# Undermatching and the first-year experience:

# Examining effect heterogeneity

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**heterogeneity**

Increasing postsecondary degree attainment is a major bipartisan policy focus of the nation, yet college completion rates have been declining over time (Hauptman, 2012; The Executive Office of the President, 2014). The growth in enrollment of students from low socio-economic backgrounds, combined with their lower than average completion rates, are one of many factors for the declining postsecondary completion rates (Bailey & Dynarski, 2011; Bound, Lovenheim, & Turner, 2010; Kane, 2004). Recently, researchers and policymakers have increasingly focused on the phenomenon of academic undermatching as one possible solution to improve the postsecondary attainment rate (The Executive Office of the President, 2014). Academic undermatching occurs when a student possesses the academic credentials competitive for admission a selective school, such as a state flagship university, but enrolls at a less selective institution like a regional college. Due to the relationship between institutional selectivity and baccalaureate completion, it is possible that undermatching contributes or exacerbates the problem of low socio-economic students dropping out.

Increasing evidence indicates that many students, particularly those from low socio-economic backgrounds, "undermatch" by attending less selective institutions that may not fit their academic credentials (e.g., Bowen, Chingos, & McPherson, 2009; Hoxby & Avery, 2012; Roderick et al.,

2008). Due to the correlation between college selectivity and graduation rates, policymakers have started to view reducing or eliminating undermatching as a way to increase college completion rates and the number of bachelor's degrees awarded (The Executive Office of the President, 2014). Despite the on-going interest from policymakers, it is not yet clear that undermatching negatively influences college outcomes after matriculation.

It is increasingly clear that undermatching is a common outcome of the college choice process (Belasco & Hall, 2015; Bowen et al., 2009; Hoxby & Avery, 2012; Roderick, Nagaoka, Coca, & Moeller, 2009; Smith, Pender, & Howell, 2013). However, researchers have come to different conclusions on whether undermatching influences college outcomes (Fosnacht, 2014; Goodman, Hurwitz, & Smith, 2015; Heil, Reisel, & Attewell, 2014; Hoxby & Avery, 2012; Jagešić, In press; Roderick et al., 2009). It is also unknown if the impacts of undermatching vary by student subgroups. In this study, I attempt to fill some of these literature gaps by examining if the impact of undermatching on high achieving, first-year students' engagement, perceived gains, and institutional satisfaction varies by race/ethnicity, sex, and parental education.

This study follows up on two previous studies that examined how undermatching influenced the first-year experience (Fosnacht, 2013, 2014). These studies found that undermatching has varying impacts on student

engagement, perceived gains, and satisfaction. In summary, students attending less selective colleges than they could have attended experienced a less rigorous academic curriculum, engaged more frequently in active and collaborative learning activities and interactions with faculty, but perceived a less supportive environment and fewer gains from attending college, and were less satisfied with their institutions. Additionally, it found that the magnitude of these relationships varied by the selectivity of the college a student had the credential to attend and that the effects were greatest for students with access to the most selective institutions. Consequently, this study will dig deeper into undermatching and examine if the impacts of undermatching also vary by students' demographic characteristics.

## Literature Review

A series of reports by the Consortium on Chicago Schools Research popularized the concept of academic matching (Roderick et al., 2006; Roderick et al., 2009; Roderick et al., 2008). They found that over 60% of Chicago Public Schools (CPS) graduates enrolling in college undermatched. Furthermore, undermatching commonly occurred among students with strong academic credentials, as only 38% of students with access to a "very selective" institution enrolled in that college type. Undermatching gained more attention through Bowen and colleagues (2009) investigation into the relationship between undermatching and degree attainment for North

Carolina students with access to the most selective public universities in the state.  After controlling for other factors, they estimated that undermatching was associated with a 10 percentage point reduction in the probability of graduating.

More recently the literature on undermatching has steadily grown. A series of studies have attempted to assess the prevalence of undermatching. Smith, Pender, and Howell (2013) used nationally representative data to assess how often students undermatch and its correlates. They estimated that about 40% of students undermatched in 2004. Their study also found that low-SES students undermatched at higher rates than high-SES students. Belasco and Hall (2015) conducted a similar study, but estimated that undermatching occurs less frequently (28%) than estimated by Smith and colleagues (2013). Hoxby and Avery (2012) investigated the application and enrollment decisions of high-achieving, low income students. They found that many students, particularly those from rural areas, failed to apply to any college with a median standardized test score within 15 percentiles of their own score.

The general consensus in the literature for the reason why students undermatch is due to the information problems inherent to the current college choice process. Students must winnow down a wide variety of possible college destinations to a manageable set without knowing their net costs or frequently know much about their academic environment.

Additionally, most schools and counselors are ill-equipped to provide much information to students and parents about their college choices (McDonough, 1997, 2005). Hoxby and Turner (2013), using a randomized experimental design, found that providing college information to high achieving, low-income students altered their college destinations by making them more likely to apply to selective institutions. However, Black, Cortes and Lincove (2015) found that undermatching is still common in situations with perfect information like Texas, where the top 10% of students in their high school are guaranteed admission to a flagship university. Additionally, they found that students' application behaviors vary by race/ethnicity. Consequently, it appears that the lack of college information is a critical reason why students undermatch, but making admissions processes more transparent is not a silver bullet to reduce undermatching.

Other studies have focused on the impacts of undermatching. The effects on degree completion are unclear. Heil et al. (2014) found that undermatching was not associated with degree completion. However, others have found the opposite (Goodman et al., 2015). The reason for the disparate findings may be due to differences in how the authors operationalize undermatching, as Rodriguez (In press) has found that different definitions may lead to alternative findings about undermatching. Additionally, Bastedo and Flaster (2014) question whether researchers can

accurately predict whether or not a student would be admitted to a selective college, particularly those practicing holistic admissions.

While degree completion is the most important outcome potentially influenced by undermatching in the eyes of policymakers, undermatching appears to be also associated with a decline in educational aspirations (Jagešić, In press). Fosnacht (2013, 2014) focused on the relationship between undermatching and student engagement, perceived gains, and institutional satisfaction during the first college year, as undermatching should have some impact on the student experience if it influences persistence and completion. These studies found that undermatching has both positive and negative effects and undermatching had the strongest impacts on high achieving students with access to some of the most selective institutions in the nation. Undermatching was positively correlated with increased engagement in active and collaborative learning activities and interactions with faculty. However, undermatches reported experiencing a less rigorous academic curriculum, feeling less supported by their institutions, fewer learning gains, and less satisfaction with their institutions. These studies speculate that if undermatching influences degree attainment, it acts through a less rigorous curriculum, which leads to fewer gains in students' learning and development and ultimately less satisfaction with their institution.

*Summary*

It is relatively clear from the existing research that many students undermatch. While it is not conclusive that undermatching impacts degree completion, two out of three studies have found that undermatching decreases the probability of earning a degree substantially (Bowen et al., 2009; Heil et al., 2014) and decades of research have demonstrated a correlation between selectivity and graduation rates.  If a causal link exists between undermatching and degree attainment, the impacts should manifest in students' within college behaviors, perceived gains, and satisfaction, factors that inform students' persistence decisions. In a previous series of studies, I found that undermatching had mixed effects on first-year student outcomes (Fosnacht, 2014). Undermatching was associated with higher levels of engagement in active and collaborative learning activities and student-faculty interaction. However, undermatches experienced a less challenging academic environment, perceived a less supportive campus environment, had fewer gains in their learning and personal development, and were less satisfied with their college experience than their peers who attended a more selective institution. These findings suggest that undermatches experienced a less rigorous academic environment, which led to fewer perceived gains, and ultimately lower levels of institutional satisfaction. As institutional satisfaction depends upon students' knowledge about and expectations for their college experience, the effect of undermatching on these outcomes may vary by their student characteristics,

which differ upon college entry. Additionally, Black and colleagues (2015) and Hoxby and Avery (2012) have reported that the propensity to undermatch varies by race/ethnicity and urbanicity, respectively. Consequently, to fully understand the undermatching phenomenon, it is important to investigate how it varies between student populations to optimize policies and practices to improve the national degree attainment rate.

## Conceptual Framework

This study was guided by Becker's (1993) human capital theory. The theory equates investments of time, money and opportunity costs to develop a more productive self to traditional forms of capital like money and property. Individuals create human capital through education, training, and health care investments which combine to define an individual's productivity level, which determines their wages in the market. The theory assumes that individuals are rational actors attempting to maximize their utility and make cost-benefit decisions when deciding to invest in their human capital. It also predicts that, in the presence of perfect information about their choices, individuals will make the most beneficial decision for themselves. However, in situations with imperfect information, an individual may make what appears to be a rationale choice to them, but in reality is not optimal.

Imperfect information is prevalent in the college choice process. To choose a college, students typically must first develop a predisposition to

attend college, then search for information about the thousands of possible institutions, and finally choose a college to attend (Hossler, Braxton, & Coopersmith, 1989; Hossler & Gallagher, 1987).  Given the multitude of postsecondary institutions, it is virtually impossible to consider all possible colleges. Furthermore, students do not receive important information, such as financial aid, until after they apply and are admitted to an institution. Consequently, the college choice process results in non-optimal outcomes for many students.

The information problems inherent to the college choice process are compounded as information about college is not equally distributed throughout society and that many schools are do know possess the knowledge or resources to properly guide students (McDonough, 1997, 2005). An increasing amount of literature indicates that students' college choice processes and outcomes vary by their demographic and community characteristics (e.g. Bowen et al., 2009; Hoxby & Avery, 2012; Smith et al., 2013). Additionally, providing students information about the college choice process appears to impact their college choice behaviors (Hoxby & Turner, 2013). Therefore, what information about college students possess appears to be a determining factor in their college choices, even in situations where clear information about the admissions process is provided (Black et al., 2015).  Since, college knowledge varies by student characteristics, the effect of undermatching may similarly vary by the same characteristics.

## Purpose

This study follows up two previous studies that examined how undermatching influenced first-year students' engagement, perceived gains, and satisfaction (Fosnacht, 2013, 2014). It found that undermatches reported a less rigorous academic experience, a less supportive campus environment, fewer perceived gains, and less satisfaction with their institution, after controlling for other factors. However, undermatches reported engaging in more frequent active and collaborative learning activities and more frequent interactions with faculty. In this study, I investigated the heterogeneity of these effects by examining if they vary by race/ethnicity, gender, and parental education. I did this by answering the following research questions using a sample of high achieving, first-year students attending four-year institutions:

1. Does the relationship between undermatching and undergraduate engagement, perceived gains, and institutional satisfaction vary by race/ethnicity, parental education, and gender?

2. If the relationships vary, how are these population groups differently impacted by undermatching?

## Methods

**Data**

I utilized data from first-year undergraduates who responded to the 2010 or 2011 Beginning College Survey of Student Engagement (BCSSE) and the 2011 or 2012 National Survey on Student Engagement (NSSE). A total of 24,018 domestic students at 146 U.S. bachelor's-granting institutions responded to both surveys. Due to previous research indicating that undermatching is most influential on the experiences of high achieving students (Fosnacht, 2013), I limited my sample to students as those with the academic credentials competitive for admission at an institution with a Barron's Admissions Competitive Index of most or highly competitive, a category titled *very selective* by the Chicago Consortium. To identify these students, I followed the approach of the Chicago Consortium studies and assigned students an admissions competitiveness score based upon an admissions competitiveness matrix (see Appendix A) containing students' high school grades and SAT I or equivalent ACT score. The matrix had four selectivity categories, *very selective, selective, somewhat selective,* and *nonselective*, following the consortium method, where *very selective* represented the high achieving students at the focus of this study. Additionally, I automatically assigned students who completed five honors and two Advanced Placement courses to the *very selective* category, in accordance with the Chicago Consortium approach.

After excluding students who attended an institution with a Barron's rating of special (e.g., music and art schools, seminaries) due to my focus

on college matching, 11,483 students were classified as being a match for very selective institution. Next, I identified undermatches by examining the Barron's Admissions Competitive Index of each student's institution, using the Barron's data provided by NSSE. Students who attended a most or highly competitive institution were classified as not undermatching, while students who attended less selective institutions were labeled as undermatching.

**Table 1.**
**Selected sample characteristics by undermatch status (N=11,483)**

| | Undermatched | |
|---|---|---|
| | No (%) | Yes (%) |
| **Gender** | | |
| Male | 35 | 65 |
| Female | 31 | 69 |
| **Race/ethnicity** | | |
| Asian/Pacific Islander | 41 | 59 |
| Black | 15 | 85 |
| Hispanic | 24 | 76 |
| White | 33 | 67 |
| Other | 34 | 66 |
| **Parental education** | | |
| High school or less | 19 | 81 |
| Associate's/Some college | 19 | 81 |
| Bachelor's | 33 | 67 |
| Graduate | 41 | 59 |
| | No (Mean) | Yes (Mean) |
| SAT I or ACT equivalent | 1,322 | 1,239 |
| Median household income | $79,038 | $67,091 |
| Poverty rate | 9% | 10% |

Table 1 contains the characteristics of the sample by undermatch status for selected variables. Females were slightly more likely than males to undermatch. Asian and Pacific Islanders had the lowest undermatching rate, while Black students had the highest. Undermatching was correlated with parental education, as students with a parental education level lower than Bachelor's were substantially more likely to undermatch. Students who undermatched, on average, had lower standardized test scores and lived in communities with lower median household income levels. However, the poverty rate of the students' home community did not differ substantially by undermatch status.

I examined three types of outcomes derived from NSSE. The first, student engagement, was represented by the five NSSE benchmarks: Level of Academic Challenge (LAC), Active and Collaborative Learning (ACL), Student-Faculty Interaction (SFI), Enriching Educational Experiences (EEE), and Supportive Campus Environment (SCE). I also examined three self-reported gains scales: gains in personal and social development, practical competence, and general education. Finally, I used NSSE's overall satisfaction scale to measure student satisfaction with their institution. I standardized all of the outcome variables to have a mean of 0 and standard deviation of 1. Data on the validity and reliability of these variables is available from NSSE (2015).

The main independent variable of interest was undermatch status and the process to identify undermatching status is described above. I also used a variety of other data to control for students' demographic and academic characteristics. The most prominent variables used were gender, parental education, and race/ethnicity, as these variables were used to examine if the effect of undermatching differed by these characteristics. I also used data on the respondents' high school grades, SAT I (M+V) or ACT equivalent score, and the number of friends attending the same college. I also used on six scales derived from BCSSE: High School Academic Engagement, Expected First-Year Academic Engagement, Academic Perseverance, Perceived Academic Preparation, Expected Academic Difficulty, and Importance of Campus Environment. Data on the validity of these scales is available from NSSE (2012) and like the Benchmarks these variables were standardized with a mean of 0 and standard deviation of 1.

In addition to these variables, I used a variety of data describing students' communities merged in via their zip codes. The majority of the data was from the U.S. Census Bureau's 2007-2011 American Community Survey 5-year estimates. The variables included the zip code's racial demography, educational attainment, poverty rate, and household income. I also used urbanity data from the U.S. Department of Agriculture's 2013 Rural-Urban Continuum Codes.

To minimize the amount of data loss, I combined data across both surveys and institution-reported data. Less than 4% of the data points were missing. Consequently, I decided to simply use employ listwise deletion and not use multiple imputation.

**Analyses**

For each of the nine outcome variables described above, I started the analyses by using two-way analysis of variance (ANOVA) models to examine if there were any significant interactions between undermatching status and the three demographic variables examined, race/ethnicity, parental education, and gender, on high achieving first-year students' engagement, perceived gains and satisfaction without controlling for other characteristics. Post hoc Wald tests were used to estimate if the interaction effects were significant.  Next, an OLS regression model was developed to estimate the main effect of undermatching on the dependent variables after controlling for other factors using the variables previously mentioned. This model included interaction effects between undermatching status and the three key demographic variables. Wald tests were used to determine if the coefficients on the interaction terms were significantly different from 0. For the interactions effects that significantly varied, I used the regression coefficient estimates to calculate the estimated effect of undermatching for each group. All analyses were performed with Stata 13.

**Limitations**

While this study attempts to dig deeper into the effects of undermatching, it suffers from some limitations. The primary limitation is that is lacks data on the respondents' college choices. Unlike other undermatching studies (Belasco & Hall, 2015; Black et al., 2015; Bowen et al., 2009; Hoxby & Avery, 2012; Smith et al., 2013), data on which institutions students applied and were admitted to were unavailable. Consequently, I was unable to do a probabilistic match on the likelihood of admission. Additionally, Bastedo and Flaster (2014) have criticized the undermatching literature for basing college match solely on grades and test scores in an era of holistic admissions at top tier institutions. I based my selectivity match matrix on grades and test scores and made an adjustment for students' curriculum to better replicate current admissions practices. However, I am cognizant, as a former admissions counselor, that it is impossible to replicate a holistic admissions review solely using quantitative data. Second, I lack some key data that may inform students' college choices like their parental income and the college-going culture of their high school. In response, I included a number of variables on their home communities like the median household income and educational attainment to serve as proxies for these measures. Furthermore, I lack data on students who undermatched by attending a community college or not enrolling at all. Consequently, this study should not be used to estimate the landscape of undermatching.

**Results**

The results will be presented in two sections. First, the results from the

two-way ANOVA models will show the outcomes where the estimated impact

of undermatching significantly varied. Next, the regression results will be

displayed in two parts. The first section will highlight where significant

interaction effects were observed after controlling for other factors. Next, for

the dependent variables where a significant interaction effect was observed,

I present the estimated effect of undermatching by demographic

characteristics.

**ANOVA models**

The initial analyses investigated if the impact of undermatching

significantly varied by race/ethnicity, parental education, and gender using

two-way ANOVA models that contained dummy variables representing

undermatch status and the demographic characteristic of interest, and their

cross product. A summary of the joint Wald tests of the interaction terms by

demographic characteristic is available in Table 2. The results show that,

without holding other characteristics constant, the mean difference on

student-faculty interaction and institutional satisfaction between students

who did and did not undermatch varied by race/ethnicity. Additionally, an

interaction term between undermatch status and gender was significant for

the following outcomes: supportive campus environment, gains in practical

competence, personal and social development, and general education, and

institutional satisfaction. None of the interaction terms between undermatch

status and parental education were significant.

**Table 2.**
**Joint Wald tests of interaction terms: ANOVA models**

| | Race/ ethnicity* Undermatch | Parental Education* Undermatch | Gender* Undermatch |
|---|---|---|---|
| Level of Academic Challenge | | | |
| Active & Collaborative Learning | | | |
| Student-Faculty Interaction | * | | |
| Enriching Educational Experiences | | | |
| Supportive Campus Environment | | | * |
| Gains: Practical Competence | | | *** |
| Gains: Personal & Social Development | | | * |
| Gains: General Education | | | *** |
| Satisfaction | * | | *** |

* $p < .05$, ** $p < .01$, *** $p < .001$

**Regression models**

After examining the ANOVA results, OLS regression was used to

examine how the results varied after controlling for other student

characteristics. Table 3 contains the results from the joint Wald tests that

examined if the interaction terms between undermatch status and the

demographic characteristics were significantly different from 0. The results

are generally similar to the ANOVA models above. The interaction terms by

race/ethnicity were significant for the following dependent variables:

student-faculty interaction, gains in personal and social development, and

institutional satisfaction. No significant differences in the estimates of the

effect of undermatch status were observed by parental education level.

However, significant differences were observed by gains in practical

competence, gains in general education, and institutional satisfaction by

gender.

**Table 3.**
**Joint Wald tests of interaction terms: OLS models**

|  | Race/ ethnicity* Undermatch | Parental Education* Undermatch | Gender* Undermatch |
|---|---|---|---|
| Level of Academic Challenge |  |  |  |
| Active & Collaborative Learning |  |  |  |
| Student-Faculty Interaction | ** |  |  |
| Enriching Educational Experiences |  |  |  |
| Supportive Campus Environment |  |  |  |
| Gains: Practical Competence |  |  | *** |
| Gains: Personal & Social Development | ** |  |  |
| Gains: General Education |  |  | * |
| Satisfaction | * |  | ** |

Notes: The models also controlled for SAT/ACT score, high school grades, # of friends attending the same school, High School Academic Engagement, Expected First-Year Academic Engagement, Academic Perseverance, Perceived Academic Preparation, Expected Academic Difficulty, Importance of Campus Environment, and the following characteristics of the students' home communities: median household income, racial demographics, poverty rate, parental education, and urbanicity.
* $p < .05$, ** $p < .01$, *** $p < .001$

For the dependent variables where the estimated effect of undermatching varied significantly, I used the linear combination of the main undermatching and cross product estimates from the OLS models to investigate how the estimates varied. Figure 1 shows the linear combinations by race/ethnicity and the overall undermatching estimate. The estimated effect of undermatching on student-faculty interaction for most of the racial/ethnic groups was roughly similar to the overall estimate of .05 SDs. However, the estimate for the catch-all "Other" group, which includes Native Americans, mixed raced, and other students, was .31 SDs. For gains in personal and social development, most of the estimates were clustered around -.14 SDs, while the estimated effect for Black students was positive and at .25 SDs. The estimated association between undermatching and institutional satisfaction was negative for all racial groups, but the estimates show considerable variability. The results indicate that undermatching has the most substantial impact on Asian and Pacific Islander (-.46 SDs) students' satisfaction and the least impact on Black students (-.08 SDs). The overall estimate for satisfaction was -.24 SDs.

**Figure 1.**
**Undermatching estimates by race/ethnicity: Student-faculty interaction, gains in personal and social development, and satisfaction**



Notes: Estimates are the linear combination of the main undermatching effect plus an interaction term holding constant all other variables at their mean. Joint Wald tests of the interaction terms were significant at $p < .05$ for all three variables. SFI = Student-faculty interaction. PSD = Gains in personal and social development. Satis.= Institutional satisfaction

Figure 2 contains the estimated association between undermatching and gains in practical competence, gains in general education, and institutional satisfaction, the three dependent variables where the estimates varied significantly, by gender. On all three outcomes, the estimated effect of undermatching was negative for both males and females. However, the estimates were stronger in all three cases for males than females.

**Figure 2.**
**Undermatching estimates by gender: Gains in practical competence, gains in general education, and institutional satisfaction**
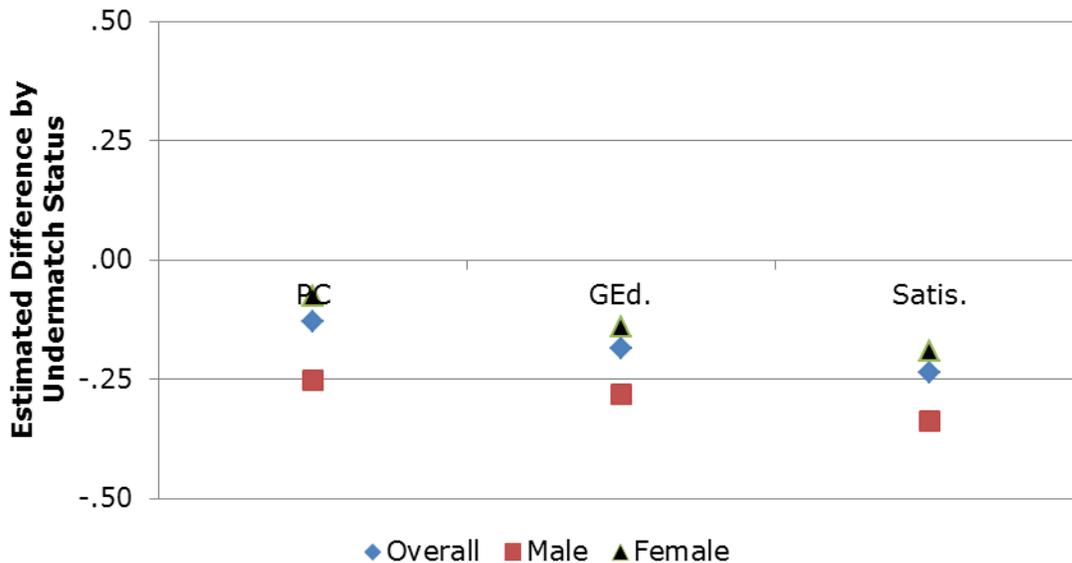


Notes: Estimates are the linear combination of the main undermatching effect plus an interaction term holding constant all other variables at their mean. Joint Wald tests of the interaction terms were significant at $p < .05$ for all three variables. PC = Gains in practical competence. GEd.= Gains in general education. Satis.= Institutional satisfaction

**Discussion**

Undermatching is been the subject of increasing attention by both researchers and policymakers. The current state of the literature indicates that a substantial number of students choose to attend a college less selective than permitted by their academic characteristics, although the precise number is unclear (Belasco & Hall, 2015; Hoxby & Avery, 2012; Rodriguez, In press; Smith et al., 2013). The more important question of whether undermatching influences college outcomes and, if so, for whom has been has not been conclusively answered. There currently is mixed

evidence on the relationship between undermatching and college completion (Bowen et al., 2009; Goodman et al., 2015; Heil et al., 2014). Additionally, others have found that undermatching reduces educational aspirations (Jagešić, In press) and has mixed effects on engagement, self-perceived gains and institutional satisfaction (Fosnacht, 2014).

In this study, I investigated how the impacts of undermatching varied by race/ethnicity, sex, and parental education on high achieving, first-year students' engagement, perceived gains, and institutional satisfaction. Disaggregating the impacts of undermatching is increasingly important as prior research suggests that probability of undermatching differs across student populations (Black et al., 2015; Hoxby & Avery, 2012). Before and after utilizing statistical controls, I found that undermatching has a varying impact on a handful of outcomes by race/ethnicity and gender. However, no differential effects were observed by parental education level. This suggests that the impact of undermatching is largely contextual and may be a function of students' knowledge about college prior to entry.

When examining the estimated correlation between undermatching and the study's outcomes by race/ethnicity, it appears that undermatching has a differential effect on Black students. As shown in Figure 1 above, the estimates for Black students are clear outliers on gains in personal and social development and institutional satisfaction. Undermatching was associated with a perceived gain in personal and social development for Black students,

but had a negative relationship for all other groups. For institutional satisfaction, the estimate for Black students was -.08 SDs, while the closest estimate was -.22 SDs. On this measure, the estimates for Asian and Pacific Islander and Hispanic students were approximately -.40 and -.46 SDs, which further highlights the degree to which the Black estimate is an outlier. Additionally, for the other outcomes studied, the estimated coefficients for Black students when undermatching generally were smaller in magnitude than the overall estimate, with the sole exception of level of academic challenge. Consequently, it appears that undermatching has few negative substantial impacts on the academic experience of first-year students.

The finding that high achieving Black students' first-year experiences are not substantially affected by undermatching may be due to a confluence of factors. First, prior research suggests that undermatching is most prevalent in rural areas (Hoxby & Avery, 2012). Second, Black students are underrepresented at highly selective institutions and thus institutions spend a considerable amount of resources recruiting them. Third, compared to other traditionally underrepresented minority groups and the nation, the Black population is more concentrated in urban and suburban areas, which facilitates access to admissions recruiters and alumni networks. Due to these factors, high achieving Black students may have more college knowledge than other racial groups and may be more deliberate in their college choices. This rationale is supported by Black and colleagues (2015) finding that Black

students were more likely to undermatch even in situations with clear and guaranteed admissions criteria, than other racial and ethnic groups. Consequently, Black students may desire a different college environment than other racial groups and their college choices reflect these preferences. These preferences may be observed in practice through the success of Historically Black Colleges and Universities in graduating Black students compared to their predominantly White counterparts with similar selectivity and resources.

The second major takeaway is that undermatching has differential effects on students' self-perceived gains and institutional satisfaction by gender. While the results for both genders were negative, undermatching was correlated with  fewer gains in practical competence and general education skills and less institutional satisfaction for males than females. However, undermatching was not associated with different levels of engagement for the two groups. This suggests that some or multiple parts of the college environment are responsible for the differential effects. While the study did not test this hypothesis, a likely rationale for this finding is that males are more influenced by their peers than females. Peers are the most important environmental influence on students (Astin, 1993) and less selective institutions have fewer high achieving students on average, thus less selective institutions may be less beneficial for males. An alternate rationale is that less selective institutions on average have fewer students

residing on-campus and thus fewer extra-curricular activities, which may benefit males more than females.

## Conclusions and future research

The current evidence on undermatching suggests that it occurs frequently, but has not conclusively indicated that it is a problem that must be remedied. This study builds off a previous series of studies that examined how undermatching influenced the first-year experience that found it has both positive and negative effects (Fosnacht, 2013, 2014). Due to the dual nature of the effects, I investigated how they varied by race/ethnicity, parental education and gender and found varying by race/ethnicity and gender. In particular, Black students were generally found to either benefit or be the least effected by undermatching. Additionally, undermatching had a stronger negative influence on the experience of males, compared to females.

These results give greater context to the undermatching phenomenon and call for further research on the effect heterogeneity of undermatching. Simply, by only examining the main effect of undermatching, researchers may be neglecting a substantial portion of the undermatch story. Consequently, there is a need for future research examining how undermatching influences degree attainment and other college outcomes disaggregated by students' characteristics.

Appendix A.
Matched selectivity by high school grades and SAT Score

| SAT Score | High School Grades | | | | | | | |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|
|           | C-  | C   | C+  | B-  | B   | B+  | A-  | A   |
| <800      | NS  | NS  | NS  | NS  | SS  | SS  | SS  | SS  |
| 800-890   | NS  | NS  | NS  | SS  | SS  | SS  | SS  | SS  |
| 900-990   | NS  | NS  | NS  | SS  | SS  | SS  | SS  | SS  |
| 1000-1090 | NS  | NS  | SS  | SS  | SS  | SL  | SL  | SL  |
| 1100-1190 | NS  | SS  | SS  | SS  | SL  | SL  | SL  | SL  |
| 1200-1290 | SS  | SS  | SS  | SL  | SL  | VS  | VS  | VS  |
| 1300-1390 | SS  | SS  | SS  | SL  | SL  | VS  | VS  | VS  |
| 1400-1490 | SS  | SS  | SS  | SL  | VS  | VS  | VS  | VS  |
| 1500-1600 | SS  | SS  | SS  | SL  | VS  | VS  | VS  | VS  |

Key: NS=Nonselective, SS=Somewhat Selective, SL=Selective, VS=Very Selective

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