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Understanding the impact of attendance and participation on academic achievement

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Abstract

Although it is widely believed that attendance is directly and positively related to academic achievement, the literature presents mixed findings. Moreover, there is a paucity of research on the potential role of engagement, particularly student participation, in explaining this relation. The present study investigated whether in-class participation mediates the relation between attendance and academic achievement, particularly in the context of a small American liberal arts college. Students' final cumulative exam scores were used as an unconfounded outcome measure for students' learning success (i.e., academic achievement). Our results demonstrated a significant indirect effect of attendance on academic performance through participation, with a point estimate of .08 ($SE = .02$), 95% CI [.06, .12.]. Notably, the direct effect of attendance on academic performance became nonsignificant ($B = .03$, $t(.71)$, $p = .48$) when controlling for participation, suggesting a strong mediation effect. These results suggest that students' in-class participation mediates the positive relation between attendance and academic achievement reported in the literature. Although caution should be taken when generalizing these results, as the data were collected in a particular educational context, our results offer potential implications for course instructors. The implications include designing courses and assessment schemes, as well as adopting active learning approaches, to encourage students' in-class participation.

Keywords: attendance, participation, engagement, academic achievement, post-secondary education

Understanding the impact of attendance and participation on academic achievement

The benefits of higher education transpire at both the individual and societal levels (Ma et al., 2016). Given the value of higher education, past research has focused on identifying factors that impact students' achievement in this context (for reviews see Hattie, 2009; Robbins et al., 2004; Schneider & Preckel, 2017). Investigations on factors that students can typically control, specifically class attendance and participation, may help guide students towards decisions and behaviours that would positively impact their achievement. On the flip side, this line of research could also help inform course design. For example, if, as it has been argued, students' class attendance significantly elevates their achievement in a course, then an instructor may wish to incorporate attendance as part of students' final grades to encourage class attendance. This gesture aligns with the finding that students who rated the importance of attending and being engaged in class most highly were also least likely to follow their own advice (Popovic & Green, 2012). Although class attendance is commonly thought to be directly correlated with academic achievement, the literature on the relation between attendance and academic achievement presents mixed findings. Moreover, there is a paucity of research on the potential role of engagement, particularly students' in-class participation, in explaining this relation. To help shed additional light on these important topics, the present study investigated whether students' participation mediates the relation between attendance and academic achievement.

Several studies demonstrate that attendance has a significant impact on academic achievement (e.g., Akhtar, Warburton, & Xu, 2017; Alzhanova-Ericsson, Bergmanb, & Dinnétz, 2017; Credé, Roch, & Kieszczynka, 2010; Deane & Murphy, 2013; Horton, Wiederman, & Saint, 2012; Latif & Miles, 2013; Marburger, 2001; Stanca, 2017; Westerman, Perez-Batres, Coffey, & Poudet, 2011), however, the magnitude varies across studies. Whereas some studies (Andrietti, 2014; Clark, Gill, Walker, & Whittle, 2011; Credé et al.,

2010; Deane & Murphy, 2013) demonstrate large correlations ($r = .41-.59$) between attendance and academic achievement, other studies (El Tantawi, 2009; Gatherer & Manning, 1998; Horton et al., 2012; Rodgers, 2001; Thatcher, Fridjhon, & Cockcroft, 2007) report a more modest relation ($r = .20-.34$). Some studies do not reveal a relation between attendance and academic achievement (Eisen et al., 2015; Hammen & Kelland, 1994; McConnell & Lamphear, 1969). Moreover, other studies have shown that the impact of attendance on academic performance declines when grade-point-average, effort (e.g., homework assignment completion, number of study hours), and motivation (e.g., self-reported interest in the course subject) are taken into account (Andrietti, 2014; Andrietti & Velasco, 2015; Bratti & Staffolani, 2013; Latif & Miles, 2013; Stanca, 2017).

Notably, attendance is typically measured by students' physical presence in a classroom, and physical presence without engagement in the class activities likely cannot explain the positive impact of student attendance on academic success that has been reported in the literature. In fact, potential mediating factors, such as engagement in class activities, could explain the inconsistent relation between attendance and academic achievement reported in the literature. To our knowledge, past research has not differentiated the impact of students' physical attendance in a class and their engagement in a lesson.

Engagement has been measured in different ways in the literature, including the use of questionnaires such as the National Survey of Student Engagement (Kuh, 2001; Kuh, 2003) and the College Student Experiences Questionnaire (Kuh, Vesper, Connolly, & Pace, 1997; Pace, 1990). Importantly, past studies have found that students who are academically engaged cope better with academic stress (Bruce, Omne-Pontã, & Gustavsson, 2010). Past studies have also demonstrated a positive relation between academic achievement and engagement in educationally purposeful activities (e.g., Bai & Pan, 2009; Carini, Kuh, & Klein, 2006; Davis & Murrell, 1993; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008; Kuh et al.,

1997; Laird & Cruce, 2009), such as studying and interacting with faculty. Engagement in educationally purposeful activities has been found to correlate positively with grade point average (Heffner & Antaramian, 2016) and to be predictive of first year grade point average above and beyond demographic characteristics, pre-college experiences and prior academic achievement (Kuh et al., 2008).

Handelsman, Briggs, Sullivan, and Towler, (2005) developed and explored the validity of the Student Course Engagement Questionnaire, a questionnaire that focuses on students' active participation and commitment to learning. Using exploratory factor analysis, they found four distinct and reliable dimensions of post-secondary student engagement: (1) participation/interaction, (2) skills, (3) performance, and (4) emotional engagement. Participation, in particular, has been shown to be positively correlated with students' grades (Handelsman et al., 2005; Petress, 2006; Weaver & Qi, 2005; for a review on student participation in higher education, see Rocca, 2010). Moreover, active participation (e.g., frequently participating in class discussions) has been shown to result in better student achievement compared to passive participation (e.g., paying attention to what is said during class discussion without directly contributing to the discussion) (Fritschner, 2000; Garside, 1996; Howard, James, & Taylor, 2002), and oral participation has been associated with motivation to study and better performance on assessments of learning (Frymier & Houser, 2016). The present study assessed whether (1) active participation can be used to predict students' academic achievement in a course of study, and whether (2) the relation between students' class attendance and academic achievement in a course is mediated by in-class participation.

Importantly, participation is operationally defined and measured in different ways in the literature. For example, participation that takes place in the classroom is differentiated from participation that takes place outside of class (e.g., online chat rooms, sending emails to

the course instructor). Traditionally, students' participation has been assessed using an instructor-centered rating system (Clarke 1985; Fisher, 1975). However, other methods have started to evolve that include assessments and moderation by individuals other than the course instructor, including the students themselves and their peers (e.g., Dancer & Kamvounias, 2005; Poole, 2000). This has largely been in response to the concern that participation assessment can be subjective and biased by teacher-learner relationships (Armstrong & Boud, 1983; Lyons, 1989). An exhaustive discussion on participation evaluation, although interesting and important, is beyond the scope of the present paper (but see Armstrong & Boud, 1983; Falchikov & Goldfinch, 2000; Gopinath 1999; Lyons, 1989; Rocca, 2010). It is important to note, however, that many studies have assessed participation based on students' contributions to class discussion via asking and answering questions and commenting on the topic at hand (for a review see Czekanski & Wolf, 2013). In line with the existing literature, we assessed participation in the present study using these same criteria.

Current Study

The purpose of the present study was to investigate whether in-class participation mediates the relation between attendance and academic achievement, particularly in the context of a small American liberal arts college. Since attendance and participation compose a portion of the students' final grades for the dataset we analyzed, we used students' final cumulative exam scores as an unconfounded outcome measure for students' learning success (i.e., academic achievement). Understanding the impact of attendance and participation on students' learning could help inform both course design and a positive course of action that can be relayed to students. For example, if participation is found to mediate any impact that attendance might have on final cumulative exam performance, instructors may wish to increase the weight of participation, as opposed to attendance, on students' final grades to encourage high participation rates. In this way, the results of the present study may have

important implications for education, including how courses are designed and providing students with information about what they can do to help improve their academic success. In the present study, participation was operationally defined as students' contributions to class discussion by volunteering comments, asking and answering questions, and participation in class demonstrations. Attendance was scored based on students' physical presence in each class. Both participation and attendance was assessed using an instructor-centered rating system. Based on past studies reviewed above, we hypothesized that participation would mediate the relation between student attendance and academic achievement.

Method

Participants

All students were enrolled in a Psychology course taught at an American small liberal arts college. Students' attendance, participation and grades from a given course are considered as archival data by the college. The archival dataset consisted of data from 700 students that were collected over the span of seven years, across seven different courses all taught by the same course instructor. The mean class size was 19 students and ranged in size from seven to 32 students. After all outliers were removed, data from 685 participants were included in the analyses of the present study. Given that these data are de-identified and stripped of any personal information that can be traced back to an individual student, the college did not require students to provide consent to have their data included in the present study. Consequently, demographic information specifically corresponding to the individuals whose data were analyzed in the present study cannot be provided. However, demographic information from students enrolled in psychology courses during the 2014-2015 academic year was collected for a 5-year self-review. The demographic information from the self-study is an accurate approximation of the demographic information from the students in the archival data because the self-study occurred during the seven-year span when the relevant

courses were offered, and the majority of the courses from the archival data were from courses required in the psychology major. From the self-study, 79% of the students were female and 21% of the students were male. The mean age of the students was 23.6 years ($SD = 7.60$). In addition, 68% of the students entered this particular institution as a transfer student, while 32% entered during their first year as a college student.

Materials

Attendance scores. Students earned points for simply attending (being physically present) each class of a course. Attendance was taken by calling roll by the instructor at the beginning of class time. If students appeared in class after roll was called, they were marked late by the instructor. Every third tardiness equated to an absence. These points contributed towards students' final marks in the course. To calculate individual students' percentage scores for attendance, the points that students earned for attendance throughout the course were divided by the total possible points they could have earned.

Participation scores. The course instructor documented students' participation at the end of each class. As mentioned above, students received participation points for asking questions, participating in class demonstrations, offering their thoughts and comments during lectures, and class discussions. "Voluntary participation" consisted of students asking questions, answering questions from the instructor or from other classmates without being called upon to answer, and volunteering to be a participant in a class demonstration. In the event that more than one student raised their hand, each student was allowed to respond in the order that their hands went up in the air. On rare occasions if a single student dominated the classroom discussion, the instructor acknowledged the student verbally as having raised their hand, but passed on them to permit other students a chance to speak. "Compulsory participation" was defined as student participation that was solicited by the instructor. In selecting students for compulsory participation, the instructor deliberately chose students who

did not regularly volunteer for participation so that participation was not dominated by a handful of students. Voluntary and compulsory participation were noted by the professor after each class.

Grades for student participation reflect an overall assessment of the students' level of engagement in the classroom throughout the entire semester. Students received 100% for participation for demonstrating class leadership by voluntarily raising their hand to answer or ask questions every, or nearly every, class and for demonstrating leadership in group work; specifically, those students who earned 100% for participation asked questions that stimulated class discussion on the lecture topic, as opposed to clarifying questions. Students who voluntarily participated at least once for 80% or more of the classes were given at least a 90% for participation. Students received 70% for participation if they only participated because they were called upon by the instructor. Students who declined to participate when called upon by the course instructor received a participation score of 50% or lower. Statements such as "I don't want to answer" as opposed to "I don't know" were counted as refusals. If students stated that they did not know, questions would be reframed to tap into the knowledge base that they did have. Students who refused to answer questions could receive a participation grade of 50% if they engaged in small group discussion or group work, as discussed further below. Scores below 50% reflect students' refusal to participate through dismissal of questions or sharing thoughts and refusal to participate in small group work or small group discussions. The benchmark grades of 90%, 80%, 70%, and 50% could be adjusted up or down by the instructor based on other evaluative information, such as if the instructor noted that the student asked a particularly insightful question.

Due to small class sizes (20-30 students), small group discussions and group work typically consisted of 4-6 students per group. The small class sizes also allowed the instructor to visit with each group two to three times within the allotted time period. The assignments

given to students for small group discussion and small group work were always designed to elicit at least a single response from each member (e.g., write down and share with the group a time when you experienced cognitive dissonance). Small group work activities were designed to be interactive, so that students would have to actively work with their peers in the group to complete the task. For example, in one of the activities (the mirror tracing task) students worked in pairs, taking turns to complete a mirror tracing exercise while the other student held up a mirror so that their partner could complete the tracing exercise. The instructor took note of students' level of engagement in group work or small group discussion, whether the student failed to participate in any way (e.g., sitting with a group but looking at their phone for the majority of the time and/or refusing to speak), had minimal participation (e.g., single sentence answer, listening but not contributing to the conversation), or took a leadership role (e.g., organizing students with tasks, directing the conversation). It is entirely possible that the instructor may have missed a student's comment to their group members because the instructor was at that moment occupied with another group. However it is important to note that participation grades reflect overall participation throughout the entire semester and not one specific moment in class. Participation grades were assigned at the end of the semester based upon a review of notes of student participation taken after each class (e.g., Crystal - good question, Sean - refused, Jenny - led discussion, Jim - called upon) and the overall impression from the instructor. The small class sizes made it possible for the instructor to familiarize herself with each student and their classroom behavior. Thus, it was possible for the instructor to evaluate each student for their participation grade through a mix of objective measures (e.g., number of times they asked a question) and subjective appraisal of their engagement (e.g., the interestingness of their question, degree of leadership in group work).

Exam. The final exam was cumulative, covering all the content covered throughout the course. The final exams were composed of multiple choice and short answer questions, as well as an essay. In some cases, short answers were not included in the exam and additional multiple-choice questions were included. The questions required students to both demonstrate and apply their knowledge of the course material, aligning with levels I to III of Bloom's taxonomy (e.g., knowledge, comprehension, application). The exam questions were created by the instructor based on the material covered in the textbooks and lectures. Students had 90 minutes to complete the exam and an overall exam score percentage was calculated based on the total points possible.

Procedure

For courses that were offered from 2008 to 2016 (which accounts for all but three of the courses), the classes consisted of two 100 minute classes per week, for a total of three hours and 20 minutes of class time each week. For courses offered in the 2016-2017 academic year and onwards (Introduction to Cognitive Psychology, Introduction to Psychology, Research Methods III), classes consisted of two 90 minute classes per week, for a total of three hours of class time each week. The change in number of hours of instruction each week was due to a change in the college's scheduling of classes. Each class typically covered the contents of half of a textbook chapter, and was supplemented by additional examples and world events that corresponded to the content being covered. The weight of attendance on students' final grades ranged from 1.7% to 6%, as was also the case for participation.

Mediation Analysis

A mediation analysis using bootstrapping with multiple replacements and bias-corrected confidence intervals (Preacher & Hayes, 2008) was conducted to assess whether participation can explain the relation between attendance and academic achievement. One

thousand samples were generated and taken with replacement in the bootstrapping mediation analysis. In this mediation model, attendance was the predictor, participation was the mediator, and academic achievement was the outcome. Semester, year, and course were included as covariates, since the data were collected across two semesters (Fall and Spring), as well as multiple years (2008 to 2016) and courses.

Results

Across all the courses included in the present study, the average class size consisted of 19 students ($SD=5$), and the average weight of attendance, participation, and the final exam on students' final grade was 3% ($SD=1.22$), 3% ($SD=1.22$), and 24% ($SD=8.39$) respectively. Other assessments that contributed to students' final grades varied across courses, and included assignments, oral presentations, essays, and short reflections papers. The mean attendance, participation, and exam marks across all courses were 86.82% ($SD=14.76$), 87.36% ($SD=10.58$), and 74.93% ($SD=15.68$) respectively. The ranges for each of these variables are fairly large, which is the typical distribution for a course at this college.

Mediation Model

A mediation analysis was conducted to examine whether participation mediates the association between attendance and academic achievement, after controlling for course, year, and semester. Since mediation analysis is comprised of multiple regression analyses, we assessed whether our data violated any assumptions of regression. An analysis of standard residuals was carried out on the data to identify any outliers. Data corresponding to standard residual values less than -3.29 or larger than 3.29 were considered as outliers and removed from the dataset. Our analysis indicated that data from 11 participants had to be removed. When the assumption of collinearity was tested, the results demonstrated that multicollinearity was not a concern (attendance, tolerance = .88, VIF = 1.13; participation, tolerance = .88, VIF = 1.13; semester, tolerance = .98, VIF = 1.02; course, tolerance = 1.00,

VIF = 1.00; year, tolerance = .99, VIF = 1.01). The data also met the assumption of independent errors (Durbin-Watson value = .11). The histogram of standardized residuals showed that the data contained approximately normally distributed errors, as did the normal P-P plot of standardized residuals, which showed points that were close to being on the line. The scatterplot of standardized predicted values indicated that the data met the assumptions of homogeneity of variance and linearity. The data also met the assumption of nonzero variances (attendance, variance = 192.31; participation, variance = 108.63; semester, variance = .24; year, variance = 5.73; course, variance = 7.34).

In this mediation model, attendance was the predictor, final cumulative exam scores was the outcome measure, and participation was the mediator (refer to Figure 1). The indirect effect of attendance on academic performance through participation was significant, with a point estimate of .08 ($SE = .02$) and a 95% CI of .06 to .12. Because zero is not in the 95% confidence interval, we can conclude that the indirect effect is significantly different from zero at $p < .05$, and that participation mediates the relationship between attendance and academic performance. Notably, the direct effect of attendance on academic performance became nonsignificant ($B = .03$, $t(.71)$, $p = .48$) when controlling for participation, suggesting a strong mediation effect.

Discussion

The present study demonstrates that the positive relation between students' attendance and performance on a final cumulative exam is mediated by students' in-class participation in a given course. These findings point to the importance of adopting practices that promote an educational context that encourages student engagement and participation. Course instructors may do so through restructuring of course designs and assessment schemes, adopting active learning approaches in class, and reframing students' perspectives and conceptions in such a way as to encourage participation and engagement in class activities as opposed to simply

being physically present in a class. As Bernstein (2018) suggests, instructors should not expect that the wholesale adoption of active learning practices will provide a general panacea for student engagement. Instead, a selective use of appropriate active learning strategies can be used to address a given situation. The present study is the first, to our knowledge, to investigate whether participation mediates the relation between attendance and students' performance on final cumulative exams. In addition to finding a significant total effect of attendance on academic performance, we found that the direct effect of attendance on academic performance was no longer significant when participation was controlled for. This may help explain the mixed findings in the literature with regards to the relation between attendance and academic performance in a course.

Attendance is typically measured in the literature by students' physical presence in the classroom. Simply being physically present in the classroom, however, does not appear to be sufficient for academic achievement. This could partly be attributed to how attendance is measured. For example, in scenarios where students' attendance is documented in a sign in basis, students may simply forget to sign in or they may ask a peer to sign in for them in their absence. However, as mentioned above, the results of the present study suggest that when it comes to academic performance, students' engagement during the class appears to be of greater importance than attendance. In the sections that follow, we discuss the findings of the present study and potential implications in greater detail, as well as factors that impact the relation between students' in-class participation and academic achievement.

Past research shows that students learn better when they are engaged with the course material, their peers, and the course instructor (Astin, 1985; Johnson, Johnson, & Smith, 1991; Kember & Gow, 1994; McKeachie, 1990; Meyers & Jones, 1993). Importantly, however, it has also been shown that the majority of students do not actively participate in class, and that student participation, in general, is quite low. For example, past studies have

shown that students ask approximately 3.3 and 3.6 questions per hour of class time (Pearson & West, 1991; West & Pearson, 1994, respectively), and that 73% of these questions are in respect to content, clarification or procedures (West & Pearson, 1994). In short, the questions reflect that students may be listening, but they are not deeply engaged with the lecture material. Other research found that 2.5% of class time (one minute of a 40-minute class period) was occupied by student participation. Although students view participation as being important and one third of students would like to participate more (Wade, 1994), past studies show that typically a handful of the same students participate regularly (Crombie, Pyke, Silverthorn, Jones, & Piccinin, 2003; Fritschner, 2000; Howard & Baird, 2000; Howard & Henney, 1998; Howard, Short, & Clark, 1996; Nunn, 1996) – a phenomenon referred to as consolidation of responsibility (Karp & Yoels, 1976). Howard and Henney (1998), for example, found that a handful of students accounted for about 90% of interactions, and that one third of these students participated regularly whereas half of the students who were observed did not participate.

Past research shows that frequency of participation across students varies based on multiple factors. For example, Howard and Henney (1998) found that in a mixed-age college classroom, nontraditional students (25 years of age or older) are more likely to initiate discussion than their traditional (18- to 24-year-old) counterparts. Other factors, such as students' gender, attendance, week in the semester, and time of day of the class, have also been found to impact in-class participation (Howard et al., 1996). Students' participation has also been shown to vary based on internal factors, including judgements about the worth of one's ideas (Wade, 1994). Interestingly, Wade (1994) found that students who were both older and male were more likely to view their ideas as important contributions compared to other students in the class. The results of the study suggest that the classroom atmosphere,

topic in question, and advance preparation are key factors that influence students' participation.

Other factors, such as receiving course credit or marks for participation, has been shown to be a powerful motivator for increasing in-class participation (e.g., Junn, 1994). In the present study, participation accounted for a portion of the final grade, and consisted of asking questions, as well as sharing thoughts and comments during class lecture and discussion. In addition to increasing the *quantity* of students' participation, course instructors should also aim to increase the *quality* of students' contributions in class. Along these lines, one option may be to award students for all in-class contributions (e.g., comments, questions, or ideas) but to assign bonus points for contributions that involve a higher level of insight, quality, and relevance to the course materials and discussions (Junn, 1994).

Given that the results of the present study suggest that participation mediates the relation between attendance and academic achievement and that, as mentioned above, students both acknowledge the importance of participation and would like to participate more, a question of interest is how educators can foster active participation from the majority, if not all, students in the class. Class size is an important factor to consider given that student participation decreases as class size increases (e.g., Constantinople, Cornelius, & Gray, 1988; Crawford & MacLeod, 1990; Fassinger, 1995; Howard, et al., 2002; Howard et al., 1996). This may be attributable, at least in part, to a high likelihood of lecture-style teaching being implemented in the context of large class sizes, which in turn, limits students' opportunities to actively participate in the class. Furthermore, students' fear of criticism from instructors and classmates may also increase as class size increases, thereby further reducing the likelihood of participation (Weaver & Qi, 2005). Thus, though it may not always be a practical or feasible option, reducing the class size may be one route to enhancing students' in-class participation in a course, thereby elevating student engagement.

Considering that course instructors often do not have much input regarding the size of their class, and that some students may be reluctant to participate regardless of class size, instructors may wish to focus their efforts on how they structure their course as a means to create a learning context that facilitates student participation. Biggs' (1996) theory of constructive alignment, for example, takes on a student-centered approach as it focuses in on what the students are doing during lessons as opposed to what the course instructor is doing. According to this framework, instructors should adopt a student-centered, active learning approach, which "transcends basic comprehension and memorization, focusing instead on the examination, analysis, evaluation, and application of course-related concepts" (Perry, Huss, McAuliff, & Galas, 1996, p. 77), with the aim of guiding their students to achieve the learning outcomes of the course. Instructors are required to clearly communicate to their students what they want them to learn and what they will have to be able to do to demonstrate that they have acquired this knowledge. Moreover, students' learning is assessed in alignment with the learning outcomes of the course that are clearly communicated to the students.

For a review of the current literature on active learning see Bernstein (2018), in which he summarises current knowledge according to eight variables: '(a) the specific active learning methods used, (b) the amount of in-class and out-of-class time devoted to those methods, (c) the demographic and other characteristics of the teachers, (d) the demographic and other characteristics of the students, (e) the discipline being taught, (f) the educational settings and formats in which the courses are taught, (g) the nature of the dependent variables, and (h) the research designs and methodologies involved' (page 293). Bernstein (2018) concludes that rather than asking a generalized question of whether active learning works, we should be providing evidence to help an individual instructor decide whether or not to use a particular active learning approach in their class with their students and their

circumstances. We do not seek to advocate for particular active learning approaches in this study.

The results of the present study suggest that there is a positive relation between students' attendance and their performance on a final cumulative exam, and this relation is explained by in-class participation. The results of the present case study, however, should be taken with caution when generalizing to other scenarios. The data that were collected in the present study came from a college which serves a large proportion of non-traditional college students (e.g., low SES, first generation to college, children of immigrants, older, etc).

Participation may be more important to non-traditional students and to students with low levels of college preparedness in helping with their grades, because it provides live feedback to the instructor about the students' understanding of the material, allowing the instructor to correct any misconceptions and scaffold learning as necessary (Vonderwell & Zachariah, 2005). Additionally, in an environment where they may feel like they do not belong and do not have a voice, participating and being engaged in a class may help create a space where non-traditional students feel they have a stake in the institution and their learning.

The results of the present study may not apply to other types of campuses and institutions, where the proportion of non-traditional college students is low. However, this exploratory research highlights the need for further research on how the relation between students' engagement in a course and their academic success may vary based on different factors. Along these lines, there is also the question of the extent to which participation enhances academic performance or if students who do well academically tend to participate more, which was not addressed in the present study. Moreover, it is also important for educators to consider how various factors could potentially impact participation differently based on the nature of the learning context (e.g., face-to-face, online, and blended learning). Dodero, Fernández and Sanz (2003), for instance, found that information technologies

encourage students' participation in the context of a traditional face-to-face classroom but not in the context of courses that are entirely online. Future research should investigate further the impact of various factors on students' in-class participation within different learning contexts, while also controlling for individual factors across students such as ability, motivation and effort, that may impact the relation between participation and academic achievement.

Conclusion

The results of the present study suggest that students' in-class participation mediates the positive relation between attendance and academic performance reported in the literature. Although caution should be taken when generalizing these results, as the data were collected in a particular educational context (a North American college which serves a large proportion of non-traditional college students, as described further above), there are multiple potential implications of the present study. For course instructors, these potential implications include designing courses and assessment schemes and adopting active learning approaches to encourage students' in-class participation. Students should also be made aware of the impact that in-class participation can have on their learning as opposed to simply being physically present in a class. Future research should investigate further how the relation between students' engagement in a course and their academic success may vary based on different factors, particularly based on the nature of the learning context (e.g., face-to-face, online, and blended learning), as well as individual factors that differ across students, including ability, motivation and effort.

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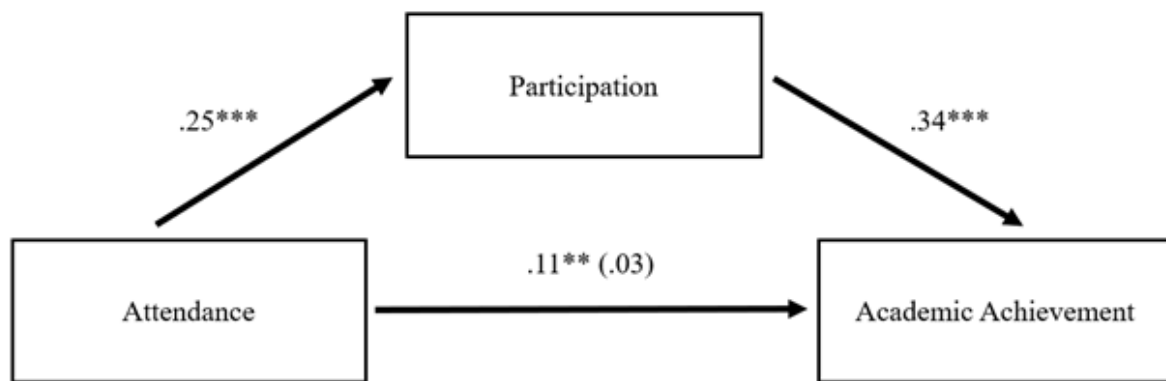


Figure 1. Unstandardized regression coefficients for the paths between attendance, participation, and academic performance after controlling for course, year, and semester. The coefficients in parentheses represent the direct path from attendance to academic performance when the mediator was controlled for. ** $p < .01$. *** $p < .001$