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Quality of Student–Faculty Interactions, Persistence, and the Mediating Role of Student Satisfaction

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Abstract

Rising student attrition, exacerbated by the COVID-19 pandemic, has resulted in increased calls for higher education officials to better understand factors associated with increasing persistence rates, especially from the first- to second year of college. Though many studies have documented the influence of the frequency of student–faculty interactions on student persistence, less research has focused on the quality of those interactions, including potential mediating influences. To address these issues, this study used longitudinal data from 8,475 students among 44 four-year institutions to explore whether the quality of student–faculty interactions influences student persistence and whether student satisfaction mediates this relationship. Guided by theoretical models of persistence, we found that even in the presence of a range of potential confounders, students' perceived quality of student–faculty interactions increased the odds of persistence to the second year of college. Furthermore, results from a Karlson–Holm–Breen (KHB) decomposition analysis suggest this relationship occurred indirectly through students' satisfaction with the overall college experience.

Keywords: student–faculty interaction, quality, persistence, satisfaction, longitudinal

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Total postsecondary enrollment has declined a remarkable 7.4% since the start of the global pandemic in 2020—with most of this change occurring in the undergraduate student body (National Student Clearinghouse Research Center, 2022). These changes, coupled with projections of reduced numbers of students entering higher education, have exacerbated concerns regarding student persistence and the long-term viability of many colleges and universities (Campion, 2020; Grawe, 2021). Even before the pandemic, and despite remaining relatively stable during the previous four years, the first- to second year persistence rate dropped 2 percentage points in the United States to 73.9% in the fall 2019 term—the lowest point since 2012 (Hope, 2021). Taken together, these changes underscore the importance for researchers to investigate what factors predict college student persistence, especially within the current rapidly changing higher education landscape (Eide, 2018; Howell et al., 2021).

A large body of research has detailed factors such as financial aid, tutoring, and early academic interventions, for example, that enhance student persistence (Stewart et al., 2015). Several other studies have also considered the influence of certain student experiences, such as interactions with faculty, on persistence (e.g., Dwyer, 2017). Though this prior work has provided institutions with critical information regarding what factors influence persistence, it remains unclear not only how the quality of student–faculty interactions affects this important outcome, but also unknown is what mechanisms drive the relationship between these concepts. Answers to these questions have the potential to provide higher education leaders with critical information with which to enhance persistence rates during these unprecedented shifts in college-going patterns.

Several decades of empirical work have documented the influence of student–faculty interactions on an extensive number of student outcomes (see Endo & Harpel, 1982; Kim & Sax, 2017; Kuh & Hu, 2001). Typically grounded in the conceptual models of student persistence advanced by Tinto (1975, 1993, 2012) and Pascarella (1980), some studies have also linked student–faculty interactions with increased likelihood of persistence in college (e.g., Dwyer, 2017; Pascarella & Terenzini, 1979). With some exceptions (e.g., Hausmann et al., 2009; Otero et al., 2007), most of the work exploring the influence of student–faculty interactions on persistence has centered on the frequency of these interactions as an antecedent to college student persistence (Cragg, 2009; Crissman, 2001; Wolniak et al., 2012). This emphasis is somewhat surprising, given key scholars studying this topic argue that the quality of these interactions might exert a greater influence on outcomes than the quantity (e.g., Sax et al., 2005). Despite this argument, some aspects of student–faculty interactions (such as the perceived quality of non-classroom interactions with faculty) on persistence remain largely underdeveloped.

Scholars studying the relationship between student–faculty interactions and persistence have often limited their work to single-institution samples (Crissman, 2001; Dwyer,

2017; Hausmann et al., 2009), thereby limiting the generalizability of the findings. Moreover, despite the evidence linking student–faculty interactions to student persistence, researchers know relatively little about the potential mediators driving this relationship, thus creating a "black box" in our understanding of potential causal mechanisms (Imai et al., 2011). Accordingly, using a multi-institutional longitudinal data set, we endeavored to determine whether the quality of non-classroom interactions with faculty, net of a range of potential confounders, influences the likelihood of student persistence to the second year of college. Furthermore, we considered whether student satisfaction with college mediates this relationship.

Literature Review

This literature review is organized into three sections. The first section describes the evidence linking student–faculty interactions to a host of important student outcomes. The second section reviews the literature speaking directly to how student–faculty interactions influence student persistence decisions. The final section includes a review of the mediating (i.e., indirect) influences associated with student–faculty interactions.

Student–Faculty Interactions

Scholars have synthesized much of the work connecting student–faculty interactions to various outcomes associated with a college education (Cole & Griffin, 2013; Kim & Sax, 2017). The research on this topic has suggested that students who interact with faculty demonstrate enhanced cognitive development (Kim & Lundberg, 2016; Volkwein et al., 1986), psychological well-being (Trolian et al., 2022), and occupational awareness (Cabrera et al., 2001). Additionally, research has linked student–faculty interactions to more meaningful interactions later in college (Fuentes et al., 2014), attitudes toward professional success (Trolian et al., 2021), and greater levels of effort devoted to educationally purposeful activities (Kuh & Hu, 2001). Other studies have suggested student–faculty interactions are positively associated with academic achievement generally (Al-Hussami et al., 2011; Cole, 2010; Guerrero & Rod, 2013), and among racial-ethnic minority students in particular (Cole & Espinoza, 2008; Tovar, 2015). Despite the academic achievement benefit accrued by racial-ethnic minority students from student–faculty interaction, it is important to note some evidence has suggested that students from more privileged backgrounds might be more likely to invoke different "practices of negotiation," which could result in different outcomes for students in these groups (Austin Smith, 2016). This evidence points to the possibility that the racial/ethnic background of students might moderate the influence of student–faculty interaction on certain student outcomes.

Though some studies have considered only the frequency of interaction between students and faculty, many scholars document the relative import of assessing the quality of these interactions rather than simply how often they occur (Anaya & Cole, 2001;

Cotten & Wilson, 2006; Romsa et al., 2017; Sax et al., 2005). Despite some research that has considered how the quality of student–faculty interactions influence outcomes such as grades (Anaya & Cole, 2001; Dika, 2012) and cognitive development (Pascarella & Terenzini, 1980), it remains unclear how perceptions of quality relate to student persistence.

Related, another line of inquiry has linked student–faculty interactions to student satisfaction. For example, some research has suggested that students who interact with faculty tend to be more satisfied with the academic aspects of college (Park et al., 2022). Such interactions also increase satisfaction with one's academic major and overall career motivation levels (You, 2020). Additional research has found that student–faculty interactions are associated with enhanced satisfaction with faculty members (Sax et al., 2005), as well as overall satisfaction with the college experience (Astin, 1993; Cole, 2008; Cole & Jackson, 2005; Lamport, 1993; Sax & Young, 2009).

Student–Faculty Interactions and Persistence

In addition to the positive influence of student–faculty interactions on a range of student outcomes, scholars have also examined the impact of these interactions on student persistence. In their early study on student–faculty interactions and persistence among a sample from a single institution, Pascarella and Terenzini (1977) found that freshmen who interacted more frequently with faculty (in particular, to discuss intellectual, course-related, or career concerns) were more likely to persist to the second year of college (see also Pascarella & Terenzini, 1979). Since this time, researchers have continued to explore the potential influence of student–faculty interactions on student persistence and degree completion. Though some of these studies have provided evidence that the frequency of student–faculty interactions enhanced persistence (Cragg, 2009; Dwyer, 2017; Lillis, 2011), a substantial number of investigations did not find any statistically reliable associations between frequency of interactions and persistence (Crissman, 2001; Hausmann et al., 2009; Romsa et al., 2017; Wolniak et al., 2012).

Importantly, other research also considered the moderating influence of student background characteristics on persistence. For example, Griffin et al. (2022) found that compared to their male counterparts, female students who reported fewer interactions with faculty were less likely to persist to the second year. Other research suggests that compared to White and Asian students, underrepresented racial/ethnic minority students were more likely to leave STEM fields as a result of feelings of discomfort with faculty interactions (Park et al., 2020). These studies underscore the importance of considering whether certain student background characteristics might moderate the influence of student–faculty interactions on student outcomes. Though these works are important in adding to what scholars know about how the frequency of student–faculty interactions influences persistence, it might be the case that the quality of these interactions matter more than the frequency (Sax et al., 2005). Despite this point, less research has focused on the quality of these interactions and how they potentially influence persistence (Dwyer, 2017).

Student–Faculty Interactions: Indirect Effects

Soon after Pascarella and Terenzini's (1977, 1979) pioneering work examining the influence of student–faculty interaction on persistence, they argued that researchers need to better understand the mechanisms driving the relationships between student–faculty interactions and student outcomes (Pascarella & Terenzini, 1981; see also Kuh & Hu, 2001). As Cotten and Wilson (2006) argue, despite the evidence suggesting students who interact with faculty outside the classroom benefit more than those who do not, it is still somewhat unclear how the contact with faculty enhances achievement. Although long used in social science research, generally, higher education researchers use formal mediation analyses far less commonly to answer questions about the impact of college on students (Mayhew et al., 2016).

As it pertains specifically to the current investigation, however, some recent higher education research has considered the potential mediating effects of other student experiences on the relationship between student–faculty interactions and other student outcomes. These studies examined a range of potential mediators, such as academic self-challenge, sense of belonging, and integration of social and academic experiences on several student outcomes, such as cognitive skills and grades, for example (Kim & Lundberg, 2016; Ko et al., 2016). Other research has explored the mediating influence of academic satisfaction on the relationship between student–faculty interactions and grade point average (GPA) among undergraduate STEM students (Park et al., 2022). Though it constitutes a smaller research base, this nascent body of evidence suggests the influence of student–faculty interactions on a range of outcomes (including persistence) may operate indirectly through other college experiences. Researchers acknowledge, however, that there remains a great deal to learn regarding the mechanisms driving the relationships between student–faculty interactions and student outcomes (Cotten & Wilson, 2006).

Taken together, a substantial body of literature connects student–faculty interactions to a range of important student outcomes, including persistence (Cragg, 2009; Dwyer, 2017). Particularly germane to the present investigation, evidence has suggested student–faculty interactions also enhance satisfaction with college (Astin, 1993; Sax & Young, 2009). Next, other research has connected student satisfaction to enhanced persistence directly (Schreiner & Nelson, 2013), whereas other investigations have also examined satisfaction as a mediator between certain college experiences, such as exposure to effective instructional approaches, and persistence (Loes et al., 2019; Pascarella et al., 2008, 2011). Schreiner and Nelson (2013) noted that despite the robust number of institutions that assess their students' satisfaction with college, the research base connecting satisfaction to persistence remains underdeveloped.

It is important to reiterate that a number of studies failed to uncover any statistically reliable associations between student–faculty interactions and persistence (Crissman, 2001; Hausmann et al., 2009; Romsa et al., 2017; Wolniak et al., 2012). As Romsa et al. (2017) argued, while the quantity of student–faculty interactions might not exert a statistically significant influence on either satisfaction or persistence, it is reasonable

to consider that the quality of students' interaction with faculty may matter more than simply the quantity. Thus, it may be that the focus on quantity rather than quality of these experiences explains the absence of significant associations between student–faculty interactions and persistence. In our review of the literature, it is apparent that researchers consider the quality of student–faculty interactions far less commonly than the frequency of such interactions (see also Cole & Griffin, 2013).

Next, despite calls to the contrary (Romsa et al., 2017; Sax et al., 2005), there remains a lack of published evidence that has considered the potential mediating influence of student satisfaction with the overall college experience on the relationship between student–faculty interactions and persistence decisions. Though the influence of the quality of student–faculty interactions on persistence might operate indirectly through other variables, extant evidence suggests when compared to other measures (such as academic achievement), satisfaction with the college experience is particularly effective at explaining the link between certain college experiences on student persistence (Loes et al., 2017, 2019; Pascarella et al., 2011). Accordingly, using a well-established measure of students' perceptions of the quality of their interactions with faculty, we endeavored to better understand the influence of the quality of student–faculty interactions on persistence, as well as whether student satisfaction with the overall college experience mediated this relationship.

Guiding Conceptual Frameworks

Studies that have examined college student persistence are often guided by Tinto's (1975, 1993, 2012) model of student departure. Tinto posited that students enter college with a wide range of precollege characteristics such as academic ability, race, sex, motivation, and parental education levels that influence decisions to withdraw from college. Central to this framework, Tinto's model also suggested that after accounting for these precollege characteristics, the more a student integrates into the academic and social fabric of their institution, the greater their commitment to the institution, resulting in a greater propensity to persist in college.

Since Tinto's (1975, 1993, 2012) early and subsequent work, other researchers have also emphasized the importance of considering the factors influencing a student's social integration into the institution. Namely, Braxton et al. (2004) underscored the importance of students' perceptions of how committed their institution is to their welfare. This perception is clearly connected to how students perceive the extent to which institutional agents (e.g., faculty) expressed concern with their well-being, which is commonly manifested through student–faculty interactions and one's subsequent satisfaction with the overall college experience.

Although Tinto's model has been frequently used in college persistence studies, it is important to note that it has attracted considerable scholarly attention and subsequent revisions since its inception. Some scholars have refined conceptual models regarding

student persistence to also consider differences across race and financial background, for example (Xu & Webber, 2018). Similar to Bowman and Felix (2017), we note that despite the attention and subsequent modifications to Tinto's model over the years, multiple constructs across retention models, including the goal of graduating and one's social and academic levels of integration, remain salient throughout the adjustments to and critiques of his work (Bean & Eaton, 2000; Braxton et al., 2004; Museus, 2014).

This noted, it is important to acknowledge the emerging body of evidence described earlier indicating that student–faculty interactions might differ by student characteristics. To wit, female and racial/ethnic minority students sometimes have less student–faculty interactions than their counterparts, which is associated with changing majors and lower rates of persistence (e.g., Griffin et al., 2022; Park et al., 2020). Accordingly, it is important to also consider potential moderating influences of sex and race/ethnicity in estimating the influence of student–faculty interactions and persistence decisions.

Basing their rationale on Astin's (1993) work, Kuh et al. (2006) argued that researchers should consider satisfaction as an intermediate outcome of college. More specifically, they noted that satisfaction with college is an antecedent to educational attainment and student outcomes, and it is a proxy for "social integration, or the degree to which a student feels comfortable in the college environment and belong to one or more affinity groups" (p. 5). This increased social integration enhances one's commitment to an institution which, in turn, increases the likelihood of persisting. This approach is consistent with Pascarella's (1980) conceptual model, which posited that student–faculty informal contact influences educational outcomes (including college satisfaction), which then drives persistence and withdrawal decisions.

Accordingly, based on the research and theory reviewed heretofore, we predicted that students' perceptions of quality interactions with faculty (which falls along academic and social dimensions of integration [Spady, 1971; Tinto, 1975]) would increase the odds of persistence to the second year (see Figure 1). Next, we expected that satisfaction would mediate this relationship. Put simply, we predicted that the quality of student–faculty interactions would enhance one's satisfaction with college, which would, in turn, lead to a greater likelihood of persistence to the second year of college (see Figure 2).

Research Methods

Samples

We used data from 44 four-year institutions that took part in the Wabash National Study of Liberal Arts Education (WNS). Funded by the Center of Inquiry in the Liberal Arts at Wabash College, the WNS is a pretest–posttest investigation of multiple institutions throughout the United States. The WNS focused on the influence of college on various psychosocial and cognitive outcomes theoretically associated with a

Figure 1. Conceptual Framework for Understanding the Influence of the Quality of Students' Non-Classroom Interactions with Faculty and College Persistence (Without a Mediator; Total Effects Model)

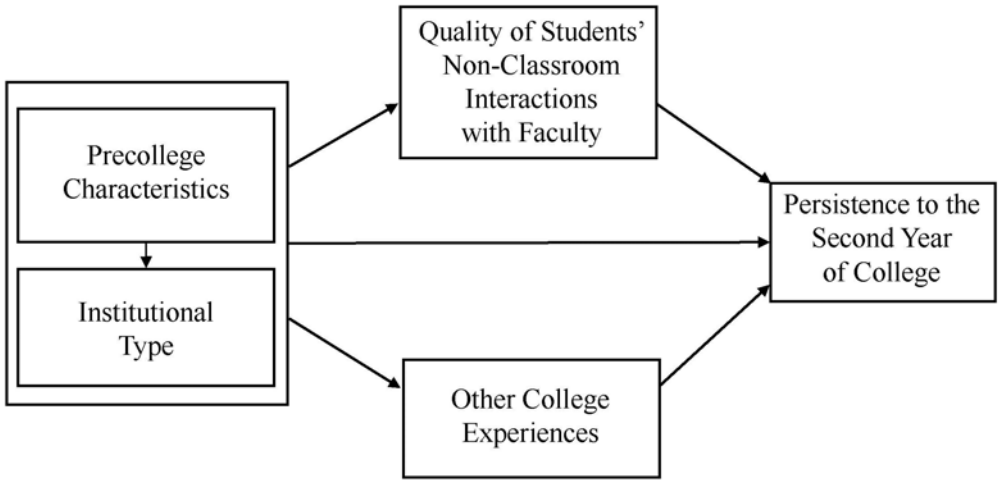
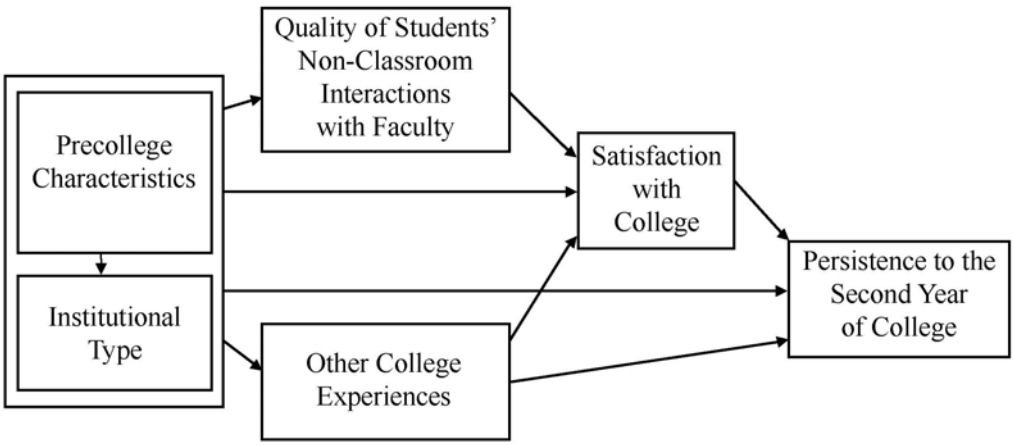


Figure 2. Conceptual Framework for Understanding the Influence of the Quality of Students' Non-Classroom Interactions with Faculty and College Persistence (With a Mediator; Direct and Indirect Effects Model)



liberal arts education. Given the WNS was principally focused on the effects of liberal arts education on college outcomes, investigators intentionally oversampled liberal arts colleges. These institutions vary widely in terms of selectivity, cost, and geographical location, for example. Respondents from six research universities, nine regional universities, and 29 liberal arts colleges participated in the WNS.

Participants consisted of three cohorts of full-time, first-time students who started college in fall 2006, fall 2007, and fall 2008. During this initial data collection phase (Time 1), respondents provided information regarding personal demographics, family background characteristics, and precollege experiences, and they completed a battery of

pretest measures (e.g., precollege critical thinking, precollege psychological well-being). The second data collection phase (Time 2) occurred in the spring of the first year and included gathering information from respondents via the WNS Student Experiences Survey and the National Survey of Student Engagement. Participants reported their academic and non-academic experiences during the first year of college, and they also took parallel posttest measures of all pretest instruments completed before beginning college. A total of 17,503 students agreed to participate in the Time 1 data collection, and 8,614 returned to provide follow-up responses at Time 2. We analyzed responses among participants who completed both Time 1 and Time 2 data collections. Specifically, 2,953 students were in the 2006 cohort, 1,305 students were in the 2007 cohort, and 4,217 students were in the 2008 cohort, for a total of 8,475 students in the analytic sample.

Variable Coding

The dependent variable, which came from institutions, was a binary measure that captured whether students enrolled in the fall of their second year of college (1 = yes). The independent variable is students' reported quality of non-classroom interactions with faculty, a standardized scale based on five items (α = .86, 95% CI [.86, .87]; see Table 1 for summary statistics and description of variables). For all scales in our analysis, we followed DeVellis and Thorpe's (2022) suggestion of including confidence intervals for the alpha coefficient to mitigate the reliance on a single-point estimate of reliability. To estimate confidence intervals, we used bootstrapping with 5,000 replications. Our mediator is college satisfaction, which we standardized and constructed from two items (α = .72, 95% CI [.70, .73]).

Guided by prior studies on student persistence decisions (e.g., Loes et al., 2017, 2019; Pascarella et al., 2008; Pascarella et al., 2011), we also included three sets of control variables: (a) precollege measures, (b) institution type, and (c) college experiences. Precollege measures include cohort, sex, race/ethnicity, first-generation college student, financial aid, ACT scores, and academic motivation. We coded sex as female (1) or male (0). Race/ethnicity consists of six categories: Black or African American, Hispanic/Latino, Asian/Pacific Islander, Native American, and nonresident alien (White is the reference category). We considered respondents as first-generation students if no parent attended a postsecondary school. We also included whether students received a federal grant (1 = yes). ACT scores are from 1 to 36, and academic motivation is a standardized scale based on eight items (α = .69, 95% CI [.68, .70]).

At the institution level, we included institution type and students' experiences. Institution type comprises three categories: research university and regional university (liberal arts college is the omitted category). We also included two indicators to represent whether students' primary or expected major is: (a) science, technology, engineering, or math (STEM), or (b) arts, humanities, or social sciences (other majors are the omitted category). Campus residence captures whether students live on campus. We included an indicator of whether students participated in a cocurricular activity and an indicator

Table 1. Description of Variables

Variables	Description	Mean	S.D.	% Miss
Dependent variables				
College persistence	Enrolled fall of second year (Yes = 1, No = 0)	0.92	0.27	1.6
Independent variable				
Quality of students' non-classroom interactions with faculty	Standardized five-item scale (alpha = .86, 95% CI [86, .87]) of the quality of students' non-classroom interactions with faculty based on the extent students agree that: (a) non-classroom interactions with faculty have had a positive influence on personal growth, values, and attitudes; (b) non-classroom interactions with faculty have had a positive influence on intellectual growth and interest in ideas; (c) non-classroom interactions with faculty have had a positive influence on career goals and aspirations; (d) since coming to this institution, they have developed a close, personal relationship with at least one faculty member; and (e) they are satisfied with the opportunities to meet and interact informally with faculty members. Positive values represent greater contact.	0.00	0.81	4.6
Mediating variables				
College satisfaction	Standardized two-item scale (alpha = .72, 95% CI [.70, .73]) of college satisfaction based on these items: (a) How would you evaluate your entire educational experience at this institution? and (b) If you could start over again, would you go to the same institution you are now? Positive values represent higher college satisfaction.	0.00	0.88	3.3
Precollege characteristics				
Cohort: 2007	2007 cohort	0.154	0.4	0.0
Cohort: 2008	2008 cohort (2006 cohort is omitted)	0.498	0.5	0.0
Female	Female student (Yes = 1, No = 0)	0.62	0.49	0.0
Black	Race/ethnicity: Black	0.10	0.3	9.0
Hispanic/Latino	Race/ethnicity: Hispanic/Latino	0.06	0.2	9.0
Asian/Pacific Islander	Race/ethnicity: Asian/Pacific Islander	0.06	0.2	9.0

(*continued*)

Table 1. Description of Variables (*continued*)

Variables	Description	Mean	S.D.	% Miss
American Indian/ Alaska Native	Race/ethnicity: American Indian/Alaska Native	0.00	0.1	9.0
Nonresident Alien	Race/ethnicity: Nonresident Alien (White is omitted category)	0.02	0.1	9.0
First-generation	No parent attended a postsecondary school (Yes = 1, No = 0)	0.11	0.31	2.8
Financial aid	Received a federal grant (Yes = 1, No = 0)	0.15	0.36	0.1
ACT scores	ACT composite score. Ranges from 14 to 36	25.48	4.66	0.0
Precollege academic motivation	Standardized eight-item scale (alpha = .69, 95% CI [.68, .70]) of precollege academic motivation based on the extent to which students: (a) enjoy the challenge of learning complicated new material; (b) academic experiences (courses, labs, studying, discussions with faculty) will be the most enjoyable part of college; (c) getting the best grades they can is very important; (d) in high school, they frequently did more reading in a class than was required simply because it interested them; (e) agree that academic experiences (courses, labs, studying, discussions with faculty) will be the most important part of college; (f) in high school, they frequently talked to teachers outside of class about ideas presented during class; (g) do well on a test because they are well prepared, not because the test is easy; and (h) are willing to work hard in a course to learn the material even if it won't lead to a higher grade. Higher values represent higher motivation.	0.04	0.98	1.0
College characteristics and experiences				
Research university	Attends a research university	0.26	0.4	0.0
Regional university	Attends a regional university (a liberal arts college is the omitted category)	0.24	0.4	0.0
STEM major	Primary or expected major in science, technology, engineering, or math	0.22	0.42	11.8
Arts, humanities, or social sciences major	Primary or expected major in arts, humanities, or social sciences (other majors are omitted category)	0.36	0.48	11.8

(*continued*)

Table 1. Description of Variables (*continued*)

Variables	Description	Mean	S.D.	% Miss
Lives on campus	Lives on campus (Yes = 1, No = 0)	0.88	0.33	2.7
Cocurricular activities	Student has participated in cocurricular activities at time (Yes = 1, No = 0)	0.77	0.42	3.4
Research with faculty	Worked on a research project with a faculty member outside of course or program requirements (Yes = 1, No = 0)	0.05	0.22	3.6
Frequency of interactions with faculty	Standardized four-item scale (alpha = .74, 95% CI [.73, .75]) of the frequency of interactions with faculty, based on how often students: (a) discussed grades or assignments with an instructor; (b) talked about career plans with a faculty member or advisor; (c) discussed ideas from readings or classes with faculty members outside of class; and (d) worked with faculty members on activities other than coursework. Higher values represent more frequent interactions.	0.00	0.75	2.9
First-year GPA	First grade's cumulative grade point average (GPA). Ranges from 0 to 4.	3.16	0.62	8.5

Note. WNSLAE 2006–09. Sample size is 8,475 respondents.

of whether they participated in research with a faculty member. We also included a standardized scale of the frequency of interactions with faculty (four items; $\alpha = .74$, 95% CI [.73, .75]). Our final control variable is the first-year cumulative GPA.

Overall, we were missing relatively few values where the indicators with the most significant percentage of missing (college majors) are under 12%. However, if we performed listwise deletion, we would drop 28% of the observations from our sample. Therefore, we handled missing values using Stata 17's multiple imputation, creating 50 imputed data sets.

Data Analysis

Our analysis aimed to estimate the extent to which students' satisfaction with college mediates the relationship between the quality of students' non-classroom interactions with faculty and college persistence. Another way to conceptualize our analysis is to decompose the total effects of the quality of students' non-classroom interactions with faculty (see Figure 1) into its direct and indirect components (see Figure 2). Notice in Figure 2 that we removed the path from the quality of students' non-classroom interactions with faculty to college persistence once we included their satisfaction with

college. Conceptually, Figure 2 shows that the quality of students' non-classroom interactions with faculty affects college persistence indirectly through (i.e., mediates) their satisfaction with college.

We used the Karlson–Holm–Breen (KHB) method to decompose the total, direct, and indirect effects of the quality of students' non-classroom interactions with faculty and college persistence to address variance and scaling issues when conducting decomposition analyses with binary outcomes (Breen et al., 2013; Mood, 2010; Williams & Jorgensen, 2023). Consistent with Figure 1, we estimated the total effects after controlling for important student background characteristics, institutional type, and college experiences other than student–faculty interaction. We used Stata 17 and the user-written command, *KHB*, for our analyses.

Results

Table 2 shows the results from the KHB decomposition analysis.[1] We present the logit coefficients, odds ratios (OR), and average marginal effects (AME). The AME represents the average change in the probability of persistence for a one-unit change in the predictor. Finally, we used bootstrapping with 5,000 replications to estimate standard errors. The total effect of the quality of students' non-classroom interactions with faculty (OR = 1.48, $p < .001$) controls for the cohort of the data, students' precollege characteristics, institution type, and other college experiences besides student–faculty interactions. In probability terms, the AME of .023 means that a one standard deviation increase in the quality of non-classroom interactions with faculty is associated with a 2.3 percentage point increase in the probability of persisting to the second year. Readers may question whether a 2.3 percentage point increase in college persistence is substantial. We contend that this association is notable because 92% of students in our data persist to the second year of college. Given the high percentage of students continuing to the second year, factors contributing to college persistence are important to consider. As a supplemental analysis, we separated our data into institutions with persistence rates below 90% and those at or above 90% to determine whether institutions with lower-than-average persistence rates—and hence more variance—drive our results (not shown but are available upon request). The quality of students' non-classroom interactions with faculty was positively associated with the outcome measure (OR = 1.28, $p = .02$), which is a 2.4 percentage point increase in the probability of persisting to the second year at institutions with less than 90% persistence rates. At institutions with 90% or higher persistence rates, the quality of student–faculty interactions was also positively associated with the outcome measure (OR = 1.52,

1 We also estimated multilevel models and school fixed-effects models and found that the substantive results did not change. However, we observed a notable decline in the sample size while conducting fixed-effects models. Readers may view our findings upon request.

Table 2. Results from Decomposition Analysis of the Quality of Students' Non-Classroom Interactions with Faculty and Persistence to the Second Year

	Quality of students' non-classroom interaction with faculty					
Decomposition	**Coef.**		**OR**	**AME**		**% of Total**
Total effect	.39	***	1.48	.023	***	100%
(Standard error)	(.06)			(.0036)		
Direct effect	.04		1.04	.0024		11%
(Standard error)	(.07)			(.0038)		
Indirect effect	.35	***	1.42	.024	***	89%
(Standard error)	(.02)			(.0014)		

Note. WNSLAE 2006–09. Sample size is 8,475 respondents. OR = odds ratio, AME = average marginal effects. All models include controls for race, sex, first-generation status, financial aid, ACT scores, precollege academic motivation, institution type, college major, on-campus residence, cocurricular activities, research with faculty, frequency of interactions with faculty, and first-year GPA. We also performed bootstrapping with 5,000 replications to produce standard errors.

*$p < .05$, **$p < .01$, ***$p < .001$ (two-tailed).

$p < .001$), which is a 2.1 percentage point increase in one's chances of reenrolling in the second year of college. These results suggest that the quality of students' non-classroom interactions with faculty is important for college persistence, even at institutions with already high persistence rates.[2]

The direct effect represents the path from the quality of students' non-classroom interactions with faculty and college persistence after accounting for the indirect path through students' satisfaction with college. We estimate a one standard deviation increase in the quality of students' non-classroom interactions with faculty is associated with a (nonsignificant) 0.2 percentage point increase in the probability of persisting to the second year. This result implies that 89% of the total effect of the quality of students' non-classroom interactions with faculty and persistence to the second year is indirect through students' college satisfaction. This indirect effect is also statistically significant ($p < .001$ two-tailed).

2 Considering the research reviewed earlier suggesting sex and race might moderate the relationship between student–faculty interactions and persistence, we also ran interactions between student–faculty interactions and race/sex, respectively (results available upon request). Given that all of the interactions were nonsignificant, however, we opted to exclude those results here.

Discussion

Researchers studying the influence of student–faculty interactions on persistence have commonly considered only the frequency of these interactions rather than other aspects of these experiences, such as perceived quality. Additionally, despite a modest research base examining potential mediating influences between student–faculty interactions and various outcomes, no research to date has examined whether satisfaction mediates the relationship between the quality of non-classroom interactions with faculty and student persistence. Accordingly, this study sought to address these gaps in the literature. In short, our findings suggested that the quality of non-classroom interactions with faculty was associated with increased odds of persisting to the second year of college. Additionally, most of this relationship appeared to occur indirectly through one's satisfaction with college. Put simply, those who report greater quality in their non-classroom interactions with faculty were more satisfied with college and, in turn, were more likely to persist to the second year.

Though this study addressed some gaps in the student–faculty interactions and persistence literature, some limitations moderated our conclusions. First, our institutional sample consisted of 44 four-year institutions, thereby inhibiting our ability to generalize to all institutions of higher learning in the United States. That noted, our data were especially unique in that they included a range of psychosocial indicators that are typically not readily available in other data sets that explore college impact. Furthermore, our institutional sample, though not fully representative of all schools, is reflective of the diversity of college and university institutional types in the United States. Related to this point, the first wave of the longitudinal data collection occurred roughly 15 years ago—well before the onset of the pandemic. The pandemic impacted the operations and priorities of higher education institutions in myriad ways, including shifts in program and course modalities; expectations of faculty, staff, and students; and use of campus classrooms and spaces. Our findings, therefore, are limited in their ability to account for this changing higher education landscape. This aside, the findings from this study are still applicable to the present (i.e., the influence of students' perceived quality of student–faculty interactions found in this study remains after the data were collected and thus can inform current practices relating to persistence). Next, our study considered only first- to second year persistence. Future research should test whether our findings extend to graduation from college, which is an arguably more salient outcome. These points notwithstanding, our study is an important first step in investigating potential mediating influences in the relationship between the quality of student–faculty interactions and persistence.

We found that the frequency of interactions with faculty failed to exert a statistically reliable influence on the outcome measure; however, students' perceptions of the quality of those interactions were positively associated with greater odds of persistence. These findings comport with other student–faculty interaction research on outcomes such as psychological well-being, satisfaction, and cognitive development, for example, which has suggested that the frequency of these interactions might be less important

than their perceived quality (Cho & Auger, 2013; Cox et al., 2010; Trolian et al., 2022). Considering many studies did not uncover a significant relationship between the frequency of student–faculty interactions and persistence (e.g., Crissman, 2001; Hausmann et al., 2009; Romsa et al., 2017; Wolniak et al., 2012), coupled with calls for researchers to explore whether the perceived quality of these interactions might influence persistence (Romsa et al., 2017), our study fills an important lacuna in the literature. As Sax et al. (2005) argued, ". . . the literature suggests that the quantity of students' involvement with faculty must be understood in the context of the quality that defines such interactions. In other words, frequent encounters with faculty do not necessarily translate into beneficial outcomes" (p. 644). As it pertains specifically to student persistence, our investigation responds to these calls by considering the influence of the quality of non-classroom interactions with faculty and persistence, while also controlling for the frequency of those interactions, alongside a range of other potential confounders.

Next, our study also addresses the suggestions of higher education researchers to explore potential indirect effects in student–faculty interaction studies (Kuh & Hu, 2001; Pascarella & Terenzini, 1981). Despite early calls for researchers to examine these indirect effects in student–faculty interactions research (e.g., Pascarella & Terenzini, 1981), formal mediation analyses are still relatively uncommon in higher education research generally, as well as within student–faculty interactions research specifically (Mayhew et al., 2016). This is a noteworthy omission, as tests for indirect effects help researchers and practitioners understand the potential mechanisms driving an observed relationship between two variables. This information, then, can help constituents implement strategies to enhance the conditions that are likely to increase student persistence.

Based on these points, our finding that most of the relationship between perceived quality of student–faculty interactions and persistence occurred indirectly through satisfaction with college is especially important. As Astin (1984) noted nearly four decades ago, "interaction with faculty is more strongly related to satisfaction with college than any other type of involvement or, indeed, any other student or institutional characteristic" (p. 525). Given this point, coupled with the robust research base reviewed earlier linking student–faculty interactions and student satisfaction, it is unsurprising that those students who reported having higher quality interactions with faculty were more satisfied with the college experience. Similarly, our finding that those who were more satisfied with college were more likely to persist is also consistent with other research (which examines the influence of effective instructional approaches) on persistence to the second year (Pascarella et al., 2008; Pascarella et al., 2011). However, our study moves beyond other research by exploring not only how the quality of student–faculty interactions influence persistence, but it also considers the extent to which this relationship occurs indirectly through satisfaction with college.

The results of our investigation provide support for Tinto's model of student departure. Namely, even in the presence of a battery of potential confounders, our indicator of academic and social integration (students' perceptions of quality interactions with

faculty) increased the odds of persistence to the second year, and this relationship largely occurred indirectly through satisfaction with college (Kuh et al., 2006; Spady, 1971; Tinto, 1975, 1993). This finding addresses a shortcoming in the student–faculty interactions literature by providing some insight into how these important experiences relate to student persistence. Also important, net of a battery of control measures including precollege measures, institution type, and college experiences, student perceptions of quality faculty interactions resulted in a roughly 3% increase the probability of persisting to the second year. Though this may initially appear to be a small increase, it is important to remember 92% of the sample enrolled in the second year—thus, the upper bounds limit of improvement is only 8%—further underscoring the importance of our findings.

In addition to the support provided to Tinto's theoretical model, it is important to acknowledge the evidence documenting that historically underserved students are less likely to persist and less likely to report positive interactions with faculty compared to their more privileged counterparts (Vetter et al., 2019). Similarly, though some research has suggested that female students are more likely than male students to seek and report positive interactions with faculty, other research has suggested that female students are less likely to report interacting with faculty and are thus less likely to persist relative to their male counterparts (cf. Griffin et al., 2022; Komarraju et al., 2010). Despite this evidence, the findings from our study suggested that the influence of the quality of student–faculty interactions on persistence did not vary by sex or race/ethnicity.

Implications for Policy, Practice, and Future Research

Results from this study also provide implications for institutional policy and practice. This study's results revealed the importance of student–faculty interactions in contributing to students' satisfaction with their college experience, and that this increased satisfaction can ultimately increase one's likelihood of persistence. As colleges and universities in the United States face nontrivial enrollment management challenges in an era of increasing institutional competition (Howell et al., 2021; Labaree, 2017), higher education leaders should consider incorporating into their strategic planning initiatives research-based methods for improving the quality of student–faculty interaction, student satisfaction, and ultimately persistence.

College and university institutional leaders focused on improving student persistence should consider ways to improve the quality of students' interactions with college faculty (Cox et al., 2010; Sax et al., 2005). For example, departmental leaders might consider having discussions at faculty meetings about ways to improve the quality of interactions between students and faculty, highlighting the importance of student–faculty relationships and offering opportunities for faculty to discuss ways to improve these experiences. Institutional leaders should also consider ways to provide additional training, support, and recognition to faculty and teaching assistants related

to improving the quality of student–faculty interactions. Training programs for faculty should consider ways to thoughtfully address issues of difference, bias, and discrimination in these interactions, in order to ensure fair and equitable experiences between students and faculty. Institutions should also consider ways to encourage high-quality student–faculty interactions in online and distance education modalities, particularly as these instructional methods become more prominent on college and university campuses. Related, given the evidence that academic programming (e.g., instruction designed to help students transition to college through enhancing the extent to which they interact with faculty and peers) prior to entering higher education might help students transitioning to college more deeply connect with faculty, institutions should endeavor to encourage these opportunities (van Herpen et al., 2020). By focusing on improving the quality of student–faculty interactions, institutions may be able to foster overall student satisfaction, and in turn, persistence.

Results from this study offer one potential pathway toward improving persistence, particularly from the first to the second year of college, which is an especially critical point during which many students leave their institutions (Reason et al., 2006). Student experiences in the first year of college can help to establish expectations for students about student–faculty interactions in higher education and can help students integrate more fully into their college and university environments (Tinto, 1993). The first year of college offers institutions the opportunity to facilitate interactions between students and faculty that can help students develop sustained relationships with faculty (Guzzardo et al., 2021; Trolian et al., 2022) which may, in turn, lead to their success and persistence in college.

Despite evidence that has documented how student–faculty interactions might differ by sex and race/ethnicity, the results from this study suggest that the relationship between the quality of student–faculty interaction and persistence does not vary by these student background characteristics. Though this finding is encouraging in that it suggests the quality of student–faculty interactions positively influences persistence decisions irrespective of sex or race/ethnicity, it is important for institutions to continue to find ways to do more to demonstrate their commitment to enhancing the quantity and quality of the relationships between faculty and students—especially those from historically marginalized backgrounds (Means & Pyne, 2017; Smith et al., 2017; Vetter et al., 2019).

Our findings suggest that institutional leaders should consider ways to encourage student–faculty interaction and to create conditions to enhance the likelihood that students have positive perceptions of these interactions. Ways to enhance perceptions of quality in these interactions include emphasizing a sense of approachability and encouraging meetings during office hours to discuss post-graduation plans, for example (Alderman, 2008; Cox et al., 2010). Colleges and universities should offer training and resources for faculty related to interacting with and supporting students inside and outside of their classrooms, and they should also consider ways to incentivize these interactions. For example, faculty development centers might offer resources

or workshops for faculty and instructors that are aimed at improving student–faculty interactions, and institutions might develop faculty recognition programs or awards for outstanding advising, mentoring, or engagement with students. Researchers hypothesize that students' perceptions of the quality of interactions with faculty might occur in part from subtle cues such as a professor's tone of voice, facial expressions, level of instructional organization, and the way in which they convey to students the importance of office hours (Cox et al., 2010). Based on this information, higher education institutions should emphasize opportunities for faculty to develop these dimensions of effective instruction and interaction with students and provide recognition to faculty who demonstrate commitment to these types of activities (Hénard & Roseveare, 2012).

Leaders at departmental and institutional levels should also regularly assess students' satisfaction with the quality of their interactions with faculty, thereby providing opportunities for student feedback and thus improving the quality of these interactions (Tinto, 1993). These assessments should occur with regular frequency and should consider both classroom and non-classroom interactions between students and faculty. For example, assessments might evaluate the perceived quality of student–faculty interactions within classroom contexts, by including additional questions on end-of-term course evaluations. Assessments might also include evaluation of the quality of student–faculty interactions outside of the classroom, such as advising, mentoring, undergraduate research, or other settings (Kim & Sax, 2017). Tinto (1993) noted that "Though prior dispositions and attributes may influence the college career and may, in some cases, lead directly to departure, their impact is contingent on the quality of individual interactions with other members of the institution" (p. 45), suggesting that improvement in the quality of these experiences may help to improve student persistence. Evidence also suggests that students tend to share with fellow classmates their perceptions regarding the quality of their interactions with faculty. This information, in turn, encourages more student–faculty interaction among students who otherwise may not have initiated contact with faculty on their own. Related, when faculty are teaching, they should reiterate their availability and desire to meet with students outside the classroom, thereby promoting the likelihood for and quality of non-classroom interaction (Alderman, 2008; Cox et al., 2010). By ensuring that students experience high-quality interactions with faculty during college, institutional leaders can help to support higher levels of student satisfaction, and in turn, student persistence.

The results of this study also evoke several recommendations for future research. First, researchers should consider additional ways to examine the context and quality of students' interactions with faculty. Prior research has commonly focused on the frequency of students' interactions with faculty, rather than focusing on the context and quality of these experiences. Researchers should consider ways to more fully measure the quality of students' interactions with faculty, coupled with their satisfaction with these interactions, to understand these important student experiences more thoroughly. The development of measures of student–faculty interaction quality can help researchers better understand the varying dimensions of quality and ways that quality in these interactions might be improved. Second, researchers should

continue to pursue methods that examine student–faculty interactions and their influence on college outcomes using longitudinal and multi-institutional data sets. By examining student–faculty interactions with broader samples and using longitudinal data, researchers can draw more generalizable conclusions about the efficacy of these experiences and their relations to college outcomes, which has the potential to enhance our understanding of how student–faculty interactions uniquely contribute to student learning and outcomes in higher education. The use of broader student samples may also help to illuminate differences in the quality of student–faculty experiences of students with varying background characteristics, such as race/ethnicity, socioeconomic status, or gender identity. Third, researchers should consider ways to examine the quality of students' experiences with faculty through non-quantitative research methods, where qualitative and mixed methods approaches might provide additional insights into the mechanisms of high-quality student–faculty experiences. Finally, researchers should continue to explore the mechanisms through which student–faculty interactions contribute to student success and college outcomes. As researchers begin to understand these mechanisms more fully, they can offer clearer recommendations to colleges and universities interested in improving institutional policy and practice that contribute to various aspects of student success, such as persistence—and ultimately—degree completion.

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