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Melissa Whatley
William & Mary - School of Education, mewhatley@wm.edu

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ORIGINAL PAPER

International Education's Academic Benefit: Potential for Community College Virtual International Exchange

Melissa Whatley[1]

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Abstract
This study focuses on the potential academic benefit of virtual international exchange for community colleges and the students they enroll through a comparison of virtual exchange and study abroad. Using data from two community colleges in the US Southeast, this study draws upon the notion of socioacademic integration. Specifically, this study theorizes that both virtual exchange and study abroad have a positive relationship with students' academic outcomes given their potential to foster socioacademic integrative moments. However, given the scalability of virtual international exchange, it was expected that these programs are associated with a greater relationship to students' academic outcomes in the aggregate. This study's results generally confirm these expectations, although findings for virtual exchange are less positive compared to study abroad. Results have implications for the establishment and success of both approaches to international education programming at community colleges. The potential for virtual international exchange to reach a larger group of students compared to study abroad, thus having a greater aggregate impact on students' success and outcomes, has key policy implications particularly for community colleges, for which service to the community is an integral component of institutional mission.

Keywords Virtual international exchange · Study abroad · Academic outcomes · Community college · International education

The COVID-19 pandemic significantly altered how students engage in international education opportunities. With study abroad programs temporarily grounded, international educators sought alternative, virtual means of exposing students to the world beyond country borders (Redden, 2020). Notably, the pandemic also underscored long-standing inequities in access to international education, particularly study abroad, which has historically been dominated by white women from wealthy backgrounds attending 4-year institutions (Lingo, 2019; Lucas, 2018; Simon & Ainsworth, 2012, among other key studies that examine study abroad participant characteristics). Virtual international exchange, defined as "the engagement of groups of learners in extended periods of online intercultural interactions and collaboration with partners from other cultural contexts or geographical locations"

✉ Melissa Whatley
mewhatley@wm.edu

[1] School of Education, College of William & Mary, P.O. Box 8795, Williamsburg, VA 23187, USA

(O'Dowd, 2018, p. 5), has recently been presented as a more accessible alternative to study abroad. Although virtual exchange programs existed long before the COVID-19 pandemic, their prominence as a means of offering international education has grown exponentially in recent years (O'Dowd, 2023a).

One of the strongest arguments in favor of virtual exchange programming is that these programs can reach a larger number of students compared to study abroad, meaning that the benefits of participation accrue to more students and, subsequently, communities and society. These arguments have come from senior leaders in international education (e.g., Abdel-Kader, 2021; Whalen, 2020) and researchers who study student participation in virtual exchange programming (e.g., Poe, 2022). While some have argued that virtual exchange should not be compared to study abroad, but rather examined in its own right (e.g., O'Dowd, 2023b), such arguments ignore that both international experiences often have similar aims to provide students with exposure to global contexts that enhance their academic and psychosocial outcomes. For example, Commander et al. (2022) include virtual international exchange alongside study abroad as a high impact educational practice (HIP) falling into the diversity/global learning category (Kuh, 2008). At many institutions, these two international-focused programs are developed and implemented in the same office on an institution's campus.

Both virtual exchange and study abroad have the potential to foster students' socioacademic integration, moments during which academic interactions among students and faculty, or students and their peers, take on a social function (Deil-Amen, 2005, 2011). Moreover, these two learning experiences display characteristics of HIPs, such as "significant investment of concentrated effort by students over an extended period of time" and "interactions with faculty and peers about substantive matters". Other key HIP characteristics include "experiences with diversity, wherein students are exposed to and must contend with people and circumstances that differ from those with which students are familiar" and "opportunities to discover relevance of learning through real-world applications" (Kuh et al., 2018, p. 11).

Both socioacademic integrative moments and HIPs are thought to foster greater academic success among students, particularly those from marginalized backgrounds (Greenman et al., 2022). Indeed, Kuh et al. (2017) define HIPs as "a demonstrably powerful set of interventions to foster student success" (p. 9). By definition, virtual exchange programs take place "under the guidance of educators and/or expert facilitators", which creates conditions for student-faculty interaction. These experiences also involve "the engagement of groups of learners in extended periods", which fosters student-to-student peer interactions that develop over time (O'Dowd, 2018, p. 5). Notably, these interactions involve both peers from a student's own institution as well as peers from a different cultural context, thus creating contexts where students interact with diverse individuals and perspectives. Faculty-led study abroad programs also offer the potential for significant sustained student-faculty interaction, which by definition takes place in another country context (Sanderson, 2014). The small-group, experiential nature of these programs means that students are often required to interact with one another and with faculty both in and out of the classroom (Price & Tovar, 2014).

In line with the idea that study abroad is a HIP that fosters socioacademic integration, prior research has found strong and significant associations between study abroad participation and students' academic outcomes, most notably for degree completion. While the majority of this research focuses on the 4-year sector (Bhatt et al., 2022; Hamir, 2011). Whatley and González Canché (2021) found that participation in study abroad is related to a 25% increase in the probability that a community college student will complete an

associate's degree or other credential, and study abroad participants attained a final cumulative GPA that was around half a point higher compared to non-participants. In contrast, very little is known about the benefits of virtual exchange programs or their potential as a HIP. One recent study is promising in that its findings indicated that virtual international exchange positively relates to measures of student success, namely GPA and graduation (Lee et al., 2022). However, the data in this study came from students attending a single large university with a decades-long focus on virtual exchange. Consequently, its findings are limited in generalizability to other institutions and contexts.

Although as HIPs, both study abroad and virtual exchange have the potential to promote student success through the cultivation of socioacademic integration, the argument in favor of virtual exchange is that it has the potential to reach students at scale, thus providing benefit to a greater number of students. That is, virtual exchange can accommodate a larger number of students with a smaller investment of time and money. Thus, its positive relationship to student outcomes in the aggregate can be much greater compared to study abroad. This potential to reach a larger number of students and thus promote positive outcomes is especially important in the community college context. These institutions have an explicit mission to serve not only individual students, but also community workforce needs, which increasingly require college graduates with academic credentials and skills that provide an entry into the middle class (Heelan & Mellow, 2017).

With this idea in mind, the purpose of this study is to consider how community college students, and subsequently institutions, communities, and society, benefit from virtual exchange and study abroad regarding student success outcomes, namely credential completion and cumulative GPA. In considering student outcomes in the aggregate rather than relying on analyses that explore benefits to individual students, this study provides empirical evidence of the extent to which community college international programming helps these institutions fulfill their mission to benefit the local community and society. This study's guiding research question asks: What is the accrued academic benefit of virtual international exchange and study abroad, defined as change in average cumulative GPA and probability of completion in a whole student body, related to each experience?

Nowhere are international education's equity and community benefit concerns more important than in the community college context. Because community colleges and their academic programs are explicitly open-access (Kisker et al., 2023), any democratizing function that virtual exchange might play in international education may be most obvious in this sector. Community college scholars and practitioners need a better understanding not only of the academic gains that an individual student might expect from participating in an international opportunity, but also the general gains that might be observed among students due to the existence of these opportunities on college campuses.

This study draws from data representing two community colleges located in the US Southeast. These two colleges have long-standing, well-established study abroad programs and offered virtual exchange options before the onset of the COVID-19 pandemic. They also represent two different environments for the implementation of international education programming. One is a large, urban community college while the other is small and located in a rural area. Consequently, the international education programs at these two colleges represent a broad array of programmatic features, as each college serves a different student population and local community.

The two outcomes that are the focus of this study, cumulative GPA and credential completion, are also key metrics under intense scrutiny among senior leadership at both these colleges. When initially approached about participating in the research represented here, international education professionals at both colleges mentioned the importance of both

these metrics in current conversations at their institutions and expressed a particular interest in knowing whether their programs contributed to broader institutional goals to raise students' academic profile (cumulative GPA) and foster greater credential completion.

Unlike the 4-year sector, community colleges are often marginalized or absent from conversations surrounding international education (Harder, 2010; Raby, 2012). The use of community college data to address timely and important questions in the field such as the one posed in this study is key to centering the international experiences available to community college students, who comprised over a quarter (27%) of all postsecondary enrollments in the United States in the fall 2019 term (Digest of Education Statistics, 2020). Recent data suggest that in the fall and winter 2020–2021 academic terms, 29% of community colleges either already offered or were currently developing virtual exchange opportunities (Cossey & Fischer, 2021). Data from the 2018–2019 academic year (the last year of data prior to the COVID-19 pandemic) show that around 31% of public, 2-year institutions offered study abroad (calculation based on Integrated Postsecondary Education Data System [IPEDS] data). As such, the international experiences studied here are not isolated incidences of programs at a few select colleges, but rather represent offerings at many community colleges.

Previous Literature

Underrepresented Students and HIPs

The community college represents an ideal context to study underrepresented student participation in HIPs. Kisker et al. (2023) summarize their description of student enrollment at community colleges as "number and variety" (p. 47). These authors highlight both the large number of students attending community colleges and the diversity of students who attend these institutions. Community college students represent a wide range of ages, attend college both full- and part-time, enroll for both credit and non-credit purposes, and represent a broad spectrum of academic preparedness (Kisker et al., 2023). Around 81% of full-time community college students received financial aid of some kind in the 2019–2020 academic year (Kisker et al., 2023). In 2020, 52% of community college students were students of color (Kisker et al., 2023).

HIPs have been shown to support a variety of positive outcomes for students in general. These outcomes include college persistence and completion (e.g., Kuh & Kenzie, 2018; McDaniel & Van Jura, 2022), GPA and number of credit hours attempted (e.g., Das et al., 2024), and critical thinking (e.g., Kilgo et al., 2015). However, some have argued that using HIPs as a blunt instrument to improve student success ignores important equity issues among students with different background characteristics (e.g., Seifert et al., 2014; Sweat et al., 2013; Valentine et al., 2021). Finley and McNair (2013) note that historically underserved students, including students of color, students with lower levels of academic preparation for postsecondary education, and low-income students, are less likely to participate in HIPs. These are precisely the student populations who often access higher education through community colleges (Kisker et al., 2023).

In a recent synthesis of the literature on HIPs, Greenman et al. (2022) critique higher education, noting that although unequal access to HIPs has been documented for years, very little has been done to "reimagin[e] the delivery of high-impact education as a way to overcome barriers to access, or to assessing the impacts of any creative HIPs

implementation" (p. 268). These authors propose three categories of solutions for addressing inequitable access to HIPs. The first involves modified approaches to how higher education institutions provide and implement HIPs, such as through shortening study abroad programs so that they better fit within a student's schedule (e.g., Coker & Porter, 2015) or providing learning community opportunities that are virtual rather than in-person (e.g., Sandeen, 2012).

The second involves curricular restructuring, such as embedding HIPs into required courses and offering HIPs across all years of a student's educational trajectory, including the first year (e.g., Finley & McNair, 2013; Kuh & Kenzie, 2018). Greenman et al. (2022) highlight a role for community colleges in this area in particular. Since these institutions often serve students early in their academic careers, providing HIPs at community colleges can ensure that students have access regardless of whether they persist in higher education. Additionally, providing HIPs at community colleges can safeguard against students missing out on these opportunities when they transfer from their community college to a four-year institution. The third proposed solution that Greenman et al. (2022) offer is to increase institutional resources focused on providing HIP opportunities and to direct additional financial aid towards students so that they can participate. Again, these authors list community colleges as a key institutional context in need of resources to offer HIPs to underrepresented and minoritized student populations.

International Education Participation

Like HIPs in general, international-focused HIPs often exhibit patterns of unequal access. Prior research focused on the 4-year institutional context has found white students were more likely to intend to study abroad compared to students of other racial/ethnic identities (e.g., Kim & Lawrence, 2021; Salisbury et al., 2011). Study abroad participants were more likely to come from higher socioeconomic status families (e.g., Lingo, 2019) and more likely to be women (e.g., Lucas, 2018). In its most recent Open Doors report prior to the onset of the COVID-19 pandemic (the 2018–2019 academic year; IIE, 2020), the Institute of International Education (IIE) reported that of the 347,099 students who studied abroad, 67% were women and 69% were white. For comparison purposes, the Digest of Education Statistics (2020) indicated that these same two demographic groups comprised approximately 57% and 55%, respectively, of overall US postsecondary enrollment in the fall 2018 term.

Prior research has highlighted several barriers that students encounter when considering study abroad participation that may help explain these participation patterns. For example, in a study of 125 students enrolled in business courses at a regional university in the US Southeast, DeJong et al. (2010) found that most students are familiar with study abroad opportunities, but indicate that finances, work obligations, and family obligations prevent them from participating. Other studies provide similar results for particular groups of students, such as Asian American students (Brux & Fry, 2010) and students of color (Kasravi, 2018). Among students enrolled at a private liberal arts college, Paus and Robinson (2008) found that family support, whether for or against the idea of study abroad, was especially influential among African American students, and McClure et al. (2010) found similar results for Latin@ students.

In contrast to the majority of prior research, which has focused almost exclusively on the 4-year sector, data from the community college sector suggest that the open-access nature of international opportunities at these institutions often mitigates some of the demographic

and socioeconomic status inequities in access observed broadly in the study abroad literature, although some groups (e.g., women) continue to access study abroad to a greater extent than others (e.g., men) at community colleges (IIE, 2020). For example, Whatley (2021) found that students across a variety of racial and ethnic identities were equally as likely to study abroad at one community college.

Unlike study abroad, virtual exchange does not benefit from decades of academic inquiry into the characteristics of the students who participate, nor is there a national organization such as IIE that collects annual data on participating student demographics. Several thought leaders have suggested that virtual exchange, alongside other virtual international experiences, has the potential to increase access to international education opportunities. De Wit (2016) suggests: "online intercultural learning is […] a logical next step towards a more inclusive, innovative approach to internationalisation" (p. 76). Abdel-Kader (2021, n.p.) indicates that "with costly travel removed from the equation, the barrier to entry [to international education] became an internet connection rather than a plane ticket and a passport". Whalen (2020, n.p.) posits that education abroad should no longer be defined as literally crossing national borders, but rather described as "mobility of students' minds" that "can be practiced in a wider variety of forms".

However, researchers caution that empirical evidence to support claims of increased accessibility for virtual exchange is thin (Bali et al., 2021; Barbosa & Ferreira-Lopes, 2021; Satar, 2021). One recent study found that at two community colleges, access to virtual exchange appeared to be less equitable compared to study abroad (Whatley et al., 2022). For example, in this study, while students across a variety of racial and ethnic identities were equally as likely to participate in study abroad, virtual exchange participants were more likely to identify as white and less likely to identify as Black. The results of this study call into question the assumption that virtual international programming is inherently more equitable compared to study abroad.

Taken together, the literature on HIPs in general and the literature on internationally-focused HIPs specifically provide a nuanced perspective of who is likely to benefit from study abroad and virtual exchange. On the one hand, with the exception of the community college context, study abroad displays patterns of access that are reflective of HIPs more generally, wherein students who are already advantaged are the ones most likely to study abroad. On the other hand, many believe that virtual exchange programs have the potential to create access to international education opportunities, but evidence of this potential in practice is largely missing.

Virtual exchange certainly speaks to two of Greenman et al. (2022)'s three categories of ways in which institutions can address the inequitable access to HIPs. Regarding the first category, they provide a modification to in-person international experiences in that students can participate without having to leave their homes and college campuses. Regarding the second, these programs can be embedded into students' courses or degree programs and can be offered at multiple time points across students' educational trajectories. Consequently, virtual international exchange holds much promise for supporting students' academic success, particularly among students for whom access to other international experiences, like study abroad, is difficult or impossible due to financial or other life circumstances.

International Education and Students' Academic Success

Key to the definition of a HIP is that these experiences have a positive association with student success (Kuh et al., 2017). Like inquiry into characteristics of students who

participate in study abroad, considerable attention has been paid in the literature to the potential relationship between study abroad participation and student success outcomes, with several studies finding a strong positive association between study abroad and degree completion (Bhatt et al., 2022; Hamir, 2011; Xu et al., 2013). For community college students in particular, two prior studies have found a positive association between study abroad and retention, completion of college-level Math and English courses, completion of college-level credits, degree and certificate completion, GPA, and transfer to a four-year institution (Raby et al., 2014; Rhodes et al., 2016). Whatley and González Canché (2021) offer a recent robust estimation of the relationship between study abroad and various indicators of student academic success among community college students using propensity score weighting. These researchers found that study abroad is associated with an increased likelihood of degree or credential attainment, increased likelihood of transfer to a 4-year institution, a greater percentage of attempted credits passed, and a higher cumulative GPA.

Regarding virtual exchange, one recent study (Lee et al., 2022) explores the relationship between program participation and student success metrics at a large US university that has identified virtual exchange as a key component of its internationalization strategy. Drawing from data representing almost 50,000 students, this study found that virtual exchange was positively related to both GPA and graduation, even in models that used a matching approach to mitigate selection bias. This study found that gains in GPA as a result of virtual exchange participation were particularly prominent for several marginalized student groups, including Black and Hispanic students, Pell recipients, and females.

One uniting feature of the literature on academic outcomes and international education participation is that without exception, these studies focus on the benefits of participation that accrue to the individual student. The current study contributes to this body of literature through analyses that can speak to the broader potential benefits of offering these experiences in the community college context.

Theoretical Framework

Tinto's (1975, 1993) interactionalist theory of student departure provides a particularly useful framework for the current study. Within Tinto's (1975, 1993) original framework, which was developed to explain why students leave college prior to credential completion, students arrive to their higher education institutions with a set of family background characteristics, skills, and abilities, along with educational ambitions, commitments, and intentions. These indicators lead students to pursue academic and social experiences within the higher education environment. In turn, these experiences frame the extent to which students integrate into the college environment. Academic integration happens when students feel like they belong intellectually at their college, while social integration is fostered through connections outside the classroom. Integration may be formal or informal, such as through in-class academic group work with peers and organized campus clubs and events or through spontaneous group study sessions and social plans on the weekend. Within this framework, academic and social integrations, whether formal or informal, lead to students' subsequent reframing of their goals and intentions regarding degree completion, which in turn encourages a decision to either depart postsecondary education or persist until degree completion.

Community college scholars have questioned the applicability of Tinto's theory of student departure in the community college context because, in its original iteration,

significant on-campus interaction was assumed (e.g., Bensimon, 2007). While such interaction is common on the campuses of residential, 4-year institutions, similar interaction is not likely to happen at many community colleges, where students are more likely to commute to campus and live at home, study part-time, maintain full-time employment, and have family commitments that take up their time outside work and the classroom (Renn & Reason, 2021). These students are less likely to have time to take part in clubs on campus or resources to participate in extensive weekend socializing.

However, this is not to say that social and academic integration does not happen for community college students, but rather that it happens differently. For example, Karp et al. (2010) found that community college students develop a sense of belonging in their college communities primarily through academic settings that foster group work and that involve clear faculty contact. For these students, social relationships begin as academic relationships, and retain a scholarly focus as they develop. Similarly, Deil-Amen (2011) found that while students' integration happens primarily in academic settings, the social interactions that derive from academic relationships are deeply meaningful. For example, students whose families may not fully understand their decisions to seek further education find support among peers in similar situations. Bensimon (2007) highlighted the importance of faculty, staff, and peers in cultivating integration among community college students. Tinto (2012) echoes a similar sentiment in a call to focus on institutional action that can foster student success.

Importantly, socioacademic integration has been found to foster student persistence towards graduation among community college students. Using data from the National Center for Education Statistics' Beginning Postsecondary Students Longitudinal Survey (BPS), Deil-Amen (2005) found that both academic and social integration positively related to persistence among a nationally-representative sample of community college students. Price and Tovar (2014) examined data from the Community College Survey of Student Engagement (CCSSE) and found that an active and collaborative learning environment positively predicted an institution's graduation rate. Based on survey items, these authors recommended that faculty implement classroom practices that require students to work together on projects both in and out of class, encourage students to work together on assignments, and commit time to discuss course materials with students outside of class.

Socioacademic Integration in Faculty-Led Study Abroad and Virtual International Exchange

Curricular components such as collaborations with peers and discussion outside the classroom are often present in faculty-led study abroad (Sanderson, 2014) and virtual exchange program design (Giralt et al., 2022; Stevens Initiative, 2021; Whatley et al., 2022). Both these approaches to international education also tend to implement practices that can foster active and collaborative learning. Regarding study abroad, students' social and academic involvement may be especially cultivated during faculty-led study abroad programs, which foster intense student engagement with at least one faculty member, tend to align study abroad curricular offerings with the curricular offerings on students' home campuses, and often comprise smaller, more intimate groups of students (Sanderson, 2014).

As an online means of international engagement, virtual exchange also requires intense involvement on the part of at least one faculty member, especially when virtual exchange programming is embedded within a course that a specific faculty member is teaching or an academic program that is the faculty member's responsibility (Giralt et al., 2022).

Moreover, by definition, virtual exchange programs require students to work together online in small groups to carry out projects, develop and give presentations, or engage in language practice (Stevens Initiative, 2021).

These characteristics of both faculty-led study abroad and virtual exchange programs can create an environment that fosters socioacademic integration and subsequent student success. Perhaps it is unsurprising, then, that as both academic and social experiences, global learning opportunities have generally earned a reputation as HIPs, meaning that student engagement in these experiences leads to greater involvement in their academic environments. This greater involvement in turn positively impacts students' educational outcomes, including both degree completion and academic achievement (defined as GPA) (Brownell & Swaner, 2010; Kuh, 2008).

Of course, returning to Tinto's (1975, 1993) framework, the extent to which students choose to participate in virtual exchange or study abroad programs is a function of a host of characteristics that students bring with them to higher education. Prior literature indicates that participation in international education opportunities does not happen on an even playing field, and some students are more likely to engage in these activities than others. The analytic approach adopted in this study accounts for observed differences in student participation before estimating the relationship between virtual exchange and study abroad and student success.

Methods

International Programs

The two community colleges that participated in this research provided annual administrative data on entering student cohorts spanning three academic years (2016–2017, 2017–2018, and 2018–2019) (see Table 8 in the Appendix for descriptive information about the students attending each college). These colleges have actively promoted international education opportunities among their students since 2010 in the case of one college and 2012 in the case of the other. The study abroad programs that these two colleges offer are short-term and faculty-led, usually lasting between 1 and 3 weeks. These programs go to a variety of countries across several continents, and students participate in programs as varied as learning Spanish in Peru, studying biology in South Africa, and earning general humanities credit in Ireland and Greece.

Virtual international exchange programs at these two colleges are diverse and speak to a variety of student needs and interests. Importantly, these programs are not virtual study abroad programs, wherein institutions might try to recreate the study abroad experience through virtual means. Instead, these programs exhibit key characteristics of true virtual international exchanges. Namely, they facilitate engagement across groups of learners in at least two country contexts for extended periods of time, most often culminating in a collaborative group project wherein students must work across countries and cultures with their peers. While these experiences are sometimes associated with particular courses that students take, others are stand-alone opportunities that students choose to participate in outside of their regular coursework. These virtual exchange programs typically last the entire span of an academic term and thus students are in contact with their peers in another country frequently and over the course of an extended period.

Two examples of virtual international exchange programs are illustrative of the types of programs offered at these two community colleges. The first involved the pairing of US students with students enrolled at institutions in either Jordan or Iraq. This program was 10 weeks long and included four bi-national sessions (involving US students and either Jordanian students or Iraqi students) that focused on identifying a common problem in sustainability in students' local communities. In addition to these large group sessions, students worked in smaller, bi-national groups to propose a solution to the identified problem and create a video together outlining their plan. Although there was no set requirement for how much time students worked together in their small groups, the projects that students submitted for satisfactory completion of the program required substantial investment working together. This first program is an example of a program that was not required in any particular class that students took, but rather students chose to participate outside their regular course requirements. Many participating students earned a global distinction notation on their diplomas as acknowledgement of their participation.

A second program, which involved Spanish language exchange, is an example of a required virtual exchange program. Through this program, all students taking Elementary Spanish courses were required to participate in a total of six 30-min language exchange sessions with a Spanish speaker located elsewhere in the world. These sessions took place over the course of an eight-week term, which is standard at both community colleges. Sessions were recorded, and students were graded based on the extent and quality of their active participation.

Data

This study's dataset contained information about student demographics, namely race/ethnicity, age at enrollment, sex, and socioeconomic status (defined as a student's eligibility for a Pell grant), and academic information corresponding to students' first term of enrollment, namely the GPA they earned during that term and their declared degree program: Associate in Arts; Associate in Science; Associate in Applied Science; or a Certificate/Diploma. These variables were selected for the study's dataset based on prior literature that points to these characteristics as salient predictors of study abroad participation.

While it may be the case in other contexts, such as the 4-year institutional context, that it is not students' broad degree program but rather their specific academic area of focus that supports their participation in international education opportunities, in the community college contexts represented in this study these two academic indicators are often one in the same. Indeed, approximately 37% of the students in this dataset did not declare an academic focus area (such as a major concentration) apart from their general degree (Associate in Arts, etc.). Consequently, degree program rather than academic program was used to approximate students' academic commitments in this study.

Because the two outcomes of interest in this study are academic in nature, a student's GPA during their first term of enrollment is particularly important to consider as a measure of prior academic achievement. Given the open access nature of the two institutions in this study, a common feature of US community colleges, other measures of prior academic achievement, such as high school GPA or standardized test scores, are not consistently collected from all students. This dataset also contained information about students' international experiences, namely participation in virtual exchange and study abroad. Finally, the dataset included students' last recorded cumulative GPA (on a scale from 0.0 to 4.0) and a binary indicator of credential completion. Data were

collected in summer 2021, and thus even the 2018–2019 entering cohort had at least three years (150% time for an Associate's degree) to complete their credential.

Prior to analysis, several groups of students were removed from the dataset. First, students below the age of 18 when they first enrolled at the community college were removed (N = 4176), as permission was not granted from each institution's respective institutional review board to use data from minors in this study. Second, students who were not residents of the United States (N = 1655) were removed, as these students presented substantial cases of missing data on a number of the variables included in this study. Next, several groups of students were removed because they were represented in the dataset in numbers too small for statistical analysis: students who initially declared an intention to earn an Associate in General Education (N = 38); students with no academic program declared during their first term (N = 32); and students without sex information (N = 8). This missing information for the final group of students presents concerns about the accuracy of other information corresponding to these same students in the dataset.

Finally, although ten students in the dataset participated in both virtual exchange and study abroad, the small size of this group precluded its inclusion in analyses. Future research with a larger dataset is needed to explore the relationship between participation in multiple international experiences and students' academic outcomes. After these exclusions, a total of 26,738 students comprised the study's analytic dataset. In total, 731 students participated in virtual exchange and 57 studied abroad. Around 17% completed a credential, and the average last-recorded cumulative GPA of all students was 2.29.

Analysis

Analytically, this study adopts a potential outcomes framework (Lewis, 1973; Rubin, 2005) in that it is concerned with the average relationship between three experimental conditions, participation in virtual exchange, participation in study abroad, and no participation, and two measures of students' academic success, last-recorded cumulative GPA and completion. Although a traditional potential outcomes framework is concerned with obtaining true treatment effects that receive a causal interpretation, this study does not claim a causal relationship between treatment conditions and academic outcomes due to ethical and data limitations. However, the potential outcomes framework remains useful for this study because the conditions under consideration can be conceptualized as an experiment, in that one could hypothetically randomize students into virtual exchange, study abroad, and no participation categories.

Because students' choice to participate in virtual exchange, study abroad, or neither is not random and is likely determined by several factors not observed in this dataset, such as whether the student is employed full time, prior travel abroad, or intellectual interests in international topics beyond the classroom, a causal interpretation is not possible in this study. Instead, this study uses the potential outcomes framework to conceptualize average relationships between these three experimental conditions and students' academic outcomes in observed data. This average relationship can be calculated at the individual student level but can also be calculated in the aggregate at the group level. This study's analytic approach unfolded in two phases, an individual phase and group phase, with the latter ultimately providing an answer to this study's research question.

Table 1 Descriptive statistics for international education, demographic, and academic characteristics for the entire sample, virtual exchange participants, and study abroad participants

Variable	Full sample (N = 26,738)	Virtual exchange participants (N = 731)	Study abroad participants (N = 57)
International experiences			
Study abroad	0.21%		
Virtual exchange	2.73%		
Control variables			
Age at enrollment[a,c]	22.99 (7.70)	21.80 (6.42)	22.39 (7.66)
Female[b]	53.21%	56.36%	73.68%
Black[b]	27.91%	15.18%	12.28%
Hispanic[b]	13.57%	9.30%	19.30%
White[b]	46.40%	63.89%	49.12%
Other race/ethnicity	12.11%	11.63%	19.30%
Pell eligible[b]	47.50%	66.89%	43.86%
First-term GPA[a,c]	2.28 (1.31)	2.70 (1.14)	3.22 (0.98)
Associate in Arts[b]	32.29%	55.95%	28.07%
Associate in Science[b]	6.42%	25.44%	7.02%
Associate in Applied Science[b]	49.75%	15.18%	56.14%
Certificate/Diploma[b]	11.54%	3.42%	8.77%

[a]Standard deviation in parentheses

[b]Difference among groups significant at $p < .05$ or less based on a chi-square test of independence

[c]Difference among groups significant at $p < .05$ or less based on a one-way analysis of variance (ANOVA)

Individual Phase

For exploring the relationship between experimental conditions and academic outcomes for the average student, two series of regression models were used. The first series employed unweighted linear regression to estimate the relationship between study abroad and virtual exchange and a student's last-recorded cumulative GPA and completion, as in (1):

$$y_{ijt} = \alpha_0 + \beta_1 VE_{ijt} + \beta_2 SA_{ijt} + Controls_{ijt}\beta_3 + \alpha_j + \delta_t + \varepsilon_{ijt}, \quad (1)$$

where y_{ijt} represents a particular outcome, cumulative GPA or completion. The models for both outcomes are estimated using ordinary least squares. In the case of cumulative GPA, this produces a standard linear model of an outcome ranging from 0 to 4, whereas when the outcome is a binary indicator of completion, this is a linear probability model. In (1), α_0 is an intercept term, and β_1 represents an estimate of the relationship between virtual exchange (VE_{ijt}) and an outcome. Similarly, β_2 represents an estimate the relationship between study abroad (SA_{ijt}) and a given outcome. β_3 is a vector of coefficients corresponding to control variables ($Controls_{ijt}$, see Table 1), and ε_{ijt} is an error term. These models also included a fixed effect for both the college that a student attended (α_j), to account for any institutional effects on these academic outcomes, and their entry cohort (δ_t), to account for any secular trends that might explain students' academic achievement over time.

While this first series of regression models follows standard analytic procedure in education research, it does not address the issue of student selection into one of the

three experimental conditions, virtual exchange, study abroad, or neither experience. That is, students are not randomly distributed among these three conditions, and this non-random distribution ideally must be accounted for in analyses such as these. For this reason, a second series of regression models used inverse probability weighting (IPW), an analytic technique that accounts for individuals' observed baseline characteristics prior to treatment (Lewis, 1973; Rubin, 2005). This second set of models tests the robustness of the first models, but even with this additional analytic rigor, weighted models are unable to estimate causal effects.

IPW is a useful approach where more than two experimental groups are involved, as in the current study, because it is able to account for selection into multiple groups, at least as far as observed characteristics are concerned. Balance among students belonging to each of this study's groups (virtual exchange, study abroad, and neither experience) is important to this study's design because it helps to address the possibility that students' non-random distribution among experimental conditions explains results rather than their participation in international education.

In this study, the IPW approach was implemented in two steps. First, multiple paired comparisons among experimental conditions were conducted to estimate a student's propensity towards selecting into a particular group: virtual exchange; study abroad; or neither experience, based on observed pre-treatment characteristics, namely demographics and first-term academic information. Within a regression context, treatment assignment was estimated using these pre-treatment characteristics to compare each treatment category and all other categories, for a total of three comparisons (virtual exchange-no participation, study abroad-no participation, virtual exchange-study abroad). Using these estimates, each student was assigned a numerical propensity toward selecting into a particular category.

In the second step, this estimated propensity score was used to assign an inverse probability weight to each student for each treatment condition. The inverse probability weight adjusts each individual observation by the inverse of the probability that that individual would select into a specific treatment group (Imai & Ratkovic, 2015). Students who were more likely to participate in a particular treatment were assigned a smaller weight, while students who were less likely to participate were assigned a larger weight, thus balancing treatment and comparison groups for each experimental category. This weighting corresponds to the average treatment effect on the treated (ATT), which estimates the relationship between treatment and a particular outcome on those who received the treatment.

Equation (2) describes ATT in a multivalued treatment context:

$$ATT_{\tilde{t},\breve{t}} = E\left\{ (y_{\tilde{t}} - y_0) \middle| t = \breve{t} \right\}. \tag{2}$$

In (2), $ATT_{\tilde{t},\breve{t}}$ is the estimated average change in outcome y (e.g., cumulative GPA) of switching a student's treatment category to $\breve{t}$ ($t = \breve{t}$) among students receiving treatment $\tilde{t}$, as compared to a control group, 0. For example, one might be interested in average change in cumulative GPA that would result if a student participating in study abroad ($\tilde{t}$) were to switch their choice of international education experience to virtual exchange ($\breve{t}$), all while maintaining comparison to the outcome of non-participation (y_0) as a reference. Common support for this analysis, meaning that there is sufficient overlap in propensity scores among the experimental groups, is found in Fig. 1. Once an inverse probability weight was assigned to each student for each treatment condition, the same regression models summarized in (1) were conducted, only these models were weighted as just described.

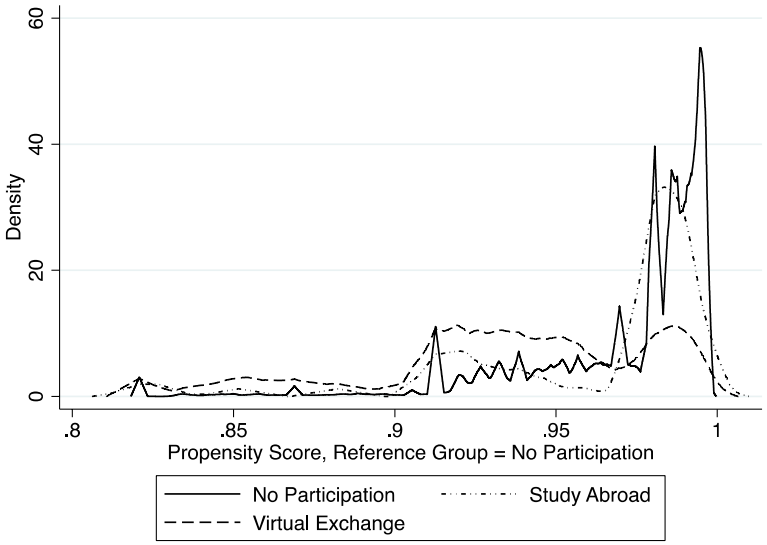

Fig. 1 Common support

Group Phase

While the individual phase of this study provides an estimate of the average academic benefit of study abroad and virtual exchange for an individual student, much like previous research, it does not provide an indication of the extent to which this relationship is reflected in the outcomes of entire groups of students, such as the population of students attending the two community colleges in this study. That is, while a few students may benefit from study abroad or virtual exchange participation, these benefits may be so small that they do not move the needle on key student success metrics for the students attending an institution broadly.

To address this limitation, the second phase of this study's analytic approach used the regression models estimated in the first phase to predict eight counterfactual means reflecting scenarios wherein either virtual exchange or study abroad was not available to students. These counterfactual predictions were calculated using counterfactual datasets wherein either study abroad or virtual exchange participation were set to zero for all students, as would be the case if these institutions were to not offer one of these two experiences. Using these counterfactual datasets, predicted outcomes were first calculated for each student[1] and then these calculations were averaged. These averaged predictions produced four means for each regression approach (unweighted linear regression and inverse probability weighted regression): mean final cumulative GPA either in the absence of virtual exchange or in the absence of study abroad and mean probability of graduation either in the absence of virtual exchange or in the absence of study abroad. A comparison of these counterfactual means to predicted means calculated using actual observed treatment levels[2] provides

[1] These predictions were calculated using Stata 17's 'predict' command.

[2] The predicted mean with observed predictor values mathematically equals the observed means of the dependent variable, per the properties of the OLS estimator.

a response to the study's research question. Specifically, paired-samples *t*-tests were used to compare differences in the mean final cumulative GPA and mean probability of graduation in the observed data with these counterfactual predictions.

Limitations

Although this study presents robust estimations of the relationship between students' participation in international education programs, namely virtual exchange and study abroad, and their academic outcomes, at least three limitations must be taken into consideration when examining the results.

First, the weighting approach used in this study is unable to account for any unobserved differences between treatment and control group students. For example, study abroad participants may have prior travel experience that non-participants do not have or may have qualitatively different academic interests compared to non-participants. Additionally, given its requirement to travel internationally, study abroad participation may have differential opportunity costs and effects for students with differing academic program interests. Indeed, program cost is often cited as a primary barrier to study abroad participation (Brux & Fry, 2010; De Jong et al., 2010; Kasravi, 2018). Regarding virtual exchange, participants may have better internet access in their homes compared to non-participants, which likely correlates with students' socioeconomic status (Skinner, 2019). The dataset used in this study does not contain information about these and other variables that may differentiate between program participants and non-participants and thus this information is excluded from the analyses.

A second, related limitation is that not all the student characteristics that Tinto's (1975, 1993) framework would prescribe for statistical models are available in this study's dataset. Most importantly, this study is unable to account for the educational ambitions, commitments, and intentions that students bring with them to the community college when they first enroll. A student's declared degree program in their first term of enrollment may indicate this information to a certain extent, and its inclusion in this study is a step towards addressing this limitation. However, presence of additional information in the dataset, most notably students' intended major or interest in specific academic programs as they move forward in their academic careers (e.g., through transfer to the 4-year sector), would be helpful in further addressing differences among students in each of this study's treatment conditions.

In other cases, information about key variables, such as a student's socioeconomic status, is only accounted for partially in the dataset. Here, a student's status as a Pell recipient is taken as a measure of their socioeconomic status. However, other aspects of socioeconomic status that may have provided a more accurate representation of socioeconomic status, such as parental education attainment or family income, are not available (Rosinger & Ford, 2019). Despite these first two limitations, the results of this study remain valuable in that they speak to the relationship between international education experiences and students' academic success among a group of students that is often absent from scholarly discussions in international education, community college students. Perhaps somewhat ironically, this lack of available data is perhaps one of the reasons why community college students are often absent from this conversation.

A final limitation of this study is that its dataset comprises information from students attending only two community colleges. This limitation is common in studies of international education in the community college sector, as there is no large,

nationally-representative dataset that contains individual-level information about community college students' participation in international education. To account for this limitation, this study uses data from two community colleges located in different settings. While the results in the following section are not generalizable to other community college contexts in the traditional sense, the implications of these results remain relevant for institutions seeking balance between traditional study abroad and newer virtual international exchange opportunities as we emerge from the COVID-19 pandemic shutdown.

Findings

Descriptive Statistics

Table 1 provides descriptive statistics for the entire sample used in this study alongside these same statistics for virtual exchange participants and study abroad participants separately.[3] Notably, this table indicates that a very low percentage of students (0.21%) participated in study abroad (N = 57), while around 3% participated in virtual exchange.

On average, students were around 23 years old, while virtual exchange participants and study abroad participants were around a year younger. Slightly over half of students in the dataset are female (53%), which is also true of virtual exchange participants (56%). In contrast, study abroad participants were overwhelmingly female (74%). The racial/ethnic composition of the full sample was 28% Black, 14% Hispanic,[4] 46% white, and 12% of another group. In contrast, Black students comprised a smaller percentage of virtual exchange participants and study abroad participants (15% and 12%, respectively) and Hispanic students comprised a smaller percentage of virtual exchange participants (9%) and a greater percentage of study abroad participants (19%). Virtual exchange participants were also more likely to identify as white (64%), while the percentage of study abroad participants who identified as white was similar to the full sample (44%). Almost half (47%) of the full sample received Pell funding, while these students comprised 67% and 44% of the virtual exchange and study abroad groups, respectively.

Although the purpose of this study is not to understand why students chose specific virtual exchange or study abroad programs, these demographic differences between groups invite questions about these choices. Some of the patterns illustrated in Table 1 are reflective of national trends, most notably a greater percentage of female students participating in study abroad (IIE, 2020; Lucas, 2018). The greater percentage of virtual exchange

[3] As the superscripts in Table 1 indicate, most of the differences among groups described here are significant at $p < .05$ or less.

[4] Use of the term *Hispanic* to identify a racial/ethnic category has received much attention in the literature recently, with many scholars considering that the term *Latinx* or *Latine* may be more appropriate or even preferred by students (e.g., Martínez & González, 2021). The term *Hispanic* as used in the current study comes directly from institutional records, which themselves draw from student-selected categories in their application materials. Other terms such as *Latinx* and *Latine* were not provided as options for students to select in these materials because these terms do not help institutions fulfill federal reporting requirements, which use the term *Hispanic* exclusively. It is not this study's purpose to argue for or against a particular term to describe this group, nor is it the study's purpose to debate the appropriateness of the terminology used for federal data reporting. Since students self-identified as *Hispanic* in their applications to attend these two community colleges and this is also the term used in the datasets themselves, this is the term used throughout this study.

Table 2 Descriptive statistics for academic outcome variables in the aggregate and by experimental condition

Outcome	All students (N = 26,738)	Virtual exchange (N = 731)	Study abroad (N = 57)	None (N = 25,960)
Mean last cumulative GPA[a]	2.29 (1.33)	2.71 (0.97)	3.36 (0.65)	2.28 (1.34)
Credential completion	17%	42%	79%	16%

[a]Standard deviation in parentheses

participants who receive Pell funding may very well be indicative of this international opportunity increasing access to students who cannot afford to study abroad for financial reasons (Abdel-Kader, 2021; Poe, 2022; Whalen, 2020).

Regarding racial/ethnic identity, the greater percentage of Hispanic students who study abroad, as compared to participate in virtual exchange, could be reflective of study abroad program offerings that appeal to these students. Many of the study abroad programs offered at these two community colleges took place in Latin America. Latin America, particularly the Caribbean and Central America, is especially easy to access geographically from the US Southeast, where these two community colleges are located. Moreover, community college students and staff alike often perceive these locations as more affordable compared to destinations in Europe. Although a speculative explanation in this study, students who identified as Hispanic may have preferred programs in Latin America for linguistic or heritage-seeking purposes, a rationale that has been documented in previous literature (Kasun et al., 2023; Shively, 2018).

Regarding academics, the average first-term GPA for students in the dataset was 2.28 (Table 1). This average first-term GPA was slightly higher for virtual exchange participants (2.70) and much higher for study abroad participants (3.22). This difference in the initial measure of students' academic achievement provides additional motivation for its inclusion as a predictor variable in this study's analyses. With reference to degree program, half the students in the dataset chose an Associate in Applied Science degree program when they first enrolled at their community college, which contrasts starkly with the virtual exchange participant group, where only 15% of students declared this degree program upon entry. In the overall sample, 32% of students chose an Associate in Arts degree when they first enrolled, a percentage that is comparable to the study abroad participant group (28%). In contrast, Associate in Arts seekers comprised a greater percentage (56%) of the virtual exchange participant group. Both the full sample and study abroad participants were also similar in that a comparable percentage of students chose Associate in Science degrees at first enrollment (6% for the full sample and 7% for study abroad participants). However, a comparably large percentage of virtual exchange participants chose this degree program (25%). Finally, around 12% of the full sample chose a Certificate or Diploma program at first enrollment while 3% and 9% of virtual exchange participants and study abroad participants, respectively, did so.

Table 2 summarizes this study's outcome variables in the aggregate and by experimental condition. The mean last recorded cumulative GPA for the entire sample was 2.29, while the mean GPA for virtual exchange participants and study abroad participants was higher (2.71 and 3.36, respectively). These higher mean GPAs contrast with the lower mean GPA among students who did not participate in either international education opportunity (2.28). A one-way analysis of variance (ANOVA) suggested that the mean cumulative

GPAs of virtual exchange participants, study abroad participants, and students participating in neither international experience were significantly different from one another ($F(2,26,735) = 56.37$, $p < .001$). A similar pattern is observed when considering credential completion. While only 17% of students in the overall sample completed their degree program, 42% of virtual exchange participants and 79% of study abroad participants did so. Around 16% of students who participated in neither international education opportunity completed a credential. A chi-square test of independence indicated a significant difference in completion across virtual exchange participants, study abroad participants, and students participating in neither opportunity ($\chi^2(2) = 499.75$, $p < .001$).

Individual Phase

Last Cumulative GPA

Table 3 summarizes results of unweighted linear regression models estimating the relationship between study abroad and virtual exchange and a student's final cumulative GPA. The first column in this table summarizes results of the model using the full data sample. The results in this column indicate a positive relationship between both international experiences and a student's final cumulative GPA. Specifically, study abroad participants were estimated to have a final cumulative GPA that was 0.3 points higher compared to students who did not participate in an international education opportunity ($p < .01$), and virtual exchange participants were estimated to have a final cumulative GPA that was 0.143 points higher compared to non-participants ($p < .001$), on average and all else equal.

Researchers have previously noted complexities in using GPA as an outcome in regression models (Bacon & Bean, 2006). Notably, a variety of GPA options are available for use in research, including term-by-term GPAs and cumulative GPAs for each term. This study adopts Bacon and Bean's (2006) recommendation in that it uses a student's last recorded cumulative GPA as the outcome variable of interest. They find that this measure is the most reliable in capturing a student's academic performance across all terms that a student is enrolled. However, this last recorded cumulative GPA may carry different meanings for different students in that for some students this GPA reflects their cumulative academic performance during the semester they graduated, while for others it represents their cumulative academic performance the semester that they dropped out. For an unknown number of students, this GPA reflects cumulative academic performance prior to transferring to another institution without completing a credential at the community college.

A table of descriptive statistics that allows for a comparison between the study's full dataset and the subset students who graduated, in general and by treatment condition, can be found in Table 9 in this study's Appendix. Notably, students who graduated were more likely to participate in both study abroad and virtual exchange compared to the study's full sample (0.21% vs. 1% and 2.73% vs. 6.82%, respectively). Another important difference between completers and non-completers is that completers exhibited higher average first-term GPAs in the general and by treatment condition. General trends in demographic and academic differences between virtual exchange participants and study abroad participants and the full sample remained even after limiting the sample to only students who completed a degree.

The regression model summarized in the second column of Table 3 uses data only from students who graduated (N = 4489) to test the robustness of the results in the first column. These results indicate that the positive relationships observed in the first model between

Table 3 Unweighted linear regression models estimating the relationship between international education participation and final cumulative GPA

	(1) Final cumulative GPA (full sample)	(2) Final cumulative GPA (completers only)
Study abroad	0.300**	0.159*
	(0.108)	(0.063)
Virtual exchange	0.143***	0.072*
	(0.034)	(0.029)
Age at enrollment	0.007***	0.007***
	(0.001)	(0.001)
Female	0.088***	0.036**
	(0.010)	(0.013)
Black	−0.133***	−0.125***
	(0.013)	(0.018)
Hispanic	0.020	−0.010
	(0.016)	(0.020)
Other race/ethnicity	0.023	−0.003
	(0.016)	(0.020)
Pell	−0.004	−0.040**
	(0.011)	(0.013)
First-term GPA	0.779***	0.313***
	(0.004)	(0.007)
AS	−0.022	−0.003
	(0.022)	(0.029)
AAS	−0.003	−0.031*
	(0.012)	(0.016)
Certificate/Diploma	−0.017	0.022
	(0.018)	(0.022)
Constant	0.321***	0.321***
	(0.028)	(0.028)
Sample size	26,738	4489
R2	0.63	0.36
Adjusted R2	0.63	0.36

***$p < .001$, **$p < .01$, *$p < .05$; Comparison groups include no participation (for international experience), white (for racial/ethnic identity), and Associate in Art (for first-term degree program). Models also include a fixed effect for college and term of enrollment

Standard errors in parentheses

both international education opportunities and a student's final cumulative GPA hold even when considering only credential completers. More specifically, this second model suggests that study abroad participation relates to a 0.159 point increase in final cumulative GPA compared to non-participation ($p < .05$) and participation in virtual exchange relates to a 0.072 point increase in GPA ($p < .05$).

Table 4 summarizes the results of weighted regression models. Again, this table includes results for a model using the full data sample (the first column) and a second

Table 4 Coefficients corresponding to weighted linear regression models estimating the relationship between study abroad and virtual exchange and final cumulative GPA

	Final cumulative GPA (full sample)	Final cumulative GPA (completers only)
Study abroad (vs. neither)	0.32***	0.16***
Virtual exchange (vs. neither)	0.23*	0.00

***$p < .001$, *$p < .05$; Outcome models include the same control variables as those listed in Table 3. Weights calculated using demographic and first-term enrollment academic characteristics

model that uses only data from students who completed a credential (the second column). In the full sample, study abroad is associated with a 0.32 point increase in a student's GPA compared to participation in neither international education opportunity ($p < .001$), while virtual exchange is associated with a 0.23 point increase in GPA compared to non-participation ($p < .05$). Among completers, study abroad is associated with a 0.16 point increase in final cumulative GPA ($p < .001$). However, the relationship between virtual exchange and final cumulative GPA is not significant. This lack of statistical significance, which contrasts with the unweighted model displayed in Table 3, may be due to a reduction in selection bias in the weighted model (Table 4) as compared to the unweighted model (Table 3).

Completion

Table 5 summarizes results of the unweighted linear regression models estimating the relationship between study abroad and virtual exchange and a student's likelihood of completion. The first column in this table summarizes results for the full sample, while the second column includes results for the subsample of students who declared an Associate in Arts or Associate in Science degree program upon entry to the community college (N = 10,350).

The rationale for this second model is to account for differences in students' degree programs and academic goals. Notably, Associate in Arts and Associate in Science degree programs are typically longer than Certificate or Diploma programs. These two Associate degree programs are often designed for 2 years of full-time study, while Certificate and Diploma programs can be as short as a single academic term. Consequently, completion for Certificate/Diploma seekers can happen over the course of a much shorter timeline. Additionally, both Associate in Arts and Associate in Science degrees are designed for students intending to transfer to the 4-year sector, while both Associate in Applied Science and Certificate/Diploma programs are intended for students who want to immediately enter the workforce. Associate in Arts and Associate in Science students may leave the community college without completing their degrees when they transfer to a 4-year institution.

Results for the full sample (column 1 in Table 5) indicate that study abroad was related to an increased probability of completion of around 50% ($p < .001$) and virtual exchange was related to a similarly positive increase of around 4% ($p < .01$), as compared to students who did not participate in international education, on average and all else equal. Results for the model including only Associate in Arts and Associate in Science seekers were similarly positive in that study abroad was related to an increased probability of completion of around 40% ($p < .001$) and virtual exchange was related to an increased probability of around 26% ($p < .01$).

Table 5 Unweighted linear regression models estimating the relationship between international education participation and completion

	(1) Completion (full sample)	(2) Completion (associate in arts and associate in science seekers only)
Study abroad	0.504***	0.400***
	(0.046)	(0.075)
Virtual exchange	0.043**	0.262***
	(0.014)	(0.019)
Age at enrollment	0.000	−0.002*
	(0.000)	(0.001)
Female	−0.014**	0.003
	(0.004)	(0.007)
Black	−0.041***	−0.039***
	(0.006)	(0.009)
Hispanic	−0.001	0.002
	(0.007)	(0.010)
Other race/ethnicity	−0.008	−0.010
	(0.007)	(0.011)
Pell	0.046***	0.045***
	(0.005)	(0.007)
First-term GPA	0.080***	0.076***
	(0.002)	(0.003)
AS	−0.038***	−0.022*
	(0.009)	(0.009)
AAS	0.003	
	(0.005)	
Certificate/Diploma	0.037***	
	(0.008)	
Constant	0.213***	0.011
	(0.012)	(0.021)
Sample size	26,738	10,350
R2	0.16	0.13
Adjusted R2	0.16	0.13

***$p < .001$, **$p < .01$, *$p < .05$; Comparison groups include no participation (for international experience), white (for racial/ethnic identity), and Associate in Art (for first-term degree program). Models also include a fixed effect for college and term of enrollment

Standard errors in parentheses

Finally, Table 6 summarizes the results of weighted regression models that estimate the relationship between international education experiences and completion. For the full sample (column 1 in Table 6), these results indicate that study abroad was related to an increased probability of credential completion of around 49% ($p < .001$) compared to students who participated in neither international education opportunity. However, the difference in likelihood of completion for virtual exchange participants was not statistically discernible from the group of non-participants in the weighted model. When considering only Associate in Arts and Associate in Science seekers, results are similar in that study abroad

Table 6 Coefficients corresponding to weighted linear regression models estimating the relationship between study abroad and virtual exchange and completion

	Completion (full sample)	Completion (associate in arts and associate in science seekers only)
Study abroad (vs. neither)	0.49***	0.39***
Virtual exchange (vs. neither)	0.11	0.23

***$p < .001$, *$p < .05$; Outcome models include the same control variables as those listed in Table 5. Weights calculated using demographic and first-term enrollment academic characteristics

Table 7 Predicted observed and counterfactual mean cumulative GPA and mean probability of completion for study abroad and virtual exchange

	Observed	Unweighted counterfactual	Difference	Weighted observed	Weighted counterfactual	Difference
Mean cumulative GPA						
Study abroad						
M	2.2893	2.2887***	−0.0006	2.2783	2.2776***	−0.0070
SE	0.006	0.006		0.001	0.001	
Virtual exchange						
M	2.2893	2.2854***	−0.0039	2.2783	2.2696***	−0.0087
SE	0.006	0.006		0.001	0.001	
Mean probability of completion						
Study abroad						
M	0.1679	0.1668***	−0.0011	0.1652	0.1642***	−0.0010
SE	0.001	0.001		0.001	0.001	
Virtual exchange						
M	0.1679	0.1667***	−0.0012	0.1652	0.1623***	−0.0029
SE	0.001	0.001		0.001	0.001	

Significance tests are paired-samples *t*-tests, ***$p < .001$

is associated with an increased probability of completion of around 39% ($p < .001$) while no significant relationship is present between virtual exchange and completion.

Group Phase

Table 7 summarizes the predicted means calculated in the second phase of this study. Regarding GPA, these predictions suggest that both study abroad and virtual exchange result in higher mean final cumulative GPAs compared to a situation where one international opportunity or the other does not exist. For example, using the weighted regression models, the predicted mean final cumulative GPA of the students in the dataset is 2.2783, while the counterfactual mean in the absence of study abroad is 2.2776 (a difference of 0.0007, $p < .001$). For virtual exchange, the predicted counterfactual mean representing the absence of these programs is 2.2696 (a difference of 0.0087, $p < .001$).

For completion, using the same weighted models, the predicted mean probability of completion is 0.1652. This predicted probability decreases to 0.1642 in the absence of study abroad (a difference of 0.0010, $p < .001$) and to 0.1623 in the absence of virtual

exchange (a difference of 0.0029). Across unweighted and weighted predictions and both academic outcomes, differences between observed and counterfactual means are significant ($p < .001$). Notably, when considering the size of these differences, although small across comparisons, the difference between observed and counterfactual means was consistently greater for virtual exchange compared to study abroad.

Discussion

This study took as its point of departure the theoretical prediction that both virtual exchange and study abroad, as high impact educational practices (HIPs), foster socioacademic integration among community college students. In turn, these experiences positively contribute to their individual academic outcomes, which in turn have a positive impact on the communities where their institutions are located (Kuh & Kenzie, 2018). For example, McDaniel and Van Jura (2022) use nationally-representative data from the Educational Longitudinal Study (ELS) to show that students enrolled in four-year degree programs who participated in HIPs were more likely to graduate within 6 years. Das et al. (2024) use propensity score matching to show that participation in a first-year seminar, an additional example of a HIP, positively related to students' cumulative GPA a semester after participation. The current study sought to explore the potential for a similar, positive relationship between participating in internationally-focused HIPs, virtual international exchange and study abroad, and student success outcomes.

Researchers have previously been critical of HIPs and how they are implemented in that historically underserved students, such as students of color, those with lower levels of academic preparation, and low-income students are less likely to have access to these opportunities (Finley & McNair, 2013; Greenman et al., 2022). Notably, the community college context, where the current research took place, is precisely where students with these marginalized identities tend to enroll when they begin their postsecondary studies (Kisker et al., 2023; Renn & Reason, 2021). Indeed, Greenman et al. (2022) identify community colleges as contexts where concerns regarding equity in access to HIPs can be addressed in higher education. For example, these authors suggest that because community colleges serve students early in their academic careers, they are ideal locations to ensure that marginalized and minoritized students have access to these opportunities.

Socioacademic integrative moments such as those fostered by HIPs are particularly relevant in the community college context because students are less likely to interact with one another and with faculty outside of the classroom, as compared to their counterparts who attend residential, 4-year institutions (Bensimon, 2007; Renn & Reason, 2021). Indeed, prior research indicates that academic settings are the primary venue wherein community college students develop a sense of belonging in their postsecondary communities and that the relationships that students form are deeply meaningful for their academic experiences (Karp et al., 2010). Based on semi-structured interview data, Deil-Amen (2011) found that in-classroom interactions with faculty and other students were deeply meaningful for community college students' sense of comfort in their postsecondary institutional environment. These classroom connections, particularly with faculty, boosted students' academic performance and had a positive impact on students' self-worth and sense of belonging. Connections with other students in the classroom helped students address barriers, such as opaque institutional practices and policies, that otherwise may have negatively impacted their academic success. In such contexts,

faculty, staff, and students themselves take on key roles in fostering socioacademic integration, which can lead to future student success (Bensimon, 2007; Tinto, 2012).

While the current study is unable to address the nature of these socioacademic integrative moments during virtual exchange and study abroad that fosters students' academic success, this is an area that is ripe for future research. The results outlined here suggest that these international experiences, and especially study abroad, do indeed contribute to these outcomes. Socioacademic integration is a likely explanation for this boost in academic performance.

Study abroad was consistently positively associated with both final cumulative GPA and completion across statistical models in this study. These results are in line with an already-robust body of literature that finds a similar positive association with students' academic outcomes in both the 4-year (Bhatt et al., 2022; Hamir, 2011; Xu et al., 2013) and 2-year sectors (Raby et al., 2014; Rhodes et al., 2016). Whatley and González Canché (2021) represents the most comparable study to the current study in that this study is both recent and makes use of data from community college students. Although this study and the current study focus on different institutional contexts and take somewhat different analytical approaches, it is striking that the results of the weighted models in both studies produce similar results with regard to the relationship between study abroad and both final cumulative GPA and completion.

Regarding GPA, Whatley and González Canché (2021) found that study abroad participants attained a final cumulative GPA that was around half a point higher compared to non-participants. The weighted models in the current study indicated that the relationship between study abroad and final cumulative GPA was around 0.32 points higher. Turning to completion, Whatley and González Canché (2021) found that study abroad was related to an increase of 25% in the probability that a student would complete their degree program, an analysis that included both associate-degree seekers and certificate seekers. In the current study, this increase was estimated to be 49%.

Results for virtual exchange were less consistent across models in the current study. While the unweighted models consistently suggested a positive, significant relationship between virtual exchange and both final cumulative GPA and completion outcomes, the statistical significance between virtual exchange and these two outcomes disappeared in the weighted model for GPA when the sample was limited only to degree completers and was not present at all in the weighted models that used completion as the outcome variable.

These results contrast somewhat with those of Lee et al. (2022), who found a consistent positive association between virtual exchange and students' academic success in the context of a large university. It is possible that the virtual exchange programs represented in this study were not as robust or extensive as those represented in Lee et al. (2022) given the nature of the community college context. For example, because community college students are earlier in their academic careers compared to more advanced students in the four-year context, it may be that they are not prepared to benefit as substantially from these virtual programs. Design features of the virtual exchange opportunities represented across these two studies may also explain this difference in results. Future research is needed to further explore how virtual programs may be best designed to achieve desired student outcomes within a diversity of institutional contexts. At the same time, it is important to note that a positive, significant result for virtual exchange was found in some of this study's statistical models, and this relationship was never negative. Offering virtual exchange opportunities does not appear to harm community college students academically, and may very well support their academic progress, at least to a certain extent.

Although the benefits of both study abroad and virtual exchange to the academic success of individual student participants appears to be positive, at least in the broad sense, individual students are not the only stakeholders with investment in their academic success. Outcomes such as improved academic performance and credential completion are key student outcomes in the community college context (e.g., Baldwin, 2017), and when approached to participate in this study, stakeholders at the two community colleges that participated in this study were particularly interested in how their international programs might contribute to institutional student success goals. Such concerns are not unfounded in a context where community colleges are funded not only based on how many students they enroll, but also how well their students perform on metrics related to academic success, most notably credential completion (Ortagus et al., 2020). This study's research question guided attention to the contribution that virtual international exchange and study abroad have on students' academic outcomes in the aggregate, which speaks to the benefit of offering these international opportunities not only to individual students, but also the colleges they attend and the communities they serve.

Compared to study abroad, virtual international exchange has the potential to reach a larger number of students (Abdel-Kader, 2021; de Wit, 2016; Whalen, 2020), which is indeed the case at the two colleges that contributed data to this study (731 students participated in virtual exchange while only 57 participated in study abroad). With appropriate technological resources and support, students can participate in virtual exchange at a much lower cost compared to study abroad, and these programs are also more flexible in that they can be offered in a variety of formats to accommodate a variety of learning preferences and life circumstances. These features address some of the primary barriers that students experience when considering study abroad, most notably, cost and obligations related to family or work (Brux & Fry, 2010; De Jong et al., 2010; Kasravi, 2018; Stroud, 2010).

In this sense, virtual exchange programs can address the first two of Greenman et al.'s (2022) solutions for providing HIP access to excluded students. These programs represent a modified approach to international education in that students participate virtually and can be located wherever is convenient for them. They can also be integrated into students' studies at any point in their degree trajectory, including in early semesters, and can be included as part of a required course that students must take regardless. For example, Giralt et al. (2022) outline how virtual exchange can be offered as a stand-alone activity, meaning that students can participate in a program outside their normal courses as a way to address internship or elective requirements, and can also be offered as integrated into a particular course. Both types of virtual exchange programs were offered at the two colleges participating in this study. In contrast to this openness and flexibility of virtual exchange, access to study abroad may be limited in that these programs require international travel and often come with comparatively high costs.

This study's results at the group level bear out this expectation, as virtual exchange offers greater advantage when considering student success outcomes in the aggregate. For example, when comparing counterfactual mean GPAs to the true mean (using the weighted model for prediction), the difference in means when the counterfactual was the absence of study abroad was -0.0070, while the difference when the counterfactual was the absence of virtual exchange was larger at -0.0087. These results suggest that virtual exchange holds particular promise for community college leaders and international educators interested in providing programming that boosts the academic performance of enrolled students in the aggregate.

The positive relationship between both virtual exchange and study abroad indicated in this study's results highlights the importance of ensuring that these opportunities are

accessible to students. Prior community college literature indicates that in many respects, study abroad is more accessible to students across a diversity of demographic and academic characteristics compared to the 4-year sector (Whatley, 2021), likely due to the open-access philosophy with which these institutions approach educational programming (Raby, 2020; Whatley & Raby, 2020).

Although research on the accessibility of virtual international exchange in the community college sector is limited, the work that does exist suggests that this accessibility may not extend to these international experiences, perhaps due to their unequal distribution across academic disciplines (Whatley et al., 2022). These results reflect a general concern among researchers that virtual exchange does not live up to its potential to provide international opportunity to students with diverse identities (Bali et al., 2021; Barbosa & Ferreira-Lopes, 2021; Satar, 2021). Given the potential for virtual international exchange to foster academic success among a numerically larger group of students compared to study abroad, this study's results support increased attention to the characteristics of students who access these virtual experiences in future research and continued efforts among community college faculty and staff to make these experiences available to diverse students across a variety of degree programs and disciplines.

Conclusion

The purpose of this study was to explore the relationship between virtual exchange and study abroad and students' academic success with a focus on the benefits of offering these two experiences to the broader institution and community. This study notably focused on students attending community colleges, a student population that is often marginalized and invisible in discussions of key issues in international higher education. Grounded in the hope that studies like this one will call attention to the role that community colleges can play in the democratization of international education opportunity, this study highlighted the importance of providing community college students with access to these international opportunities not only for individual students themselves but also the institutions they attend and the communities where they live and work. If international education is associated with positive academic outcomes among students, even if these benefits are small, it is certainly possible that these experiences are also associated with other outcomes that are beneficial to communities, such as increases in students' intercultural communication skills or abilities to work across cultural differences. Balancing the scalability of virtual exchange for a larger group of students with the clear benefits of study abroad to a smaller group of individual students must be a key focus for community college international educators as we emerge from the COVID-19 pandemic.

Appendix

See Tables 8 and 9.

Table 8 Descriptive statistics for international education, demographic, and academic characteristics for students attending each community college in this study

Variable	College 1 (N = 23,308)	College 2 (N = 3430)
International experiences		
Study abroad	0.19%	0.35%
Virtual exchange	0.19%	20.03%
Control variables		
Age at enrollment[a]	22.70 (7.39)	24.98 (9.32)
Female	52.14%	60.44%
Black	29.28%	18.69%
Hispanic	14.59%	6.65%
White	43.60%	65.42%
Other race/ethnicity	12.53%	9.24%
Pell eligible	45.77%	59.24%
First-term GPA[a]	2.25 (1.31)	2.52 (1.33)
Associate in Arts	33.45%	24.43%
Associate in Science	5.82%	10.47%
Associate in Applied Science	50.24%	46.41%
Certificate/Diploma	10.49%	18.69%

[a]Standard deviation in parentheses

Table 9 Descriptive statistics for international education, demographic, and academic characteristics for the entire sample, virtual exchange participants, and study abroad participants

Variable	Full sample (N = 26,738)	All completers (N = 4489)	Virtual exchange participants (N = 731)	Virtual exchange participants (completers only) (N = 306)	Study abroad participants (N = 57)	Study abroad participants (completers only) (N = 45)
International experiences						
Study abroad	0.21%	1.00%				
Virtual exchange	2.73%	6.82%				
Control variables						
Age at enrollment[a]	22.99 (7.70)	24.13 (8.56)	21.80 (6.42)	21.30 (6.61)	22.39 (7.66)	23.16 (8.43)
Female	53.21%	55.05%	56.36%	57.52%	73.68%	75.56%
Black	27.91%	16.04%	15.18%	10.46%	12.28%	13.33%
Hispanic	13.57%	12.88%	9.30%	9.15%	19.30%	22.22%
White	46.40%	58.99%	63.89%	69.28%	49.12%	44.44%
Other race/ethnicity	12.11%	12.10%	11.63%	11.11%	19.30%	20.00%
Pell eligible	47.50%	48.41%	66.89%	63.73%	43.86%	42.22%
First-term GPA[a]	2.28 (1.31)	3.12 (0.89)	2.70 (1.14)	3.18 (0.77)	3.22 (0.98)	3.39 (0.79)
Associate in Arts	32.29%	28.78%	55.95%	54.25%	28.07%	22.22%
Associate in Science	6.42%	5.99%	25.44%	25.49%	7.02%	6.67%
Associate in Applied Science	49.75%	48.30%	15.18%	13.40%	56.14%	62.22%
Certificate/Diploma	11.54%	16.93%	3.42%	6.86%	8.77%	8.89%

[a]Standard deviation in parentheses

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