Innovative Higher Education (2021) 46:111–131
https://doi.org/10.1007/s10755-020-09529-3

Shaping Students' Career Attitudes toward Professional Success: Examining the Role of Student-Faculty Interactions

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Accepted: 16 October 2020 / Published online: 7 November 2020

Abstract
This study examined the relationship between student-faculty interaction in college and students' fourth-year career attitudes toward professional success. Results suggest that some interactions with faculty, such as frequency of student-faculty interaction, are positively associated with students' fourth-year career attitudes toward professional success. Other interactions, such as personal discussions with faculty and research with a faculty member, are negatively associated with certain attitudes about professional success such as students' desire to make a lot of money. These mixed findings suggest that faculty may have a role to play in shaping students' career attitudes, but that interactions with faculty, depending on the type and context of the interaction, may encourage or discourage students' attitudes regarding professional success.

Keywords Student-faculty interactions · Career attitudes · Higher education

Career-related outcomes of attending a college or university are a central part of the ongoing national debate about the purposes, costs, and value of higher education in the U.S. (Epstein & McKinnon-Crowley, 2020; Renn & Reason, 2013). Students receive messages that they should focus on future employment early in their college or university careers, and to make college attendance worthwhile, they should pursue academic majors that are career-focused and perceived as more lucrative (Vespia, Freis, & Arrowood, 2018). Indeed, students' interests in being "well off

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financially" have increased over time (Allan, Owens, & Duffy, 2017; Eagen et al., 2014). Higher education leaders also face pressures as they navigate an environment of increasing accountability for students' career outcomes (Vespia et al., 2018). In this current climate, a better understanding of the college experiences that shape students' career attitudes can assist institutions in better meeting students' needs. The present study centers on an important experience within the U.S. college and university environment—interactions between faculty members and students—and how they have the potential to shape students' career attitudes toward professional success during college.

Attending a college or university shapes U.S. students' careers over the course of their lifetimes, as employment outcomes remain one of the most tangible results of obtaining college degree, with a near 20% increase in lifetime earnings over high school graduates (Hout & Janus, 2011; Renn & Reason, 2013). Researchers have studied the experiences that help explain how students change during college, as well as college experiences that influence students' career aspirations and attitudes (for reviews see Mayhew, Rockenbach, Bowman, Seifert, & Wolniak, 2016; Pascarella & Terenzini, 2005). However, questions remain about what types of experiences may shape students' career attitudes, and more specifically, the role that faculty may play in shaping these attitudes and aspirations. This study addresses this gap in the literature by examining the relationship between student-faculty interactions during college and changes in students' career attitudes toward professional success. Additionally, this study takes an innovative approach to this issue by considering whether specific types of student-faculty interactions are associated with students' fourth-year career attitudes. While previous research has considered the link between faculty interactions and career attitudes, most studies have focused on single-item measures of student-faculty interactions or career attitudes and few studies have used longitudinal data to examine changes in career attitudes toward professional success during college. This study attempts to address some of these limitations of prior studies by using five measures of student-faculty interactions to examine changes in several measures of students' career attitudes toward professional success across four years of college, using a pretest to control for students' precollege career attitudes.

Students' in-class and out-of-class interactions with faculty have been positively associated with a range of college outcomes (Kim & Sax, 2017). Students may interact with faculty to seek guidance about academic course selection, to request clarity about course assignments, or to engage in undergraduate research. Additionally, seeking career-related advice may be one of the main reasons for students to interact with a faculty member (Cotten & Wilson, 2006). College and university faculty have an important role to play in helping students in selecting an academic curriculum or major and may subsequently help to shape a student's future career path. This study examines the connection between several types of student–faculty interactions in college and students' senior-year career attitudes toward professional success using longitudinal data from the Wabash National Study of Liberal Arts Education (WNS).

Student-Faculty Interactions

Thiele (2016) referred to student-faculty interactions as the "academic core of the university experience" (p. 334). Indeed, student-faculty interactions have been studied extensively in higher education (Cox & Orehovec, 2007; Kim & Lundberg, 2016; Kim & Sax, 2017). Research on student-faculty interactions has suggested a positive association with academic outcomes, personal development, and academic self-efficacy (Kim & Sax, 2014; Komarraju, Musulkin, & Bhattacharya, 2010), sense of belonging (Cotten & Wilson, 2006), cognitive

gains and satisfaction (Kuh & Hu, 2001), educational aspirations (Trolian & Parker, 2017), and learning (Lundberg & Schreiner, 2004).

Through extensive reviews, Pascarella and Terenzini (2005) and Mayhew et al. (2016) reported that both formal and informal student-faculty interactions were positively associated with college outcomes including cognitive skills, intellectual growth, attainment, and career choice. These authors concluded that both the frequency and quality of student-faculty interactions is important in shaping college student outcomes. Researchers have noted that the frequency of student-faculty interactions increases during college but is mediated by the amount of individual student effort (Kuh & Hu, 2001). More contact between faculty and students is generally associated with an enhanced educational experience during college (Kim & Sax, 2009). Other researchers have suggested that, whether personal or academic, the quality of relationships students have with faculty is positively associated with academic performance (Anaya & Cole, 2001) and academic motivation (Trolian, Jach, Hanson, & Pascarella, 2016). Kezar and Maxey (2014) acknowledged the impact student-faculty interactions have on learning and educational experiences, specifically noting the potential for faculty to positively affect students' college experiences and career paths.

Students' Career Attitudes

A variety of studies have considered career attitudes with respect to students' undergraduate experiences. Research on career attitudes and college experiences has found that students who work for pay during college have greater satisfaction with the overall college experience when their work is linked to both academic and career goals (Broughton & Otto, 1999; Derous & Ryan, 2008). Literature on college and university students' career attitudes has considered a host of influential factors. Previous research has identified personal factors, such as interests and work-relevant experiences, as well as contextual factors, including financial realities and sources of social support, that served as barriers and supports for students' career choices (Lent et al., 2002). Taking a career development course has been shown to predict graduating with a higher number of total credits and grade point average (Hansen, Jackson, & Pedersen, 2017). Additionally, students' employment experiences in college, including on-campus and off-campus employment and internships, have been associated with changes in students' career attitudes (Trolian, Jach, & Snyder, 2018).

Studies in the psychology literature have examined the basis for college student attitudes about careers. Dahling and Thompson (2012) found that students who engaged in maximization, defined as a "generally dysfunctional (…) decision-making style that involves seeking the single best option when making a choice" (p. 278), reported less satisfaction with their college major and lower career decision self-efficacy. In a study on finding a professional calling, Hunter, Dik, and Banning (2010) identified themes of "guiding force" (p. 181), personal fit, meaning making, and altruism that contribute to students' perceptions of finding a professional calling. Another study considered the relationship between career adaptability (defined as concern, control, curiosity, and confidence) with academic satisfaction (Duffy, Douglass, & Autin, 2015). Findings suggested that higher levels of career adaptability were associated with higher academic satisfaction. Together, the previous literature on students' career attitudes has considered personal, psychological, and contextual factors.

Student-Faculty Interactions and Students' Career Attitudes

Some prior research has examined student-faculty interactions and career attitudes. Researchers have suggested that student-faculty interactions about students' career plans can be

beneficial for overall career development (Komarraju et al., 2010). Thiele (2016) described career-related interactions between faculty and students as an important source of social capital (Bourdieu, 1984), as faculty may provide connections and networking, write letters of recommendation. and help students secure internships in their chosen field (Chambliss & Takacs, 2014). Cotten and Wilson (2006) also noted that students reported career-related matters as one of the top reasons to interact with faculty. In a recent qualitative study (Grantham, Robinson, & Chapman, 2015), student discussions with faculty about careers was identified as a key theme, where students most frequently valued discussions with faculty members about their academic careers. However, the literature on student-faculty interactions and students' career attitudes remains limited and has not examined the context of students' interactions with faculty.

Some researchers have also examined the relationship between students' career attitudes and specific demographic factors. In an examination of career-related guidance received from mathematics professors, men received more career guidance than women, with male students who had male professors receiving the most guidance (Blondeau & Awad, 2017). Previous studies have identified teachers and professors as an important source of encouraging messages about future careers, with first-generation students reporting that teachers and professors as the most influential, even when compared to familial support (Powers & Myers, 2017).

Purpose of the Study

This study seeks to add to these important bodies of scholarship by considering whether several aspects of interactions with faculty have the potential to influence students' development of career attitudes toward professional success in college. The following research question guided this study: Is there a relationship between students' interactions with faculty during college and students' fourth-year career attitudes toward professional success? Specifically, this study examines the relationship between five aspects of student-faculty interaction in college, which examine varying contexts of these interactions: frequency of interaction, quality of interaction, student-faculty research, discussing personal problems or concerns with faculty, and perceptions of faculty willingness to spend time outside of class. This study also considers five aspects of students' career attitudes toward professional success that assess the importance of: obtaining recognition from colleagues, having administrative responsibility for the work of others, working in a prestigious occupation, making a lot of money, and becoming successful in a business of one's own—in order to consider the role that faculty may play in shaping students' career attitudes during college.

Theoretical Framework

As this study considers contextual and individual characteristics, Super's Developmental Self-Concept Theory (Super, 1953, 1963, 1980) was used as a guiding framework. According to Super's theory, an individual's self-concept shapes career development as individuals choose occupations and career paths that reflect their values and beliefs about themselves. Such values and beliefs, developed over time within specific contexts, contribute to humans' understandings of their own constructions of self over the course of their lives. While fluid and often changing, social scientists believe that such self-referential cognitions, often referred to as self-concept or identity, are used to regulate, guide, and evaluate their thoughts and behaviors across contexts, including the vocation and careers (Vondracek & Porfeli, 2011). Super

(1953,1963, 1980) grounds his definition of self-concept in class psychological life-stage models, with particular emphasis on an individual understanding of their roles throughout their life.

Super details five phases of development toward self-concept: growth, exploration, establishment, maintenance, and decline. Super's phases sequentially correspond to stages of the human lifespan. The growth phase includes development of self-concept and movement from play toward a work orientation and occurs in adolescence. The exploration phase includes further development of self-concept, exploration of career values and options, and the narrowing of occupational choices and takes place in young adulthood. The establishment phase involves solidifying one's occupational choice and advancing within a particular career field and occurs in early and middle adulthood. During the maintenance phase in middle and later adulthood, individuals continue to establish work patters and to develop non-occupational goals. Finally, the decline phase entails disengagement from one's career toward retirement and occurs in late adulthood. Super's theory implies individual change over time, suggesting malleability in shaping one's self-concept and career values and beliefs.

This study is particularly concerned with the exploration phase of Super's theory (Super, 1953, 1963). In this phase, young adults, who are often university-aged, have opportunities to explore and examine career options and values. At this stage, individuals' self-concept and identity development are often influenced by educational experiences that engage them in career learning and decision-making. This study considers students' interactions with faculty during college and whether these experiences have the potential to help shape students' development of career attitudes toward professional success that may shape their self-concept and career decisions.

Methods

Data and Sample

Data are from the Wabash National Study (WNS), a longitudinal, multi-institutional study of college experiences and outcomes in the United States. The WNS has three cohorts of student participants from a diverse set of colleges and universities across the U.S., including two-year and four-year institutions, public and private institutions, historically Black colleges and universities, and single-sex and coeducational institutions. WNS colleges and universities include a range of institutions from different regions across the United States, and WNS institutions also varied by characteristics such as size, selectivity, control, and patterns of student residence.

The WNS collected data from student participants at three separate assessment points. At the beginning of students' first year of college, participants completed a survey asking them about their backgrounds and prior educational experiences and completed a series of assessment instruments designed to measure several college outcomes. This first-year set of assessments was designed to serve as a precollege pretest for the longitudinal WNS. At the end of students' first year of college, participants completed a set of survey instruments asking them about their college experiences and repeated the same series of college outcomes assessment instruments. This end-of-first-year set of assessments was designed to serve as a first-year posttest for the WNS. Finally, at the end of students' fourth year of college, participants again completed a set of survey instruments asking them about their college experiences and

repeated the series of college outcomes assessment instruments for a third time. This end-of-fourth-year set of assessments was designed to serve as a fourth-year posttest for the WNS. This study uses data from the first and third assessment points to consider changes over four years of college.

Three cohorts of students participated in the WNS over six years. The first cohort participated from 2006 to 2010 (2010 Cohort), the second cohort participated from 2007 to 2011 (2011 Cohort), and the third cohort participated from 2008 to 2012 (2012 Cohort). Participants included first-year, full-time undergraduates at each WNS institution. The sample used in this study includes students from all three WNS cohorts who attended one of the four-year colleges and universities in the WNS, which included seven research universities, nine regional universities, and 30 liberal arts colleges. After narrowing the sample to those students who attended a four-year college or university and using listwise deletion to account for missing data, useable data was available for 3437 student participants.

Table 1 presents descriptive statistics for all variables. The student sample was 58% female and 42% male. Of the sample's participants, 6% were Asian/Asian American/Pacific Islander, 5% were Black/African American, 5% were Latinx/Hispanic, and 84% were White/Caucasian. The sample was comprised of 24% first-generation students and 76% continuing-generation students. For institutional type, 61% of the sample attended a liberal arts college, 15% attended a regional college or university, and 24% attended a research university. Of the sample's participants, 28% majored in a STEM field; 50% majored in an arts, humanities, or social sciences field; and 22% majored in a professional field.

Variables

Dependent Variables Dependent variables were items measuring students' career attitudes toward professional success, as measured at the end of the fourth year of college, where students were asked to rate how important it was to: obtain recognition from colleagues for contributions to one's field of expertise; have administrative responsibility for the work of others; work in a prestigious occupation; make a lot of money; and become successful in a business of one's own. These measures examine students' values about work, which reflect rewards and outcomes of work that students may regard as important or worth pursuing (Hansen & Wiernik, 2018). Each of the five items was considered individually, and a scaled measure of all items—the WNS Professional Success Scale (5-item scale; $\alpha = 0.76$)—was also considered, for a total of six dependent variables. For more information on the WNS Professional Success Scale, see Pascarella et al. (2007).

Independent Variables This study used five indicators of students' self-reported experiences with faculty, as measured at the end of the fourth year of college, to measure student-faculty interaction, including: frequency of faculty interaction (4-item scale; $\alpha = 0.70$); perceived quality of student-faculty interaction (5-item scale; $\alpha = 0.85$); whether or not a student worked on a research project with a faculty member (binary item); whether or not a student had discussed a personal problem or concern with a faculty member (binary item); and perceptions that faculty were willing to spend time outside of class to discuss issues of interest and importance to students (Likert-scale). These measures span both classroom and non-classroom interactions with faculty and examine students' perceptions of the frequency, quality, and context of their interactions with faculty in college.

Table 1 Descriptive Statistics

Variable	Mean	Standard Deviation	Range
Background and Precollege Characteristics			
Sex: Male (vs. Female)	0.42	0.49	0.00–1.00
Race/Ethnicity: Asian/Pacific Islander (vs. White/Caucasian)	0.06	0.24	0.00–1.00
Race/Ethnicity: Black/African American (vs. White/Caucasian)	0.05	0.22	0.00–1.00
Race/Ethnicity: Hispanic/Latino/a (vs. White/Caucasian)	0.05	0.22	0.00–1.00
Parent Education: Bachelor's Degree or Higher (vs. Less than Bachelor's)	0.76	0.43	0.00–1.00
Precollege Academic Ability (ACT or Equivalent Score)	0.00	1.00	−4.41 – 2.05
Precollege Academic Motivation	0.00	1.00	−4.43 – 2.53
Precollege Educational Aspirations	0.00	1.00	−3.14 – 1.30
High School Involvement	0.00	1.00	−5.05 – 2.35
Precollege Career Attitudes			
Professional Success Scale (Precollege)	0.00	1.00	−2.22 - 1.52
Recognition from Colleagues for Contributions (Precollege)	0.00	1.00	−2.24 - 1.52
Administrative Responsibility for the Work of Others (Precollege)	0.00	1.00	−1.44 - 1.97
Working in a Prestigious Occupation (Precollege)	0.00	1.00	−1.51 - 1.49
Making a Lot of Money (Precollege)	0.00	1.00	−1.59 - 1.52
Becoming Successful in a Business of One's Own (Precollege)	0.00	1.00	−1.28 - 1.61
Institutional and Environmental Characteristics			
Institutional Type: Regional University (vs. Liberal Arts College)	0.15	0.36	0.00–1.00
Institutional Type: Research University (vs. Liberal Arts College)	0.24	0.43	0.00–1.00
Barron's Institutional Selectivity Score	0.00	1.00	−2.09 – 1.35
Institutional Size	0.00	1.00	−0.74 - 3.42
College Experiences and Measures of Student Effort			
Average College Grades	0.00	1.00	−4.11 - 1.22
STEM Major (vs. Professional Major)	0.28	0.45	0.00–1.00
Arts, Humanities, Social Sciences Major (vs. Professional Major)	0.50	0.50	0.00–1.00
Employment: Hours Worked On-Campus	0.00	1.00	−0.99 - 3.74
Employment: Hours Worked Off-Campus	0.00	1.00	−0.50 - 3.95
Hours of Cocurricular Involvement	0.00	1.00	−1.15 - 3.19
Hours Spent Socializing/Relaxing	0.00	1.00	−1.89 - 2.48
Hours Spent Preparing for Class	0.00	1.00	−2.14 - 1.84
Positive Interactions with Peers	0.00	1.00	−5.52 - 1.24
Academic Challenge/Effort	0.00	1.00	−3.61 - 3.06

Table 1 (continued)

Variable	Mean	Standard Deviation	Range
Student-Faculty Interaction Measures			
Frequency of Student-Faculty Contact	0.00	1.00	−2.41 - 2.21
Quality of Student-Faculty Contact	0.00	1.00	−3.85 - 1.27
Research with Faculty	0.36	0.48	0.00–1.00
Personal Discussion with Faculty	0.63	0.48	0.00–1.00
Out-of-Class Time Spent with Faculty	0.00	1.00	−4.22 - 0.88
Professional Success Scale (PSS)			
PSS – Time 1	0.00	1.00	−2.22 - 2.26
Obtain Recognition – Time 1	0.00	1.00	−2.24 – 1.52
Supervise Others – Time 1	0.00	1.00	−1.44 – 1.97
Prestigious Occupation – Time 1	0.00	1.00	−1.51 – 1.45
Make Money – Time 1	0.00	1.00	−1.60 – 1.52
Business of One's Own – Time 1	0.00	1.00	−1.28 – 1.61
PSS – Time 3	0.00	1.00	−1.94 – 2.40
Obtain Recognition – Time 3	0.00	1.00	−1.88 – 1.47
Supervise Others – Time 3	0.00	1.00	−1.21 – 1.86
Prestigious Occupation – Time 3	0.00	1.00	−1.31 – 1.57
Make Money – Time 3	0.00	1.00	−1.39 – 1.71
Business of One's Own – Time 1	0.00	1.00	−1.05 – 1.75

All continuous variables are standardized. $n = 3437$

Control Variables The longitudinal design of the WNS allowed us to statistically control for a host of factors that had the potential to confound the relationships examined in the current study. Pascarella (1985) offered a model of student change during college, suggesting several potential influences that should be controlled for when examining the relationship between college experiences and changes in students' outcomes or attitudes during college. These influences include students' background characteristics, institutional contexts and environments, interactions with agents of socialization, and the quality of student effort all have the potential to influence student change in college and subsequent college outcomes. Pascarella's framework guided the selection of control variables for the current study.

Background characteristics (measured at the beginning of students' first year of college) included: students' sex, race/ethnicity, parental education, precollege academic ability (ACT or equivalent score), precollege academic motivation (8-item scale; $\alpha = 0.74$), precollege educational aspirations, and degree of involvement in high school activities (7-item scale; $\alpha = 0.58$). College/university institutional characteristics (measured at the beginning of students' first year of college) included: institutional type (liberal arts college, research university, or regional college/university), selectivity (Barron's selectivity index), and size (total undergraduate population). Other college experiences, interactions with agents of socialization, and measures of student effort (measured at the end of students' fourth year of college) included: students' average grades during college, college major (STEM major; arts, humanities, or social sciences major; or professional major), hours spent engaged in paid employment, hours spent engaged in cocurricular activities, hours spent socializing and relaxing, hours spent preparing for class, the degree of students' positive interactions with peers (8-item scale; $\alpha = 0.87$), and the degree of students' academic effort and engagement in college (11-item scale; $\alpha = 0.66$). Finally, the longitudinal design of the WNS allowed the researchers to control for a precollege measure of each dependent variable, taken at the beginning of the first year of college, isolating changes in career attitudes to the four years of college examined. Please see Appendix 1 Table 3 for a complete list of variables and their definitions.

Analyses

The researchers used ordinary least-squares (OLS) regression to perform analyses. In Model I, the aggregated, five-item Professional Success Scale was regressed on all variables measuring students' interactions with faculty and control variables.. In Models II-VI, each individual professional career attitude was regressed on all variables measuring students' interactions with faculty and control variables. Continuous variables were standardized prior to analyses in order to provide a standardized interpretation of regression coefficients (i.e., interpretation of coefficients in terms of standard deviation change), and all models used a clustering command (SVY in STATA) to account for the nested nature of the data, as students in the sample were nested within institutions. Additionally, dummy variables were added to each model to account for membership in one of the three WNS cohorts (2010, 2011, or 2012). Models were also examined for potential multicollinearity between independent variables, which can create redundancy within statistical models and lead to unreliable regression estimates. To evaluate potential multicollinearity within each model, we calculated Variance Inflation Factors (VIFs), which ranged from 1.09–2.22, well below recommended VIF limits.

Results

Table 2 presents regression estimates of the association between several measures of students' interactions with faculty in college and students' career attitudes toward professional success at the end of four years of college. In the presence of a host of control variables, several measures of student-faculty interaction were positively associated with students' fourth-year career attitudes. Regression coefficients are discussed in terms of standardized effect sizes, and range in size from small effects (0.05–0.07), to medium effects (0.09–0.12), to large effects (0.19), according to recommendations made by Mayhew et al. (2016) about standardized effect sizes in college impact research when a robust multivariate model is utilized.

Increased frequency of student-faculty contact was positively associated, on average, with the desire to obtain recognition from colleagues for contributions to one's field of expertise ($B = 0.12$; $p < 0.001$), have administrative responsibility for the work of others ($B = 0.11$; $p < 0.001$), work in a prestigious occupation ($B = 0.07$; $p < 0.001$), make a lot of money ($B = 0.05$; $p < 0.01$), and become successful in a business of one's own ($B = 0.05$; $p < 0.05$). Additionally, increased frequency of student-faculty contact was positively associated, on average, with the overall PSS ($B = 0.10$; $p < 0.05$). Effect sizes for frequency of student-faculty contact ranged from small (0.05–0.07) to medium (0.10–0.12).

Higher reported quality of student-faculty contact was positively associated, on average, with the desire to obtain recognition from colleagues for contributions to one's field of expertise ($B = 0.10$; $p < 0.001$), but was negatively associated, on average, with the desire to have administrative responsibility for the work of others ($B = -0.05$; $p < 0.05$). Quality of student-faculty contact was not associated with the desire to work in a prestigious occupation, make a lot of money, or become successful in a business of one's own, and it was also not associated with the overall PSS. Effect sizes for quality of student-faculty contact ranged from small (0.05) to medium (0.10).

Engaging in research with a faculty member was positively associated, on average, with the desire to obtain recognition from colleagues for contributions to one's field of expertise ($B = 0.19$; $p < 0.001$), but was negatively associated, on average, with the desire to make a lot of money ($B = -0.09$; $p < 0.01$). Research with a faculty member was not associated with the desire to have administrative responsibility for the work of others, work in a prestigious occupation, or become successful in a business of one's own, and it was also not associated with the overall PSS. Effect sizes for research with a faculty member ranged from medium (−0.09) to large (0.10–0.19).

Discussing a personal problem or concern with a faculty member was negatively associated, on average, with the desire to make a lot of money ($B = -0.09$; $p < 0.01$). Discussing a personal problem or concern with a faculty member was not associated with the desire to obtain recognition from colleagues for contributions to one's field of expertise, have administrative responsibility for the work of others, work in a prestigious occupation, or become successful in a business of one's own, and it was also not associated with the overall PSS. The effect size for discussing a personal problem or concern was medium overall (−0.09).

Finally, faculty willingness to spend time outside of class to discuss issues of interest and importance to students was negatively associated, on average, with the desire to work in a prestigious occupation ($B = -0.05$; $p < 0.05$). Faculty willingness to spend time outside of class was not associated with the desire to obtain recognition from colleagues for contributions to one's field of expertise, have administrative responsibility for the work of others, make a lot of money, or become successful in a business of one's own, and it was also not associated with

Table 2 Regression Estimates of the Relationship Between Five Measures of Student-Faculty Interaction and Students' Fourth-Year Student Career Attitudes

	Model I (PSS)		Model II (Recog)		Model III (Admin)		Model IV (Prestige)		Model V (Money)		Model VI (Business)	
Variable	**Coef. (S.E.)**		**Coef. (S.E.)**		**Coef. (S.E.)**		**Coef. (S.E.)**		**Coef. (S.E.)**		**Coef. (S.E.)**	
Background and Precollege Characteristics												
Sex: Male	0.12 (0.04)	**	−0.06 (0.04)		0.15 (0.04)	***	0.08 (0.04)	*	0.06 (0.04)		0.23 (0.04)	***
Race/Ethnicity: Asian/Pacific Islander	0.17 (0.05)	**	0.19 (0.07)	**	0.20 (0.07)	**	0.17 (0.04)	***	0.09 (0.05)		0.12 (0.07)	
Race/Ethnicity: Black/African American	0.02 (0.08)		0.03 (0.10)		0.10 (0.09)		0.05 (0.12)		0.20 (0.10)		0.17 (0.12)	
Race/Ethnicity: Hispanic/Latinx	−0.05 (0.06)		0.09 (0.07)		−0.04 (0.06)		−0.05 (0.05)		−0.08 (0.07)		−0.08 (0.07)	
Parent Education: Bachelor's Degree or Higher	0.02 (0.04)		0.03 (0.04)		−0.04 (0.04)		0.02 (0.04)		−0.02 (0.04)		0.03 (0.04)	
Precollege Academic Ability	−0.10 (0.02)	***	−0.04 (0.02)	*	−0.17 (0.02)	***	−0.09 (0.03)	**	−0.05 (0.02)	*	−0.10 (0.02)	***
Precollege Academic Motivation	−0.01 (0.02)		0.02 (0.02)		0.02 (0.02)		0.00 (0.02)		0.02 (0.02)		−0.01 (0.02)	
Precollege Educational Aspirations	0.02 (0.01)		0.05 (0.02)	**	−0.02 (0.02)		0.05 (0.02)	**	0.02 (0.01)		−0.01 (0.01)	
High School Involvement	−0.02 (0.02)		−0.04 (0.02)	*	0.00 (0.02)		0.01 (0.02)		0.02 (0.02)		−0.01 (0.02)	
Precollege Career Attitudes												
Professional Success Scale (Precollege)	0.52 (0.01)											
Recognition from Colleagues for Contributions (Precollege)			0.27 (0.09)	***								
Administrative Responsibility for the Work of Others (Precollege)					0.28 (0.02)	***						
Working in a Prestigious Occupation (Precollege)							0.45 (0.02)	***				
Making a Lot of Money (Precollege)									0.51 (0.02)	***		
Becoming Successful in a Business of One's Own (Precollege)											0.44 (0.02)	***
Institutional and Environmental Characteristics												
Institutional Type: Regional University (vs. Liberal Arts)	0.10 (0.13)		0.12 (0.08)		0.05 (0.09)		0.18 (0.13)		0.07 (0.11)		−0.02 (0.09)	
Institutional Type: Research University (vs. Liberal Arts)	0.16 (0.09)		0.01 (0.09)		0.25 (0.07)	***	0.21 (0.10)	*	0.16 (0.08)		0.06 (0.04)	
Barron's Institutional Selectivity Score	0.06 (0.04)		−0.01 (0.04)		0.03 (0.03)		0.07 (0.03)	*	0.06 (0.04)		0.05 (0.03)	
Institutional Size	−0.02 (0.03)		−0.01 (0.03)		−0.03 (0.02)		−0.01 (0.03)		−0.02 (0.02)		−0.01 (0.01)	
College Experiences and Measures of Student Effort												
Average College Grades	0.01 (0.02)		0.07 (0.02)	**	−0.03 (0.02)		0.02 (0.02)		−0.04 (0.02)		−0.03 (0.01)	

Table 2 (continued)

	Model I (PSS)		Model II (Recog)		Model III (Admin)		Model IV (Prestige)		Model V (Money)		Model VI (Business)	
STEM Major (vs. Professional Major)	−0.03 (0.05)		−0.03 (0.05)		−0.13 (0.06)	*	0.04 (0.05)		−0.01 (0.06)		−0.07 (0.06)	
Arts, Humanities, Social Sciences Major (vs. Professional Major)	−0.01 (0.05)		−0.01 (0.04)		−0.06 (0.05)		0.01 (0.05)		−0.02 (0.05)		−0.02 (0.07)	
Employment: Hours Worked On-Campus	−0.04 (0.01)	***	−0.05 (0.02)	***	0.01 (0.01)		−0.05 (0.02)	**	−0.04 (0.02)	*	−0.03 (0.02)	
Employment: Hours Worked Off-Campus	0.04 (0.02)	*	−0.01 (0.02)		0.01 (0.02)		0.04 (0.02)	*	0.06 (0.02)	***	0.05 (0.02)	**
Hours of Cocurricular Involvement	0.01 (0.01)		−0.04 (0.02)	*	0.06 (0.02)	***	−0.01 (0.01)		0.01 (0.01)		0.03 (0.02)	
Hours Spent Socializing/Relaxing	0.05 (0.01)	***	0.02 (0.01)		0.02 (0.02)		0.06 (0.02)	***	0.09 (0.01)	***	0.01 (0.02)	
Hours Spent Preparing for Class	−0.06 (0.02)	**	0.02 (0.02)		−0.09 (0.02)	***	−0.04 (0.02)		−0.06 (0.02)	***	−0.08 (0.02)	***
Positive Interactions with Peers	−0.01 (0.02)		0.01 (0.02)		0.03 (0.02)		−0.03 (0.02)		−0.02 (0.02)		−0.02 (0.02)	
Academic Challenge/Effort	0.11 (0.02)	***	0.07 (0.03)	**	0.11 (0.02)	***	0.11 (0.03)	***	0.05 (0.02)	**	0.09 (0.03)	***
Student-Faculty Interaction Measures												
Frequency of Student-Faculty Contact	0.10 (0.02)	***	0.12 (0.02)	***	0.11 (0.02)	***	0.07 (0.02)	***	0.05 (0.02)	**	0.05 (0.02)	*
Quality of Student-Faculty Contact	0.01 (0.02)		0.10 (0.03)	***	−0.05 (0.02)	*	0.02 (0.02)		−0.02 (0.02)		−0.03 (0.03)	
Research with Faculty	−0.01 (0.03)		0.19 (0.03)	***	−0.03 (0.04)		−0.05 (0.04)		−0.09 (0.03)	**	−0.01 (0.04)	
Personal Discussions with Faculty	−0.03 (0.03)		−0.05 (0.04)		0.00 (0.04)		0.00 (0.03)		−0.09 (0.03)	**	0.00 (0.03)	
Out-of-Class Time Spent with Faculty	−0.02 (0.02)		−0.03 (0.02)		0.01 (0.02)		−0.03 (0.02)	*	−0.02 (0.01)		0.00 (0.02)	
R^2	0.41		0.19		0.22		0.30		0.36		0.31	

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$. All continuous variables are standardized. $n = 3437$. Model I: WNS Professional Success Scale (all five career attitude measures combined); Model II: Obtaining recognition from colleagues for contributions to one's field of expertise; Model III: Having administrative responsibility for the work of others; Model IV: Working in a prestigious occupation; Model V: Making a lot of money; Model VI: Becoming successful in a business of one's own

the overall PSS. The effect size for faculty willingness to spend time outside of class was small overall (−0.05).

Limitations

This study and its findings are limited by several factors. First, due to use of a preexisting data set, measures of student-faculty interaction and students' career attitudes were predetermined, and there may be other ways to define and measure these two constructs that were not included in the current study. For example, the WNS career attitude measures focus largely on students' extrinsic career motivations rather than measures of intrinsic career motivation, such as finding personal fulfillment through one's work. These preexisting measures limit our ability to examine a broader range of career attitudes that may be influenced by students' interactions with faculty.

It is important to note that the Professional Success Scale (PSS) employs a neoliberal view of the purpose of higher education because each item on the scale focuses on economically- and individually motivated goals. While current research has argued that there is little agreement on what the employability skills of undergraduate students should be given the lack of consistency across institutions of higher education, policy makers, and employers (Suleman, 2018), literature over the past twenty years has documented the dominance of the neoliberal university model (Kezar, 2004; Labaree, 1997; Slaughter & Rhoades, 2009). Current research has used the PSS as one way of aligning with this paradigm (Trolian et al., 2018). While the PSS is limited in its ability to measure all professional goals of undergraduate students, we use the PSS as one way of examining a dominant view that has been well-documented in the literature (Slaughter & Rhoades, 2009). While beyond the scope of the present study, we agree with Suleman's (2018) call for future research to consider economic and social processes associated with employability and with the popular literature discussion on expanding how professional success ought to be defined by stakeholders (Ostrow, 2014; Skallerup Bessette, 2015).

The four-year institutions that participated in the WNS are not necessarily representative of all four-year colleges and universities in the U.S., and therefore the results of this study may not be generalizable to all colleges and universities. Similarly, students who participated in the WNS were largely White (84%), female (58%), continuing generation (76%), and attended a liberal arts college (61%). This sample composition is not representative of all undergraduate students attending colleges and universities in the United States, and therefore the results of this study may not be generalizable to all populations of students. While we attempted to control for other factors that had the potential to confound our relationships of interest, there may be other factors that we were unable to control for in this study.

Discussion and Implications

Faculty in higher education may understand the importance of interacting with students in terms of their academic goals but may not fully understand the ways in which their interactions, both in and out of the classroom, may influence students' career attitudes. This study used longitudinal data to examine the relationship between five measures of students' interactions with faculty in college and their fourth-year career attitudes toward professional success. While previous research has considered the link between faculty interactions and

career attitudes, most studies have focused on single-item measures of student-faculty interactions or career attitudes and few studies have used longitudinal data to examine changes in career attitudes during college. This study addressed the limitations of prior studies by using five measures of student-faculty interactions to examine changes in several measures of students' career attitudes toward professional success across four years of college, using a pretest to control for students' precollege career attitudes.

Findings from this study support previous research that has suggested the importance of student-faculty interactions during college (Mayhew et al., 2016; Pascarella & Terenzini, 2005). Findings from this study also suggest a relationship between these interactions and students' fourth-year professional and career attitudes toward professional success. However, this study revealed mixed findings in terms of the type and context of each interaction measure and students' career attitudes toward professional success. While some measures of students' interactions with faculty, such as frequency of student-faculty interactions, were positively associated with students' fourth-year career attitudes, other measures, such as personal discussions with faculty and faculty willingness to spend time outside of class, were either not associated or negatively associated with students' career attitudes. These mixed findings suggest that faculty may have a role to play in shaping students' career attitudes, but that students' interactions with faculty, depending on the type and context of the interaction, may both encourage or discourage certain types of career attitudes toward professional success. Our findings build upon previous research by Powers and Myers (2017), who found that encouragement from professors matters in students' vocational aspirations. The results of this study suggest that faculty should be thoughtful, even strategic, when engaging with students, particularly in conversations around career aspirations, and cognizant of the myriad ways in which they may influence students both in and out of the classroom.

Increased frequency of student-faculty contact was positively associated with all five measures of professional success, as well as with the overall PSS. These findings suggest that increased interactions with faculty in college may help to foster students' career attitudes, including students' desire to obtain recognition from colleagues for contributions to their field of expertise, have administrative responsibility for the work of others, work in a prestigious occupation, make a lot of money, and become successful in a business of their own. Higher education institutions interested in encouraging these career attitudes among students should consider ways to promote increased student-faculty contact and may want to consider ways to focus conversations between students and faculty around issues of career interests and pathways. For example, institutions might develop ways to incentivize and recognize faculty members who regularly interact with students outside of class. In addition, institutions of higher education can develop and implement programs around career exploration or career preparation that involve faculty-student interaction.

Higher perceived quality of student-faculty contact was positively associated with the desire to obtain recognition from colleagues for contributions to one's field of expertise but was negatively associated with the desire to have administrative responsibility for the work of others. These mixed findings suggest that the quality of student-faculty interaction may be linked to some types of career attitudes, but that the quality of these interactions may not play a central role in shaping students' career attitudes toward professional success. Further, these findings suggest that quality faculty-student interactions may involve encouragement related to the independent nature of academe in which professors pursue their individual research agenda and gain respect among colleagues within their discipline. Conversely, this focus on independence and collegiality may result in a lack of encouragement (or even discouragement) for

being responsible for the work of others, a tenet of bureaucracy, which is contrary to the ideals of the collegium (Birnbaum, 1988). Higher education institutions should consider ways to improve the overall quality of students' interactions with faculty members but may want to specifically consider ways that the quality of these experiences might be tied to students' career interests and career attitudes.

Engaging in research with faculty was positively associated with the desire to obtain recognition from colleagues for contributions to one's field of expertise but was negatively associated with the desire to make a lot of money. These findings suggest that undergraduate research experiences with faculty in college may foster interest in careers where recognition of contributions may be valued, but where high earnings may not be an important factor. Higher education institutions interested in fostering students' career attitudes may consider ways to link undergraduate research experiences and future career paths. For example, institutions might develop career-related programs that focus on using research skills in one's career or consider ways to more intentionally link undergraduate research experiences with potential academic and non-academic careers.

Discussing a personal problem or concern with a faculty member was negatively associated with the desire to make a lot of money, and perceived faculty willingness to spend time outside of class to discuss issues of interest and importance to students was negatively associated with the desire to work in a prestigious occupation. These findings again suggest that, while discussing personal issues with faculty and faculty willingness to meet with students outside of class, these interactions may not play a central role in shaping students' career attitudes toward professional success, perhaps because these forms of professional success embody the ideals of the neoliberal university (Slaughter & Rhoades, 2009) and are at odds with the drivers behind faculty motivation.

These findings, overall, suggest some potential implications for colleges and universities interested in influencing students' career attitudes. Institutional leaders must consider the types of career attitudes toward professional success that they would like to cultivate among students. Should institutions encourage students: to reach their highest earning potential, develop expertise in their career fields, and/or find a personally rewarding or fulfilling career? As posited by Labaree (1997), education has prioritized these differently over time. By considering the types of career attitudes they hope to cultivate among students, institutional leaders can be more thoughtful and strategic in how they provide career education to students.

In alignment with these career education priorities and Super's Developmental Self-Concept Theory (Super, 1953, 1963), institutions should provide support and resources for faculty to engage in interactions with students that meaningfully connect to their careers. Prior research has suggested that student-faculty interactions about career plans can be beneficial for students' career development (Komarraju et al., 2010), and findings from the current study suggest that some types of interactions with students have the potential to influence their career attitudes toward professional success. Together, these findings suggest that institutions should encourage frequent student-faculty interactions but should also consider that the type and context of these interactions may matter. Institutions ought to encourage interactions that focus on student success and career development and should provide incentives for faculty to engage in meaningful conversations with students about their future career plans. Additionally, institutions should provide training to faculty to encourage their use of relevant career development theory and research in their interactions with students about career decision-making and planning. By encouraging and supporting student-faculty interactions that are

focused on students' careers, institutions and faculty can help to positively shape students' professional and career attitudes.

As described by the exploration stage of Super's Developmental Self-Concept Theory (Super, 1953, 1963) undergraduate students have opportunities to explore and examine career options and values making it important to understand the experiences and interactions in college that may influence students' career attitudes. This study offers new insights into the ways in which students' interactions with faculty in college may help to shape their career attitudes. Overall, this study's findings suggest that student-faculty interactions, depending on the type and context of the interaction, can encourage or discourage certain professional and career attitudes.

Directions for Future Research

Future research is needed to better understand the relationship between student-faculty interactions and students' professional and career attitudes. Qualitative research methods could examine what types of conversations with students facilitate their thinking about career paths or career values, and how student-faculty interactions may influence student interest in pursuing graduate school, contributing to one's field, and making a lot of money. The use of a qualitative approach may also help illustrate effective structures and processes for student-faculty interaction and how those interactions are perceived by students. The present study examined a set of student professional career attitudes toward professional success, and future research can examine expanded or alternative definitions of professional success. For example, future research might examine students' desire to engage in careers that are personally rewarding and/or contribute to society.

Additionally, the benefits of interactions with faculty may not be the same for all groups of students. Future research can continue to examine the ways in which student-faculty interactions may influence career attitudes for students with differing background characteristics such as race/ethnicity, gender, parental education, disability status, or international student status. Finally, future research might examine whether the relationship between student-faculty interactions and students' career attitudes is moderated by other factors, such as major or institutional type. Additional research in these areas can continue to examine the role that faculty may play in helping to shape students' career attitudes toward professional success and beyond.

Authors' Contributions All authors listed contributed to data analysis and manuscript writing. Author order reflects the weight of these contributions.

Data Availability Data available upon request from the Center for Research on Undergraduate Education, University of Iowa, N491 Lindquist Center, Iowa City, IA 52242, USA.

Compliance with Ethical Standards

Conflicts of Interest/Competing Interests None.

Code Availability Not available.

Appendix 1

Table 3 Variable Definitions

Variable	Definition and Coding
Dependent Variables	
WNS Professional Success Scale*	Mean-based scale measuring the personal importance of achieving professional/career success. Items included: obtaining recognition from colleagues for contributions to one's field of expertise; having administrative responsibility for the work of others; working in a prestigious occupation; making a lot of money; and becoming successful in a business of one's own
Obtaining Recognition from Colleagues for Contributions to One's Field of Expertise*	Item measuring importance of obtaining recognition from one's colleagues for contributions to one's field of expertise. Response options ranged from 1 = Not Important to 4 = Essential
Having Administrative Responsibility for the Work of Others*	Item measuring importance of having administrative responsibility for the work of others. Response options ranged from 1 = Not Important to 4 = Essential
Working in a Prestigious Occupation*	Item measuring importance of working in a prestigious occupation. Response options ranged from 1 = Not Important to 4 = Essential
Making a Lot of Money*	Item measuring importance of making a lot of money. Response options ranged from 1 = Not Important to 4 = Essential
Becoming Successful in a Business of One's Own*	Item measuring importance of becoming successful in a business of one's own. Response options ranged from 1 = Not Important to 4 = Essential
Independent Variables	
Frequency of Student-Faculty Contact* (4-item scale, $\alpha = 0.75$)	Mean-based scale measuring self-reported frequency of interactions with faculty. Items included: frequency of discussing grades or assignments; frequency of discussing career plans; frequency of discussing readings or ideas outside of class; frequency of collaboration on activities outside of class
Quality of Student-Faculty Contact* (5-item scale, $\alpha = 0.87$)	Mean-based scale measuring self-reported quality of non-classroom interactions with faculty. Items included: faculty interest in personal growth; faculty interest in growth; faculty interest in career goals; faculty interest in close relationships; faculty interactions are satisfactory)
Research with Faculty	Binary item measuring self-reported engagement in research with a faculty member during college. Coding: 1 = Student worked on a research project with a faculty member; 0 = Student has not worked on research with a faculty member
Personal Discussions with Faculty	Binary item measuring self-reported engagement in personal discussions with a faculty member during college. Coding: 1 = Student discussed a personal problem or concern with a faculty member; 0 = Student has not discussed a personal problem or concern with a faculty member
Out-of-Class Contact with Faculty*	Item measuring self-reported perceived willingness of faculty to spend time outside of class to discuss issues of interest and importance to students. Response options ranged from 1 = Strongly Disagree to 5 = Strongly Agree
Control Variables	

Table 3 (continued)

Variable	Definition and Coding
Sex: Male	1 = Male; 0 = Female
Race/Ethnicity: Asian/Pacific Islander	1 = Asian/Pacific Islander; 0 = White/Caucasian
Race/Ethnicity: Black/African American	1 = Black/African American; 0 = White/Caucasian
Race/Ethnicity: Hispanic/Latino/a	1 = Hispanic/Latinx; 0 = White/Caucasian
Parent Education: Bachelor's Degree or Higher (vs. Less than Bachelor's)	1 = At least one parent has a four-year degree (BA/BS or higher); 0 = Neither parent has a four-year degree
Precollege Academic Ability (ACT or Equivalent Score)*	Composite ACT or SAT equivalent score converted to an ACT metric; information provided by the student's college/university
Precollege Academic Motivation* (8-item scale, $\alpha = 0.69$)	Mean-based scale of student's precollege academic motivation
Precollege Educational Aspirations*	Item measuring highest intended academic degree; options ranged from Vocational/technical certificate or diploma to doctorate degree
High School Involvement* (7-item scale, $\alpha = 0.62$)	Scale measuring student's involvement in a variety of activities during high school
Institutional Type: Regional University	Item measuring type of college/university attended. 1 = Attended a regional college/university; 0 = Attended a liberal arts college
Institutional Type: Research University	Item measuring type of college/university attended. 1 = Attended a research university; 0 = Attended a liberal arts college
Barron's Institutional Selectivity Score*	Barron's measure of institutional selectivity; response options ranged from 1 = Least Selective to 6 = Highly Selective
Institutional Size*	Total undergraduate student population size
Average College Grades*	Average cumulative grades in college at the end of the fourth year of college
College Major: STEM	Student's major at the end of the fourth year of college; 1 = STEM Major (Science, Technology, Engineering, or Mathematics); 0 = Professional Major (Business, Education, or Professional)
College Major: Arts, Humanities, or Social Sciences	Student's major at the end of the fourth year of college; 1 = Arts, Humanities, or Social Sciences Major; 0 = Professional Major (Business, Education, or Professional)
Employment: Hours Worked On-Campus*	Average hours per week spent in paid employment (on-campus) in the fourth year of college; response options included 1 = 0 h; 2 = 1–5 h; 3 = 6–10 h; 4 = 11–15 h; 5 = 16–20 h; 6 = 21–25 h; 7 = 26–30 h; 8 = more than 30 h
Employment: Hours Worked Off-Campus*	Average hours per week spent in paid employment (off-campus) in the fourth year of college; response options included 1 = 0 h; 2 = 1–5 h; 3 = 6–10 h; 4 = 11–15 h; 5 = 16–20 h; 6 = 21–25 h; 7 = 26–30 h; 8 = more than 30 h
Hours of Cocurricular Involvement*	Average hours per week spent participating in co-curricular activities in the fourth year of college; response options included 1 = 0 h; 2 = 1–5 h; 3 = 6–10 h; 4 = 11–15 h; 5 = 16–20 h; 6 = 21–25 h; 7 = 26–30 h; 8 = more than 30 h
Hours Spent Socializing/Relaxing*	Average hours per week spent socializing and relaxing in the fourth year of college; response options included 1 = 0 h; 2 = 1–5 h; 3 = 6–10 h; 4 = 11–15 h;

Table 3 (continued)

Variable	Definition and Coding
	5 = 16–20 h; 6 = 21–25 h; 7 = 26–30 h; 8 = more than 30 h
Student's Level of Academic Effort*	Average hours per week spent preparing for class in the fourth year of college; response options included 1 = 0 h; 2 = 1–5 h; 3 = 6–10 h; 4 = 11–15 h; 5 = 16–20 h; 6 = 21–25 h; 7 = 26–30 h; 8 = more than 30 h
Positive Interactions with Peers* (8-item scale, $\alpha = 0.87$)	Mean-based scale measuring student's positive interactions with peers
Academic Challenge/Effort* (11-item scale, $\alpha = 0.66$)	Mean-based scale measuring the degree of students' academic effort and engagement in college

*Standardized variable

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