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Extent of Student-College Matching for Students Enrolled in Special Education Services

Katherine C. Aquino
St. John's University, czadoaqk@stjohns.edu

Ryan P. Hudes
Seton Hall University, ryan.hudes@shu.edu

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Ryan P. Hudes[1]
Katherine C. Aquino[2]

Abstract

This study investigates the prevalence of postsecondary student-college match for students enrolled in special education services at the secondary education level by using data from the Education Longitudinal Study of 2002. This study examines alternative student-college match scenarios – including undermatch, match, and overmatch – and addresses the gap in research specific to college match and students in special education. Findings indicate that students who enrolled in special education services in high school undermatched to schools they had the potential of enrolling in. Moreover, undermatching for this student group increased if students were Black, Hispanic, or of low socioeconomic status.

Keywords: student-college match; students with disabilities, transition from secondary to postsecondary education

In recent years, researchers, policymakers, and practitioners have been charged with better understanding the factors that predict timely degree completion, particularly among students at four-year institutions pursuing bachelor's degrees. An emerging factor associated with degree completion is its relationship with institutional selectivity, often framed in terms of rankings such as Barron's Admissions Competitiveness Index. Specifically, the National Center for Education Statistics (NCES, 2016a) reported that at institutions where less than 25% of applicants are accepted, 89% of first-time, full-time students completed a bachelor's degree program from the first institution attended within six years of enrollment. Similarly, at institutions where 25-49.9% of applicants are accepted, 69% of first-time, full-time students completed a degree programs within six years from the first institution attended. Related to institutional selectivity, Light and Strayer (2000) found that students of all academic ability levels have a higher probability of four-year degree completion if the selectivity of the college they attend corresponds to their measured academic skill level, typically inclusive of observable characteristics such as grade point average and standardized test scores. This raises the question, to what extent is a student's academic potential, institutional selectivity, and bachelor's degree completion related?

Although institutional selectivity and academic skill level contribute to any student's completion of postsecondary education, students with disabilities have a decreased likelihood for entry into and completion of higher education (Synder, de Brey, & Dillow, 2016; United States Census Bureau, 2017). Of all individuals aged 25 years or older within the United States, 28% of individuals with a disability have less than a high school education, compared with only 12% of individuals without a disability. Moreover, of Americans 25 years or older, only 13% of individuals with a disability possess a bachelor's degree or higher – less than half of the 31% of the same age range without a disability (United States Census Bureau, 2017). Holistically, only 11% of all students enrolled in postsecondary institutions have a self-identified disability (Synder et al., 2016) and, of students with disabilities attending postsecondary education, a larger portion attend two-year institutions and have difficulty transitioning from the two-year to four-year sector (Burgstahler, Crawford, & Acosta, 2001; Raue & Lewis, 2011).

Given that the selectivity of an institution is correlated with bachelor's degree completion (Light &

Strayer, 2000), further investigation of this as a factor related to bachelor's degree completion – specifically understanding the extent to which students attend institutions with a selectivity that matches their academic potential is warranted – is something that can be framed in terms of a student-college match (Bowen, Chingos, & McPherson, 2009; Light & Strayer, 2000). The following sections detail this study's intent to carefully examine student-college match for all students, but with a focus on students with disabilities within the K-12 sector. For this study, students with disabilities will be identified through the enrollment in a special education high school program.

The study of student-college match is primarily situated at the "nexus of both college access and college completion agendas" and is linked to several policy issues (Rodriguez, 2013, p. 3). Initially, the study of student-college match emerged following the implementation and evaluation of affirmative action policies – an effort to determine if minority students were underqualified, based on grade point average and standardized test performance, for admission to postsecondary institutions. Similarly, other research examines the substantial number of economically disadvantaged students with high academic qualifications that attend less selective institutions (Bowen et al., 2009; Rodriguez, 2015). The latter is referred to as undermatch and is often considered an estimate based on a given set of observable student-level characteristics, typically including grade point average, standardized test scores, and participation in AP/IB courses, compared to the selectivity of the institution attended. Given its roots in several federal policies, researchers have a renewed interest and have investigated the extent of student-college match, but have primarily focused on undermatch (Belasco & Trivette, 2015; Bowen et al., 2009; Roderick, Nagaoka, Coca, & Moeller, 2008; Smith, Pender, & Howell, 2012).

Existing statistics indicate that student-college match is pervasive and affects students of all backgrounds. Using the NCES' Education Longitudinal Study of 2002 ([ELS], 2002), sponsored by the National Center for Education Statistics (U.S. Department of Education, n.d.; Ingels et al., 2014), Smith et al. (2012) estimated the extent of undermatch, occurring when a student attends an institution with a selectivity below their academic ability, to be about 41% of the college-going population – among the 2002 cohort of tenth grade students. Of the 41% that were found to have undermatched, the students possess a range of academic credentials, but the students were primarily from low socioeconomic status families (about half), live in rural areas, and have parents lacking a college degree (Smith et al., 2012). Simi-

larly, Bowen et al. (2009) found the "big fish-small pond" hypothesis, that is, attending a less selective institution in which a student is overqualified, resulted in lower degree completion rates among its sample of North Carolina high school graduates – a 15% point shortfall in adjusted degree completion rates for overqualified students. Likewise, in the Chicago Public School System, just one-third of students with four-year institution aspirations actually enrolled in a college that matched their academic qualifications (Roderick et al., 2008). Despite existing research indicating less prepared students struggle academically in higher selectivity schools (Heil, Reisel, & Attewell, 2014; Sander & Taylor, 2012; Sowell, 2003; Thernstrom & Thernstrom, 1997), the extent of other student-college mismatch types – including match or overmatch – are not empirically examined in the current body of literature.

In summary, academic student-college match types, specifically undermatch, are prevalent in existing studies, but little research exists regarding other scenarios, including match and overmatch. Further, little research exists regarding the relationship between student-college match and students who participate in high school-level special education programs.

As noted in Grigal, Migliore, and Hart (2014), "for people with disabilities, the importance of enrolling in and completing a postsecondary education program is magnified in relation to employment outcomes and earning" (p. 186). Despite this, students with disabilities have additional challenges and needs when preparing for and transitioning to college that may impact institutional choice or academic achievement at the postsecondary level (Garrison-Wade & Lehmann, 2009; Hitchings, Retish, & Horvath, 2005; Janiga & Costenbader, 2002; Morningstar et al., 2010; Papay & Bambara, 2011). Navigating the higher education system is a continuous process, with many situations contributing to the overall success (or difficulties) of the student (Roessler, Hennessey, Hogan, & Savickas, 2009; Ruh, Spicer, & Vaughan, 2009).

Unlike the postsecondary education structure where students with disabilities must self-identify to receive disability support services, the Individuals with Disabilities Education Act (IDEA) allows for schools and school staff (e.g., teachers, school psychologists, etc.) to provide services that support the socio-academic success of this student population within the K-12 sector. The IDEA not only mandates a free and appropriate public school education, but also provides the opportunity for supportive services to assist with student academic performance (United States Department of Education, n.d.). Although special education services are available to aid students'

academic success, research notes the potential negative impact of utilizing special education services on rigorous academic preparation and postsecondary opportunities (Harry & Klingner, 2014; Klingner & Harry, 2006; National Research Council, 2002).

In the 2013-2014 academic year, 6.5 million students were supported by the IDEA (National Center for Education Statistics, 2016b). Of the 13% of all students enrolled in U.S. public education who received special education services, significant variation occurred by student disability type, ethnicity, and gender. Of the students receiving special education services, 35% had a specific learning disability, 21% had speech or language impairments, 13% were considered with "other health impairment," 9% had Autism, 6% had an intellectual disability, 6% had a developmental delay, and the remaining 9% consisted of individuals with emotional disturbances, multiple disabilities, hearing impairment, or orthopedic impairment. Males consisted of a larger percentage of individuals receiving special education services; 16% of all males utilized IDEA services, compared to only 9% of all females. Moreover, there was variation by ethnicity for the percentage of students supported under IDEA, with 17% of all American Indian/ Alaska Native students, 15% of all Black students, 13% of all White students, 1 % of Hispanic students, and 6% of all Asian students. Due to the variation in the student population who receive special education services, there may also be variation in need, ability, and opportunity for higher education, ultimately influencing postsecondary matching.

Overview of the Study

This study sought to extend existing undermatch research by: (1) developing a student-college match indicator; (2) determining how many students who received K-12 special education services undermatch, overmatch, or match; (3) using comparative analysis for students in special education services and all others; and (4) incorporating an expanded student-college match methodological model, including additional student-level predictors when determining academic credentials. It is the intention of this study to examine the extent of student-college match types, specifically undermatch, among students with disabilities; understanding undermatching among this student population can provide rationale for the creation of additional curricular and extracurricular support, as well as strengthen collaborations throughout the campus environment to counteract undermatch's negative relationship with degree completion. This study was guided by the following research questions:

1. What is the extent of postsecondary student-college match for students enrolled in special education services at the secondary level, including undermatch, an overmatch, and a match?
2. For students enrolled in special education services at the secondary level, to what extent do postsecondary student-college match rates vary by socioeconomic status and race/ethnicity?

Theoretical Framework

While no existing theory examines student-college match, Tinto's theory of integration (1975) seeks to explain the motivation behind students' decisions to leave postsecondary education, but also could be applied to students integrating as a function of their academic fit. Tinto's theory postulates that student departure is primarily motivated as a result of interactions between a student and the institutional environment (inclusive of social and academic components). The determination of a student-college match is typically based on the selectivity of the institution, as well as the predicted probability of admission given several student-level determinants clustered around demographic and socioeconomic characteristics, college-related attitudes and expectations, and admissions-related activities. As such, Tinto's theory can be applied to the study of student-college match as it can be understood as a measurement or natural extension of integration.

As noted in Hurtado and Carter (1997), Tinto's model did not address a perceived sense of inclusion for students considered racially or ethnically diverse. In reaction to the exclusionary aspects of Tinto's model, the concept of sense of belonging was proposed – a psychological measure of integration that addresses students' sense of feeling welcomed by their institution and their subsequent integration, cohesion, and success. Similar to perceptions and experiences of other diverse student groups, having a disability does not indicate that all students will share similar postsecondary experiences. Students with disabilities may not feel accepted in college, ultimately deterring their perceived inclusion and reinforcing "stereotypical beliefs and discriminatory practices" (Lechtenberger, Barnard-Brak, Sokolosky, & McCrary, 2012, p. 857).

Prior to deriving the student-college match indicator, a consistent approach for identifying institutional selectivity was addressed. For this study's student-college match indicator model, the selectivity of institutions was determined based on the Barron's Admissions Competitiveness Index. The Barron's

Index includes accredited four-year postsecondary institutions that admit incoming freshman students without any prior college experience and grant baccalaureate degrees (Barron's Educational Series Inc., 2004). The Barron's selectivity levels sorts institutions into several categories based on five criteria, including: (1) median entrance exam scores for the 2004-04 freshmen class; (2) percentage of 2003-04 freshmen scoring 500 and above and 600 and above on both the verbal and mathematics sections of the SAT or percentage of 2003-04 freshmen scoring 21 and above and 27 and above on the ACT; (3) percentage of 2003-04 freshmen who ranked in the upper fifth of their high school class and percentage who ranked in the upper two-fifths; (4) minimum class rank and grade point average required for admission; and (5) percentage of applicants to the 2003-04 freshmen class who were accepted. Given the selection criteria, Barron's categorizes institutions into seven selectivity levels, including: (1) Most competitive; (2) Highly competitive; (3) Very competitive; (4) Competitive; (5) Less competitive; (6) Noncompetitive; and (7) Special. Due to limited data for each selectivity category and guided by previous research (Roderick, Coca, & Nagaoka, 2011; Roderick, Nagakoa, Coca, Moeller, 2008; Roderick et al., 2006; Roderick, Nagaoka, Coca, & Moeller, 2009; Smith et al., 2012), the Barron's seven categories were collapsed into five groups, specifically: (1) two-year college; (2) nonselective; (3) somewhat selective; (4) selective; and (5) very selective.

Based on existing student-college match literature grounded in theory, several factors associated with college-going students were included in the student-college match model. These factors included demographic and socioeconomic characteristics, college-related attitudes and expectations, and admissions-related activities. First, demographic characteristics included gender, race/ethnicity, native language, urbanicity, dependent status, and socioeconomic status. By adding demographic characteristics, background effects can be controlled when assessing the influence of other variables in the model. The demographic and socioeconomic characteristics precede the model's other variables. Second, college-related attitudes and expectations ranged from academic achievement to extracurricular activities. Achievement-related variables included highest high school level math course completed, number of AP/IB courses, high school grade point average, college application activity, and the ELS cognitive test. Lastly, admissions-related activities incorporated guidance counselor interaction, teacher interaction, peer interaction, parental interaction, college publication/website usage, college representative interaction.

Methodology

This study used data from NCES' ELS: 2002 (U.S. Department of Education, n.d.). The ELS is a nationally-representative, multilevel longitudinal survey that was specifically designed to track high school students as they progress from 10th grade through high school and on to postsecondary education or the workforce, or both (Ingels et al., 2014). Specifically, ELS: 2002 was used for this study as it is the most comprehensive source of nationally-representative data that includes: (1) pre-college academic achievement; (2) postsecondary aspirations; (3) postsecondary enrollment information; and (4) postsecondary degree completion status. Capturing data regarding a student's pre-college academic achievement, their desire to attend a postsecondary institution, and actual enrollment information are critical components for estimating the degree of student-college match. ELS:2002 has a great deal of data on students' demographic characteristics, attitudes and impressions of attending a postsecondary institution, and information regarding the college search, choice, and application process, which are critical for deriving the student-college match indicator.

The ELS:2002 was initially administered to high school sophomores in 2002, again when the cohort were high school seniors in 2004, two years following the cohort's scheduled high school graduation in 2006, and lastly in 2012, or ten years following initial survey collection. Data collection in 2006 captured self-reported information regarding postsecondary institutions to which students applied and were admitted, including information about the institution where they enrolled. This study is interested in this application data as the predicted probability model used to determine the likelihood of admission relies heavily on this to determine postsecondary access for students who were enrolled in special education to each selectivity level.

The ELS: 2002 full, established base year sample size includes approximately 17,754 students across about 750 secondary institutions, yielding an 87% weighted student response rate and a 68% school response rate (Ingels et al., 2014). Eligible sample members who had not responded in the prior follow-up were not contacted for subsequent follow-ups, that is, a respondent who had not responded in the second follow-up and in the first follow-up were not fielded for the third follow-up. The first follow-up sample was freshened and yielded a response rate of 89%. The second follow-up consisted of about 15,900 members, of which 14,200 completed the appropriate questionnaire – yielding an 88% response rate.

To address this study's research questions, data from the base-year (high school sophomores), first follow-up (high school seniors), and second follow-up (two years following the cohort's scheduled high school graduation) surveys were used. Further, a subset of only first-time full-time high school graduates in 2004 immediately entering a four-year institution were included in the analytic sample – that is, students attending a two-year or specialized institution, regardless of student-college match type, were excluded. NCES categorizes the ELS: 2002 students in this study's analytic sample as standard enrollees by virtue of immediately enrolling in postsecondary education and continuing their enrollment into 2006. To identify these students, the ELS: 2002 contains a second follow-up respondent type indicator that was used to help frame this study's sample. For ELS: 2002, immediate enrollment is defined as enrolling in a postsecondary institution by October following high school completion/exit year. By narrowing the sample frame and using the standard enrollees that continued to four-year postsecondary institutions and students who participated in the ELS: 2002 third follow-up, the weighted analytic sample for this study includes 6,455 students.

Data Preparation

Prior to completing data analysis using a longitudinal data set, several preparatory steps were completed to assemble the dataset and prepare it for analysis. First, the ELS: 2002 institution and student files were merged with the Barron's Competitiveness Index file, including selectivity, acceptance, and enrollment data. Second, the handling of missing data was considered as it is an inevitable concern for any empirical study using large-scale secondary data. Thirdly, students enrolled in special education during the ELS: 2002 base-year (while in 10th grade) were identified using the dichotomous BYS33I indicator. Lastly, categorical variables were recoded in preparation for the logistic regression predicted probability model. Once these preparatory steps were completed, the predicted probability model was completed and the student-college match indicator was created. The following sections briefly outline the methods used for each of the preparatory steps and present this study's data analysis strategy.

As the missing data were determined to be missing at random, multiple imputation was used. Multiple imputation addresses single imputation's limitations by including an additional form of error based on the variation in the parameter estimates across the imputation, or "between imputation error" (Allison, 1999; Soley-Bori, 2013; Von Hippel, 2004). The multiple imputation process is a similar-based procedure that replaces each missing value with potential values, which represent a distribution of possibilities (Schafer, 1997). After establishing convergence, MCMC was run a second time to generate five imputed data sets (Von Hippel, 2004). To complete the imputation, SPSS imputed incomplete variables one at a time and used the imputed variable from one step prior as a predictor in all subsequent steps. SPSS used linear regression to impute responses for missing continuous variables and logistic regression to impute responses for missing categorical variables (Von Hippel, 2004).

Once the missing values were imputed, dichotomous variables were created for each accepted institution for all students in the sample in preparation for completing the logistic regression predicted probability model. These dichotomous variables were created for each Barron's selectivity level and were used as the dependent variable for each logistic regression predicted probability model. Once completed for all students at each selectivity level, the highest selectivity level to which the student was predicted to be admitted was coded. This selectivity level was compared to the selectivity level of the institution in which the student enrolled. The two values were compared to derive the student-college match indicator.

Deriving the Student-College Match Indicator

Prior to completing the statistical analysis for making a student-college match determination, the student-college match indicator was operationalized following the defined conceptual framework. The student-college match variable was derived using the both the Barron's Admissions Competitiveness Index and existing ELS: 2002 variables. This derived student-college match variable was then used to address this study's descriptive research questions.

Determine enrolled institution selectivity. All four-year institutions are assigned a selectivity level as part of the Barron's Admissions Competitiveness Index, including six selectivity categories encompassing the most competitive, highly competitive, very competitive, competitive, less competitive, and non-competitive (Barron's Educational Services, 2004). The selectivity of each respondent's first-attended postsecondary institution was coded as a derived categorical variable according to the following scale: (1) two-year college; (2) nonselective; (3) somewhat selective; (4) selective; or (5) very selective.

Determine student's academic potential. Like Smith et al. (2012) and Rodriguez (2015), this study estimated predicted probabilities using logistic regressions based on available students' application and admission data from the ELS:2002. Using this

approach, the probability of being admitted to each selectivity level based on demographic and socio-economic characteristics, college-related attitudes and expectations, and admissions-related activities was calculated for each student. Variables related to demographics, college-related attitudes and expectations, and student admissions-related activities were included. A student's qualification level was determined based on the highest selectivity level to which they were accepted, given a probability of admission greater than 80 %. In prior studies, Smith et al. (2012) used a 90 % threshold, while Rodriguez (2015) used 80 %. An 80 % qualification level was selected for this study as the model incorporated additional predictors and, thus, the likelihood of more precise estimates is increased. Rodriguez (2015) notes, "the predicted probability approach yields the highest level of precision in determining the likelihood of student qualifications compared to other approaches" (p. 12).

Student-college match indicator. Once the predicted probability model was run for each student at each selectivity level, the highest selectivity category to which the student was found eligible for admission was identified and the computed variable was coded accordingly. This categorical variable was coded for the student's highest eligible selectivity level as either: (1) two-year college; (2) nonselective; (3) somewhat selective; (4) selective; or (5) very selective.

Once the derived highest selectivity eligible (student potential) and actual enrolled selectivity variables were created for each student, the student-college match indicator was derived. This variable was computed by comparing the derived variable representing the selectivity of the actual enrolled institution with the derived variable representing the highest selectivity potential. For cases where potential is less than enrolled, the case was coded as an undermatch; for cases where potential is greater than enrolled, the case was coded as an overmatch; and for cases where potential equals enrolled, the case was coded as a match. This derived student-college match indicator variable was coded as 0 = undermatched; 1 = matched; and 2 = overmatched.

Data Analysis

The first stage of the data analysis will use this study's derived student-college match indicator to primarily explore descriptive statistics of the sample. To address this study's research questions and better understand the extent of student-college match types among students in special education services at the secondary level, all student-college match scenarios will be considered. A demographic snapshot of students in each category – including undermatch, over-

match, and match – will be provided, with an emphasis on predominant student-college match determinants.

Further, the extent of each student-college match type with an emphasis on socioeconomic status and race/ethnicity will also be examined. Descriptive analyses will include measures of central tendency, including frequencies, means, standard deviations, minimum, maximums, and cross-tabulations.

Findings

The results presented are arranged into two sections that parallel this study's research questions. This section begins with a description of this study's full sample and the special education services subgroup and focuses on identifying the rate of postsecondary student-college match scenarios, while also describing the profile of students found to either undermatch, match, or overmatch. The second section continues the exploration of the study's sample, but specifically explores the extent to which student-college match types differ by student background characteristics, including socioeconomic status and race/ethnicity.

Data and Sample

Prior to addressing the research questions, the study's sample was identified and all available application and admission data for eligible ELS: 2002 participants were aggregated. This resulted in 6,455 total weighted cases and 304 in special education services (4.7% of the full sample), each case containing multiple student and transcript-reported application and admission data points. This included institutions to which students applied, admissions decisions, and enrollment information – resulting in approximately 10,380 viable data points. By using all available admissions-related data from all respondents – including students that may have applied and been accepted to a four-year institution, but attended a two-year institution – the predicted probability method used for determining a student's potential, or the selectivity level to which a student is likely to be granted admission given observable characteristics, is more precise (Rodriguez, 2015).

Table 1 includes a comparison of demographic characteristics across the full sample, with a distinction for students in special education. Further, the distribution by race/ethnicity and socioeconomic status are included. Specifically, among Black students, almost 9% identified as participating in a special education program. Similarly, among students in the lowest socioeconomic group, almost 9% were part of a special education program.

Extent of Student-College Match

To determine the extent of postsecondary student-college match for students enrolled in special education services at the secondary level, a three-step process was used. First, each student's potential for admission was predicted using 13 variables – including variables from categories such as demographic and socioeconomic characteristics, college related attitudes and expectations, and admissions-related activities. Given the variables in the model, Table 2 provides the distribution by highest predicted potential selectivity level the student would be eligible for admission and the distribution of actual enrollment by selectivity level.

Table 2 further details the distribution of background characteristics by predicted potential selectivity levels. Among high socioeconomic students, 13.3% qualified for either a very selective or selective institution; whereas among middle socioeconomic students, just about 2.5% were eligible for the same levels. Students in the lowest socioeconomic category, however, were often predicted eligible for the lowest selectivity levels – somewhat selective and nonselective – about 26% and 62%, respectively. Similar results were found for students in the middle socioeconomic group. That is, about 31% had a predicted selectivity potential of somewhat selective and about 64% had a predicted potential of nonselective. When examining race/ethnicity, among White students – the largest group – 41% and 49% had a predicted admission potential at either a somewhat selective or nonselective institution, respectively. Similar findings emerged regarding race/ethnicity – specifically with the majority of students eligible for the lower selectivity categories. Among Black and Hispanic students, the majority were predicted eligible for nonselective institutions – that is, 55% of Black students and about 75% of Hispanic students. Among Asian students, the distribution by predicted selectivity level was similar as approximately 45% and 50% achieved a predicted potential in the somewhat selective and nonselective categories, respectively.

Second, using the Barron's Admissions Competitiveness Index, each student's institutional selectivity level was determined based on their actual enrollment. Table 3 provides the distribution by selectivity level and select demographics. Compared to Table 2, no students in the sample were enrolled in a two-year institution, despite the 10.4% that were predicted to be eligible for just a two-year institution. These respondents enrolled in a four-year institution, likely within the nonselective category. Of those students in the sample, 12% enrolled in a very selective institution, 19% in selective, 38% in somewhat selective, and 31% in a nonselective institution.

Table 3 provides a snapshot of the demographic and background characteristics for students by actual enrolled selectivity levels. When examining low socioeconomic status students, about 36% and 39% enrolled in somewhat selective institutions or nonselective institutions, respectively. In contrast, among high socioeconomic students, the spread among very selective, selective, and somewhat selective institutions increased. That is, about 23%, 20%, and 39% enrolled in very selective, selective, or somewhat selective institutions, respectively. Like the predicted student potential, an increased number of Asian students (about 45%) enrolled in a somewhat selective institution, about 22% in a selective institution, and about 20% in a nonselective institution. Just 6% of Black students enrolled in very selective institutions – the majority enrolled in somewhat selective (about 42%) or nonselective (about 40%). Similarly, about 18% and 65% of Hispanic students enrolled in somewhat selective or nonselective institutions, respectively. For White students, the distribution by selectivity levels varied – with the majority in selective, somewhat selective, and nonselective institutions. Specifically, among White students, approximately 22%, 41%, and 23% were enrolled in selective, somewhat selective, or nonselective institutions, respectively.

Lastly, the highest potential selectivity level was compared to the actual enrolled selectivity level for each student to determine the type of student-college match. Table 4 provides the distribution by student-college match type. Of the 6,455 students in the full sample, 40.5% undermatched, 24.6% matched, and 34.9% overmatched. However, of the study's weighted special education subset (n= 304), 51% undermatched, 25.6% matched, and 23.6% overmatched. This study's undermatch finding (40.5%) for the full sample is consistent with existing literature (Rodriguez, 2015; Smith et al., 2012) and suggests that many students attend four-year institutions that are not congruent with their academic potential. Likewise, and perhaps more notably, a similar number of students were found to overmatch, or attend an institution with a selectivity level above their academic credentials. The variation among students in special education services is noteworthy as it highlights that this student population undermatches at a greater rate than the overall student population enrolling in higher education.

Table 5 presents the distribution of student-college match types by socioeconomic status. Among students from the low socioeconomic category, about 63% – the majority – undermatched, while just 21% and about 16% matched or overmatched, respectively. Similarly, among middle socioeconomic students, about 59% undermatched and the remainder of the students matched (25%) or overmatched (16%). Con-

versely, among the high socioeconomic students, about 39% overmatched, while 29% matched and 32% undermatched.

When examining variation by race/ethnicity, Table 6 details the distribution by student-college match type. For White students, the distribution by match type was somewhat distributed; that is, 41% undermatched, 32% matched, and about 26% overmatched. A similar pattern emerged for Asian students; that is, about 41% undermatched, 33% matched, and 24% overmatched. In contrast, among Black students, approximately 68% undermatched, 15% matched, and 17% overmatched. Similarly, among Hispanic students, about 73% undermatched, 18% matched, and 11% overmatched. Students who identified as other race/ethnicity often undermatched (47%), but about 19% matched and 33% overmatched.

Discussion

This research study provided additional clarity on an understudied topic within postsecondary education literature – college matching for students with disabilities. The student-college match concept captures the enrollment choices of students entering the postsecondary environment and whether these choices correspond to the observed academic potential of the student. Overall, findings presented in this study underscore that students with disabilities undermatch at a greater rate than the overall studied sample. As disability service providers, greater awareness is needed regarding student-college match tendencies to further assist with the support and advocacy of this student population. As such, this concept is especially important as previous research indicates undermatching is associated with lower degree completion rates (Bowen et al., 2009) -- a concept already well documented with this student population (United States Census Bureau, 2017).

For this research, students with disabilities were defined as individuals who enrolled in special education coursework and programs. As indicated in the findings and in support of previous research, the sample had a larger percentage of males than females enrolled in special education coursework (National Center for Education Statistics, 2016b). Conversely, the special education service sample only somewhat mirrored the ethnic breakdown of students in special education in U.S. public education. Black students were the largest group within the sample to participate in special education coursework at the secondary education level; this finding is similar to previous research identifying Black students as the second largest group enrolled in special education. Within

the sample, White students encompassed the smallest group of individuals participating in special education coursework, by race/ethnic type.

One of the study's research objectives was to identify the highest predicted potential selectivity level a student would be eligible for at postsecondary admission. Incorporating demographic and socioeconomic characteristics, college-related attitudes and expectations, and admission related activities, this study produced a theoretical model that identified a postsecondary institutional level that was most appropriate for each student. In the implementation of this model, the findings indicate significant disparity between the highest potential institutional option and actual enrollment for students who were enrolled in special education services during high school. Holistically, more students with disabilities undermatched. As this research study only investigated the actual enrollment within four-year institutions, if two-year institution enrollment was included in the analysis, findings of undermatching by students with disabilities may have been even more pronounced. One key finding was that, of the students who enrolled in special education coursework in high school, students identifying as Black, Hispanic, or of low socioeconomic status had the greatest percentage of undermatching.

Limitations

While the ELS: 2002 provides invaluable data to explore this study's research questions, the data, and this study has substantive and methodological limitations that warrant discussion. Most notably, while the ELS:2002 spans from a student being in 10th grade to ten years later, the ELS:2002 sample is limited in its generalizability to three overall groups or populations: (1) spring 2002 high school sophomores; (2) spring 2004 high school seniors; or (3) spring 2002 10th grade schools.

From a methodological perspective, it is important to consider that a student-college match determination, regardless of how it is derived, should be considered strictly an estimate. As detailed and reiterated by Bastedo and Flaster (2014), a student-college match determination contains many assumptions. Most notably, a student-college match determination relies exclusively on a given set of observable characteristics that may not fully account for student potential.

Further, the method for stratifying institutions by selectivity is generally consistent for elite, selectivity institutions, but variance among less selective institutions is often problematic. While this study used a collapsed version of the Barron's Admissions Competitiveness Index, the potential for local or regional

institutional reputations associated with less selective colleges can skew selectivity ratings. As noted in existing literature, this is often a concern when considering Historically Black Colleges and Universities (HBCU). That is, an institution's cultural reputation may be more highly valued by a prospective student over its institutional selectivity, despite the student's predicted potential for admission to a more selective institution (Smith et al., 2012). Similarly, some HBCUs may be more selective than the academic profile (as measured by test scores, class rank, and GPA) of its applicant pool.

Lastly, this study identifies students with disabilities as individuals enrolled in special education services, specifically the participation in special education coursework and/or services, in secondary education. As the concept of "students with disabilities" can have varying interpretations (i.e., self-identified, identified through the use of K-12 educational services, among others), it is important to highlight this definition for the reader. Moreover, due to the limited number of qualifying cases, special education was not considered as an independent predictor variable when determining admissions likelihood, nor a component of the derived student-college match indicator.

Conclusion

Research indicates a gap in the desire and potential to enter into higher education and actual enrollment, and varies widely by socioeconomic and racial groupings (Berkner & Chavez, 1997). For individuals participating in special education services who are already at a decreased likelihood for postsecondary enrollment, low socioeconomic status, or possessing a historically underrepresented minority background are even at a lesser rate of enrollment opportunity (Blair & Scott, 2002; Newman, Wagner, Cameto, Knokey, & Shaver, 2010; Sanford et al., 2011). Although student-college match may initially appear as an admissions or enrollment management challenge at the postsecondary level -- as disability support providers are charged with supporting the needs of this student population already enrolled at their respective institutions, disability support providers serve as a unique role in further exploring how to support students with disabilities who undermatch.

Building on the current literature and attempting to address the understudied topic of college undermatching for students with disabilities, this study found that students who enrolled in special education services in high school undermatched to schools they had the potential of enrolling in. Moreover, undermatching for this student group increased if students

were Black, Hispanic, or of low socioeconomic status. With these findings, it can be inferred that students with disabilities are not only at a decreased likelihood to think about and/or plan for higher education but, if they do decide to enroll in postsecondary education, they will choose institutions less selective than their actual potential. As students enrolled in special education services within the K-12 sector are often stigmatized, engaged in a less rigorous curriculum, and have lower expectations for academic performance (Harry & Klingner, 2006; Hehir, Grindal, & Eidelman, 2012; Klingner & Harry, 2014; National Research Council, 2002), several factors may impede in enrolling in attainable institutional options. Additional exploration is needed to better assess the specific reasons for undermatching for students with disabilities.

As students with disabilities are at a greater likelihood to apply and/or enroll in institutions that are not congruent with their academic potential, there is rationale for greater preparation during the K-12 to higher education transition process, allowing students with disabilities more options and greater preparation for appropriate student-college match. Driven by the noted findings, it may be beneficial for disability service providers to work with their institutions' admissions teams to provide materials and resources to share with students with disabilities within secondary education preparing for college enrollment. Additionally, creating materials to share with high school guidance counselors could provide valuable information addressing perceived trepidation students with disabilities may feel prevent their enrollment in an appropriate institution. It is essential that disability service providers leverage available support and resources to facilitate the enrollment of students with disabilities throughout the college choice and application processes to assist in identifying an ideal student-college match.

Although the concept of student-college match is not frequently addressed as a practice-based concept, and instead a research-driven idea, disability support providers should explore the idea of student-college match, as it further allows the understanding of students with disabilities outside of an aggregated group. As disability support providers, we understand that although students with disabilities all need support and some form of accommodation, each student is an individual, with unique characteristics, experiences, and levels of preparation for the postsecondary environment. That said, disability support providers must be cognizant that students vary not only in their preparation for higher education, but their institutional decisions as well. With this study's findings detailing that students with disabilities have a great-

er likelihood of undermatching, disability support providers can collaborate with other departments, including career services and graduate studies, to facilitate ongoing and comprehensive opportunities to strengthen the undermatched student's academic journey. If a student is capable of more, disability support providers are in favorable circumstances to serve as the point person to further facilitate opportunities for student development.

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About the Authors

Ryan P. Hudes holds a B.A. in Communication, M.A. in Strategic Communication, and a Ph.D. in Higher Education Leadership, Management, and Policy, with a concentration in Research, Assessment and Program Evaluation. His research agenda seeks to better understand student-college match and its implications for student outcomes, particularly four-year degree completion, persistence, transfer, and system dropout. Ryan serves as the Assistant Dean of Graduate Studies and Administration in the College of Communication and the Arts at Seton Hall University. Currently, a co-edited volume with Katherine C. Aquino entitled *Improving Postsecondary Choice and Pathways: Student Access and College Match* is in production with Routledge. He can be reached by email at: ryan.hudes@shu.edu.

Katherine C. Aquino received her B.S. in Psychology, M.A. in School Psychology, and a Ph.D. in Higher Education Leadership, Management, and Policy. Her research interests include the socio-academic transitioning into and within the higher education environment for students with disabilities. She is the co-editor and contributing author of *Disability as Diversity in Higher Education: Policies and Practices to Enhance Student Success.* Currently, a co-edited volume with Ryan P. Hudes entitled *Improving Postsecondary Choice and Pathways: Student Access and College Match* is in production with Routledge. In September 2019, Katherine will serve as Assistant Professor in the School of Education at St. John's University. She can be reached by email at: katherinecaquino@gmail.com.

Table 1

Demographic Characteristics of ELS:2002 Full Sample and Special Education Subset

Variable	*N*	Special Education	Non-Special Education
Gender			
Male	2,918	6.10	93.90
Female	3,537	3.56	96.44
Race/Ethnicity			
White	4,302	3.63	96.37
Black	809	8.78	91.22
Hispanic	590	4.41	95.59
Asian	358	5.59	94.41
Other	396	7.83	92.17
Socioeconomic Status			
Lowest	888	8.78	91.22
Middle	2,899	4.28	95.72
Highest	2,668	3.82	96.18

Note. Weighted; Row percentages may not equal 100% due to rounding. Source: U.S. Department of Education. (n.d.). National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002).

Table 2

Select Demographic Characteristics of ELS:2002 Special Education Respondents Enrolled in Four-year Institutions by Highest Potential Selectivity Level

Variable	*N*	Very Selective	Selective	Somewhat Selective	Nonselective	Two-year
Gender						
Male	178	1.91	5.51	34.72	53.71	4.16
Female	126	0.32	4.44	37.78	55.24	2.54
Race/Ethnicity						
White	156	1.28	6.92	41.41	48.72	1.41
Black	71	1.41	2.25	32.11	54.93	9.86
Hispanic	26	0.00	1.54	20.00	75.38	5.38
Asian	20	5.00	1.00	45.00	50.00	0.00
Other	31	1.29	7.10	25.16	67.74	0.00
English as Native Language						
English	255	0.94	5.33	37.41	52.31	4.16
Non-English	49	2.86	3.67	28.57	64.90	0.00
Socioeconomic Status						
Lowest	78	0.51	2.56	25.64	62.05	9.23
Middle	124	0.65	1.94	31.13	63.87	2.58
Highest	102	2.55	10.78	49.80	37.45	0.00

Note. Weighted; Row percentages may not equal 100% due to rounding. Source: U.S. Department of Education. (n.d.). National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002).

Table 3

Select Demographic Characteristics of ELS:2002 Special Education Respondents Enrolled in Four-Year Institutions by Actual Enrolled Selectivity Level

Variable	N	Very Selective	Selective	Somewhat Selective	Nonselective	Two-year
Gender						
Male	178	13.48	20.11	34.49	31.91	0.00
Female	126	10.32	17.46	42.22	29.84	0.00
Race/Ethnicity						
White	156	14.10	21.67	41.41	22.56	0.00
Black	71	6.20	12.11	41.69	40.00	0.00
Hispanic	26	3.08	15.38	18.46	65.38	0.00
Asian	20	14.00	22.00	45.00	20.00	0.00
Other	31	21.94	22.58	23.87	32.26	0.00
English as Native Language						
English	255	12.24	18.90	40.16	28.78	0.00
Non-English	49	12.65	19.18	26.12	42.45	0.00
Socioeconomic Status						
Lowest	78	7.18	17.44	36.15	38.97	0.00
Middle	124	6.45	19.03	37.58	36.77	0.00
Highest	102	23.14	20.00	39.41	18.24	0.00

Note. Weighted; Row percentages may not equal 100% due to rounding. Source: U.S. Department of Education. (n.d.). National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002).

Table 4

Distribution of Students by Student-College Match Type

Population	N	Undermatch	Match	Overmatch
All Students	6,455	40.5	24.6	34.9
Special Education	304	51.0	25.6	23.6

Note. Weighted; Row percentages may not equal 100% due to rounding. Source: U.S. Department of Education. (n.d.). National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002).

Table 5

Distribution of Student SES by Student-College Match Type

Socioeconomic Status	N	Undermatch	Match	Overmatch
Low SES	78	63.33	21.03	15.90
Middle SES	124	59.03	25.32	15.81
High SES	102	31.57	29.80	38.82

Note. Weighted; Row percentages may not equal 100% due to rounding. Source: U.S. Department of Education. (n.d.). National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002).

Table 6

Distribution of Student Race/Ethnicity by Student-College Match Type

Race/Ethnicity	N	Undermatch	Match	Overmatch
White	156	41.28	31.92	26.15
Black	71	67.61	14.65	17.18
Hispanic	26	73.85	17.69	10.77
Asian	20	41.00	33.00	24.00
Other	31	47.10	19.35	32.90

Note. Weighted; Row percentages may not equal 100% due to rounding. Source: U.S. Department of Education. (n.d.). National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002).