning. The results of the study might be very different had we asked students to write short answers, particularly given our sample this time seemed to have higher-achieving students more generally.

When measuring note-taking, doing associated homework, or highlighting together, about 41 percent of students were counted as notetakers. Students who both listened AND read were the most likely to be notetakers, followed by listeners, and then readers. When measured in this way, notetakers displayed a small, statistically insignificant advantage relative to exam

performance in the bivariate analysis. When measured separately, only students who incorporated reading (readers or listeners AND readers) reported highlighting, and highlighters were significantly less likely to correctly answer exam questions than non-highlighters. So while note-taking in general may confer some advantage to students as far as exam performance goes, notetakers are a statistical minority in our sample and not all forms of note-taking appear to be equal performance boosters.

Where notetakers were a statistical minority, multitaskers were a majority with nearly two-thirds (69 percent) of students reporting some form of multitasking. Podcast listeners were the most likely to multitask, followed by listeners AND readers, and then readers. Types of multitasking also varied by mode of accessing the podcast content. Those who incorporated listening (both listeners only and listeners AND readers) were more likely to engage in behaviors that would be difficult to incorporate while reading like using social media or the Internet, working out, getting dressed / ready, texting, working around the house, and driving. Readers on the other hand, were more likely to incorporate multitasking behaviors with audio components like talking with someone or listening to music, which of course, would be more difficult to incorporate while also listening to a podcast.

Notetakers were less likely than non-notetakers to multitask and there was also variation in the types of multitasking behaviors common in each group. To some extent, the multitasking behaviors more common among non-notetakers seemed consistent with activities that would make note-taking difficult – i.e., texting, using social media or the Internet, working around the house, working out, driving, and working for pay. That said, notetakers were also more likely than non-notetakers to engage in some behaviors that seemed at odds with note-taking like talking with someone, watching TV, and getting dressed / ready. There is also evidence in the

qualitative data that suggests that students treat these different modes of accessing podcasts as qualitatively different: 10.26 percent of readers and 2.27 percent of those who did both reported choosing their mode because it allowed them to multitask; compare that with 24.41 percent of those who listened to the podcast. In other words, differences in students' behavior likely stem from fundamentally different frames through which students understand reading for a class as opposed to listening to a podcast.

Beyond these rates and types of multitasking by mode of accessing the podcast content and note-taking, however, we were unsurprised to find that multitaskers showed significantly depressed exam performance as compared to students who did not report multitasking, a finding that confirms and refines those from our previous study (Oslawski-Lopez and Kordsmeier 2021).

So, what do these findings mean for possible best practices? These findings buttress the best practices we offered in our initial study (Oslawski-Lopez and Kordsmeier 2021) – offering students multiple modes of accessing content and instructing students how to best engage with the content (i.e., taking notes and avoiding pairing the listening / reading assignment with other activities). In analyzing the qualitative data, more of our students (10.48 percent) remarked that they liked podcasts in general and would like to see them used more often in their courses as compared to only 3.33 percent saying they disliked podcasts in general. The fact that students show a preference for podcasts is not insignificant. Only about 2 percent of cases responded that they did not read or listen to the podcast. This is a remarkable level of student engagement with course materials, even given a sample that overrepresents the students with the highest grades.

Based on these results, we cannot help but agree with the idea that podcasts can be a potent tool in driving student engagement with class materials (Prince 2020; Greenberg 2021; Oslawski-Lopez and Kordsmeier 2021; King and Kusch 2024). Offering both the transcript and

audio is essential to meet accessibility needs and encourage the best learning practices. In our qualitive data, the biggest reason that students gave for choosing the mode of accessing the content that they chose was a preference for it, no matter the mode (66.93 percent for those that listened, 76.92 percent for those that read, and 86.36 percent for those that did both). This suggests that giving students choices and multiple ways of accessing content is paramount in students' eyes. For instructors this suggests both that they should be encouraged to utilize podcasts as an alternative to readings but only if they are also able to offer students transcripts of the podcasts so that students can choose the modality that works best for them.

Making best learning practices explicit is the second essential component to using podcasts effectively. Even in a sample that overrepresents the students with the highest grades (and presumably the strongest study habits), the students do not naturally adopt best practices for extracting information from assigned materials. Indeed, when the information is presented in formats that are more similar to their experiences outside of academics, students may default to behaviors used in their everyday lives, such as listening to a podcast while working out or browsing an article on their phones while listening to music. Instructors who incorporate podcasts as "reading" in their classes might consider using our mini-lecture "Listening to Podcasts for Class: Tips for Success," published in *Teaching Resources and Innovations Library for Sociology (TRAILS),* to teach students the importance of note-taking and the dangers of multitasking (Kordsmeier and Oslawski-Lopez 2024). As our study suggests, class time spent explicitly instructing students how to best extract information is necessary if students are going to get the most out of podcast assignments. These skills can pay dividends for students given that these best practices related to note-taking and multitasking likely apply to more than just podcast listening / reading assignments, a possibility future studies can examine more fully.

Alternatively, more structured assignments around podcasts, like listening/reading guides, can help signal to students that they need to pay attention to the content in the podcast (Greenberg 2021; King and Kusch 2024). The amount of signposting or instruction necessary may vary based on how much exposure they have had to podcasts during their college career. This may mean that they are more necessary for first-year students (as evidenced by that group's lower scores) but given the relative novelty of podcasts as a learning tool in higher education, they may be necessary at all levels.

While our current study confirms and clarifies the best practices we offered in our initial study (Oslawski-Lopez and Kordsmeier 2021), we are left with further questions and possibilities. Specifically, future research should continue investigating the relationship between multitasking, note-taking, and exam performance. Related to note-taking, we were not surprised that highlighting was negatively associated with exam performance. That said, only a handful of students in our analysis reported this type of note-taking. Future research can continue investigating the relationship of highlighting to academic performance, perhaps by continuing the comparison we started here between note-taking, working on associated homework, and highlighting. There were hints in our data that some types of multitasking were more damaging than others, especially among non-notetakers. Coupling the small sample size of this study (N=210) with low proportions of any one type of multitasking meant that we could not report these individual relationships with certainty. In addition to survey research with larger samples, experimental studies might also be able to parse how multitasking and note-taking affect exam performance.

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NOTES

[INSERT ENDNOTES]

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END MATTER

TABLES

Table 1. Summary of Data Collection

	Fall 2020	Spring 2021	Fall 2021	Spring 2022
Introduction to Sociology (Oslawski-Lopez's Institution)	1 F2F section (3 podcasts)	2 F2F sections (2 podcasts)	2 sections [1 F2F (3 podcasts), 1 online (1 podcast)]	3 sections [2 F2F (2 podcasts), 1 online (2 podcasts)]
Upper-level Sociology Courses (Kordsmeier's Institution)	1 online section (1 podcast)	-	1 hybrid section (1 podcast)	-

Table 2. Descriptive Statistics

	% / Mean	SD	Min.	Max.	N
Demographics					
R is a first-year student	61.38%	.49	0	1	145
R is assumed to be a woman	78.62%	.41	0	1	145
R enrolled in an upper-level course	8.97%	.29	0	1	145
R enrolled in an online course	16.55%	.37	0	1	145
R is a humanities or social science student	24.14%	.43	0	1	145
Mode of Accessing Podcast					
R listened to the podcast	60.48%	.49	0	1	210
R read the podcast transcript	18.57%	.39	0	1	210
R listened to the podcast and read the transcript	20.95%	.41	0	1	210
Note Taking					
R took notes	33.33%	.47	0	1	210
R took notes or worked on associated homework	39.05%	.49	0	1	210
R highlighted	3.81%	.19	0	1	210
R took notes, worked on associated homework, or highlighted	40.95%	.49	0	1	210
Multitasking					
Number of multitasking activities reported	1.26	1.23	0	7	210
R reported any type of multitasking	69.05%	.46	0	1	210
R texted	25.24%	.44	0	1	210
R used social media or the Internet	20.48%	.40	0	1	210
R worked around the house	20.48%	.40	0	1	210
R talked with someone	12.86%	.34	0	1	210
R worked out	10.48%	.31	0	1	210
R drove	10.48%	.31	0	1	210
R watched TV	8.57%	.28	0	1	210
R worked for pay	6.19%	.24	0	1	210
R listened to music	4.76%	.21	0	1	210
R ate food	3.81%	.19	0	1	210
R got dressed / ready	2.38%	.15	0	1	210
Correct Answers to Exam Questions					
R correctly answered podcast exam questions	81.43%	.39	0	1	210

Table 3. Correct Exam Questions by Mode of Access (N = 210)

	Listened	Read	Listened and Read	Total
Incorrect Answer				
n	23	8	8	39
%	(18.11)	(20.51)	(18.18)	(18.57)
Correct Answer				
n	104	31	36	171
%	(81.89)	(79.49)	(81.82)	(81.43)
TOTAL				
N	127	39	44	210
%	(100.00)	(100.00)	(100.00)	(100.00)

NOTE: Column Percents Shown in Parentheses; Pearson Chi-Square = .12, Pr. = .94

Table 4. Note-Taking by Mode of Access (N = 210)

		Listened	Read	Listened and Read	Total
Took Notes					
	n	39	13	18	70
	%	(30.71)	(33.33)	(40.91)	(33.33)
Took Notes or Did Homework					
	n	48	13	21	82
	%	(37.80)	(33.33)	(47.73)	(39.05)
Highlighted **					
	n	0	2	6	8
	%	(.00)	(5.13)	(13.64)	(3.81)
Took Notes, Did Homework, or Highlighted					
	n	48	14	24	86
	%	(37.80)	(35.90)	(54.55)	(40.95)
TOTAL					
	N	127	39	44	210
	%	(100.00)	(100.00)	(100.00)	(100.00)

NOTE: Column Percents Shown in Parentheses; $^{+}p < .10$, $*p < .05$, $**p < .01$

Table 5. Percent of Students Correctly Answering Exam Questions by Note-Taking (*N*=210)

		No Notes	Notes	Total
Took Notes % Correct				
	n	113	58	171
	%	(80.71)	(82.86)	(81.43)
	Total			
	N	140	70	210
	%	(100.00)	(100.00)	(100.00)
Took Notes or Did Homework % Correct				
	n	102	69	171
	%	(79.69)	(84.15)	(81.43)
	Total			
	N	128	82	210
	%	(100.00)	(100.00)	(100.00)
Highlighted % Correct*				
	n	167	4	171
	%	(82.67)	(50.00)	(81.43)
	Total			
	N	202	8	210
	%	(100.00)	(100.00)	(100.00)
Took Notes, Did Homework, or Highlighted % Correct				
	n	100	71	171
	%	(80.65)	(82.56)	(81.43)
	Total			
	N	124	86	210
	%	(100.00)	(100.00)	(100.00)

NOTE: Column Percents Shown in Parentheses; $^{+}p < .10$, $^{*}p < .05$, $^{**}p < .01$

Table 6. Multitasking Behaviors by Mode of Access, Percents (N = 210)

	Overall (N = 210)	Listened (N = 127)	Read (N = 39)	Listened and Read (N = 44)
R reported any type of multitasking	69.05	71.65	58.97	70.45
R texted	25.24	22.83	25.64	31.82
R used social media or the Internet	20.48	21.26	17.95	20.45
R worked around the house	20.48	20.47	12.82	27.27
R talked with someone^{+}	12.86	11.02	23.08	9.09
R worked out	10.48	12.60	7.69	6.82
R drove	10.48	11.81	2.56	13.64
R watched TV	8.57	7.09	10.26	11.36
R worked for pay	6.19	8.66	2.56	2.27
R listened to music**	4.76	1.57	17.95	2.27
R ate food	3.81	3.94	.00	6.82
R got dressed / ready	2.38	3.15	.00	2.27

NOTE: $^{+}p < .10$, $*p < .05$, $**p < .01$

Table 7. Multitasking Behaviors by Note-Taking, Percents (N = 210)

	Overall (N = 210)	No Notes (N = 124)	Took Notes (N = 86)
R reported any type of multitasking**	69.05	77.42	56.98
R texted	25.24	27.42	22.09
R used social media or the Internet*	20.48	25.81	12.79
R worked around the house	20.48	23.39	16.28
R talked with someone	12.86	12.10	13.95
R worked out*	10.48	14.52	4.65
R drove	10.48	11.29	9.30
R watched TV	8.57	6.45	11.63
R worked for pay	6.19	8.06	3.49
R listened to music	4.76	3.23	6.98
R ate food	3.81	3.23	4.65
R got dressed / ready	2.38	1.61	3.49

NOTE: $^{+}p < .10$, $*p < .05$, $**p < .01$

Table 8. Percent of Students Correctly Answering Exam Questions by Multitasking (N = 210)

	R Did Not Multitask	R Multitasked	Total
Incorrect Answer			
n	5	34	39
%	(7.69)	(23.45)	(18.57)
Correct Answer			
n	60	111	171
%	(92.31)	(76.55)	(81.43)
TOTAL			
N	65	145	210
%	(100.00)	(100.00)	(100.00)

NOTE: Column Percents Shown in Parentheses; Pearson Chi-Square = 7.37, Pr = .01

Table 9. Logistic Regression of Correctly Answering Exam Questions (N= 210)

	1. Mode of Access	2. Took Notes	3. Took Notes / Home-work	4. High-lighted	5. Multi-tasking	6. Full Model
Read	.86	.85	.87	.99	.83	.83
	(.40)	(.39)	(.39)	(.46)	(.41)	(.41)
Both Listened and Read	1.00	.98	.97	1.38	1.38	1.27
	(.44)	(.44)	(.44)	(.72)	(.75)	(.67)
Took Notes		1.16				
		(.47)				
Took Notes or Did Homework			1.35	1.40	1.14	1.10
			(.52)	(.56)	(.49)	(.49)
Highlighted				.17*	.17*	.15*
				(.14)	(.15)	(.13)
Multitasked					.27*	.26*
					(.14)	(.14)
R is a first-year student						.41^{+}
						(.20)
R is assumed to be a woman						1.33
						(.63)
R is a humanities or social science student						1.05
						(.58)
R is enrolled in an upper-level course						1.07
						(1.47)
R is enrolled in an online course						.79
						(.50)
N	210	210	210	210	210	210
Pseudo R^2	.001	.001	.004	.028	.066	.091

NOTE: Exponentiated coefficients; Standard errors in parentheses; *+p < .10, *p < .05, **p < .01*

APPENDICES

Appendix A. Ungraded Survey

You are being asked to participate in a research study about students' preferences for audio vs. print "reading" content and how these preferences correlate with reading comprehension. Scientists do research to answer important questions which might help change or improve the way we do things in the future.

This consent form will give you information about the study to help you decide whether you want to participate. Please read this form, and ask any questions you have, before agreeing to be in the study.

Please note the following:

(i) you are being asked to participate in research,

(ii) to participate in the research, you will complete a short, ungraded survey,

(iii) your participation in this short, ungraded survey is voluntary and completion or incompletion will not impact your grade in this course,

(iv) the risks of participating are minimal, but you may feel some discomfort when answering the questions on this ungraded survey; benefits of participation include helping instructors understand students' preferences for audio vs. print "reading" content and how these preferences correlate with reading comprehension,

(v) efforts will be made to keep your personal information confidential. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. No information which could identify you will be shared in publications about this study.

(vi) you can contact Jamie Oslawski-Lopez, PhD... with any questions about the research. For questions about your rights as a research participant, to discuss problems, complaints, or concerns about a research study, or to obtain information or to offer input, please contact the IU Human Subjects Office at...

(vii) lastly, you must be at least 18 years old to participate in this research.

Q1. Are you 18 years old or older? Type “YES” or “NO” below.

- If you answered “NO,” that you are not 18 years old or older, you should exit this ungraded survey. You must be at least 18 years old to participate in this research.

Q2. Did you listen to and/or read the transcript of the [Insert Podcast Name] podcast?

- I read the transcript
- I listened to the podcast
- I listened to the podcast AND read the transcript
- I did not listen to the podcast OR read the transcript

Q3. Why did you choose to listen to and/or read the transcript of the assigned podcast? [Open-ended response]

Q4. How did you engage with what you were listening to and/or reading? (Check all that apply)

- I took notes
- I highlighted the text
- None of the above (I only read and/or listened to the podcast)

Q5. Other than taking notes, what other activities did you engage in while listening to and/or reading the transcript of the podcast? (Check all that apply)

- Watching TV
- Talking with someone
- Texting
- Using social media
- Working out/walking/running
- Working for pay
- Working around the house
- Driving
- Other [Please specify in the next question]
- None of the above

Q6. What "other" activities did you engage in while listening to and/or reading the transcript of the podcast? [If you did not select "other" above, you can skip this question or type in N/A (Not applicable)]. [Open-ended response]

Q7. Is there anything else you would like to share about this listening / reading assignment? [Open-ended response]

Appendix B. Multiple-Choice Quiz/Exam Questions

Q for *Give Theory a Chance* - "Jaclyn Wypler on Learning to Love Theory" (Green 2020)

True or False: Wypler has used theory at farming conferences.

Q for *Office Hours* - "Lisa Wade on American Hookup: The New Culture of Sex on Campus" (Powell and Nobles 2017)

To gather data for her book *American Hookup: The New Culture of Sex on Campus*, Lisa Wade used which research method?

- **Weekly student diaries**
- Weekly student interviews
- Weekly student surveys
- Weekly student group meetings

Q for *Office Hours* - "Victor Rios on Policing Black and Latino Boys" (Shannon 2015)

During the Office Hours Podcast #105, Dr. Victor Rios discusses how the Black and Latino boys he studied were _____.

- Correctly punished for their behaviors.
- **Criminalized.**
- Unable to change.
- Given a great deal of opportunity to succeed.

Q for NPR *Hidden Brain* - "Lost in Translation: The Power of Language to Shape How We View the World" (Vedantam 2018)

According to the Sapir-Whorf hypothesis and the NPR Hidden Brian Podcast "Lost In Translation: The Power Of Language To Shape How We View The World," if our language was similar to those spoken in a community called Pormpuraaw and we used cardinal directions rather than the ideas of left and right, we might be better at what?

- Using the GPS on our smartphones
- Planning livable communities
- **Staying oriented in physical space**
- Participating in social endeavors

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[i] This research has been approved as exempt by the Indiana University Institutional Research Board (Protocol #2001813115).

[ii] Using publicly available data from Indiana University's Department of Institutional Analytics, we averaged 2020, 2021, and 2022 fall official census data on enrollments of non-traditionally

aged students, students of color, female students, and first-generation college students at Oslawski-Lopez's and Kordsmeier's universities to make these comparisons.

[iii] Given that age is only one metric for non-traditional status (e.g., others might include marriage, parenting, working for pay, and veteran status), this is likely an undercount of this population at both authors' institutions and nationally (Zack 2020).

[iv] It is important to note that without all students self-reporting pronouns, it is possible that some individuals were miscounted.