



Improving Admission of Low-SES Students at Selective Colleges: Results From an Experimental Simulation

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Low socioeconomic status (SES) students are underrepresented at selective colleges, but the role that admissions offices play is poorly understood. Because admissions offices often have inconsistent information on high school contexts, we conducted a randomized controlled trial to determine whether providing detailed information on high school contexts increases the likelihood that admissions officers ($n = 311$) would recommend admitting low-SES applicants. Admissions officers in the detailed-information condition were 13 to 14 percentage points (i.e., 26%–28%) more likely to recommend admitting a low-SES applicant from an underserved high school than those in the limited-information condition, although the limited-information condition provided significant details about family SES and high school context. These findings were consistent regardless of the selectivity of the college, admissions office practices, and participant demographics.

Keywords: college admissions; cognitive bias; correspondence bias; decision making; holistic review; low-income students; randomized controlled trial; undermatching

A substantial number of highly qualified low-income students do not enroll in selective colleges (Bastedo & Jaquette, 2011; Hoxby & Avery, 2012), and enrollment gaps in science and engineering are particularly large (Chen, 2009; Museus, Palmer, Davis, & Maramba, 2011). Nonetheless, once they enroll in these colleges, low-income students often succeed academically and graduate at high rates (Bowen, Chingos, & McPherson, 2009). Because admissions offices are so reluctant to be studied, surprisingly little research has been conducted on the effects of selective colleges' own admissions practices, particularly with respect to applicants from lower socioeconomic status (SES) families. Although issues with access for low-SES students are well documented, admissions officers often lack evidence-based practices that would allow them to make decisions that result in both access and excellence.

We drew on a national pool of college admissions officers to conduct a randomized-controlled simulation to demonstrate how decision-making biases may interact with the structure of admissions applications, particularly with respect to low-SES applicants in science and engineering. Despite a robust research program among decision theorists since the 1970s, little work on

such cognitive biases exists in educational contexts (Moore, Swift, Sharek, & Gino, 2010; Swift, Moore, Sharek, & Gino, 2013) or in examining how cognitive biases may play a role in reproducing inequality.

This research is particularly salient given growing concerns about the representation of low-SES and first-generation college students on selective college campuses. Although there is evidence that admissions officers have preferences for lower SES applicants from underserved high schools (e.g., Attewell, 2001; Bowen, Kurzweil, & Tobin, 2006; Espenshade, Hale, & Chung, 2005), these preferences have been demonstrated empirically when academic qualifications “are considered on an all-other-things-equal basis” (Espenshade & Radford, 2009, p. 112). However, for students from low-SES high schools, the differential opportunities available to these students make equivalent academic qualifications far more difficult to obtain. Bowen et al. (2006), for example, point out that students in the top income quartile are six times more likely to take the SAT and score 1200

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or above compared to students in the lowest quartile. Without taking context into account, we are likely to have an overly constrained view of who can succeed in selective colleges. And given emerging and established work on cognitive biases in decision making, admissions officers may discount the important ways that contextual opportunities shape student achievement.

Correspondence Bias and College Admissions

In designing this study, we considered the possible role of *correspondence bias*, which is the human tendency to attribute decisions to a person's disposition or personality rather than to the situation in which the decision occurs (Gilbert & Malone, 1995; Ross & Nisbett, 1991). This phenomenon has been dubbed the “fundamental attribution error” because it is so common and has been demonstrated repeatedly across many contexts (Ross, 1977). Although this experiment was not designed to prove the existence of correspondence bias in application reading, it was inspired by the extensive research in social psychology demonstrating this effect.

In a famous experiment demonstrating correspondence bias, participants were asked to conduct a quiz bowl and randomly assigned to the role of quizmaster, contestant, and audience member (Ross, Amabile, & Steinmetz, 1977). Quizmasters were asked to write questions based on their personal, esoteric knowledge. One might expect observers to note how unfair this game is for contestants since almost everyone knows some random facts that most people do not. Yet after the quiz, observers consistently rated the randomly selected quizmasters as having much more “general knowledge” than the contestants; thus, observers routinely attributed task performance to dispositional attributes (i.e., general knowledge) even when the situation was designed so that the quizmaster clearly had a substantial advantage. Dozens of experiments have demonstrated these correspondence bias effects both among novices and experts (Ross & Nisbett, 1991).

However, evidence suggests that correspondence bias can be mitigated by providing robust, high-quality information about situational attributes. For instance, two experimental studies asked undergraduates to take the role of admissions officers and provide admissions recommendations for hypothetical graduate school applicants (Moore et al., 2010; Swift et al., 2013). When these participants were given information about the average GPA of the applicants' undergraduate institutions, they gave far more favorable ratings when applicants received the same GPA from a low/average GPA institution (with tougher grading practices) than from a high/average GPA institution.

Based on prior research, we surmised that correspondence bias is likely to be present in the evaluation of high school academic credentials during the college application review process. Applicants from underresourced high schools have reduced access to the honors and Advanced Placement (AP) courses (Attewell & Domina, 2008; Klopfenstein, 2004; Perna, 2004) that are strong predictors of admission to selective colleges (Bastedo, Howard, & Flaster, 2016; Espenshade & Radford, 2009). These applicants are also less likely to have access to test preparation and knowledge about how to craft an effective college application, from writing personal statements to deciding on extracurricular activities (Buchmann, Condrón, & Roscigno,

2010; Holland, 2014). Correspondence bias suggests that college admissions officers are likely to overlook these situational barriers and therefore provide recommendations for lower SES applicants that underestimate the value of their credentials. Because high-SES applicants often do not face these types of environmental constraints, correspondence bias likely has a disproportionately negative effect on low-SES applicants.

To help balance the playing field, selective colleges that use holistic admissions practices wish to identify applicants who maximize the opportunities available at their high school (Lucido, 2015; Mamlet & VanDeVelde, 2012). As a result, providing higher quality information on high school context should make this information more salient, making it more likely that admissions officers will admit a low-SES applicant as admission officers account for applicants' external circumstances. As previous research has suggested (Moore et al., 2010; Swift et al., 2013), correspondence bias in college admissions could be reduced if admissions officers had easy access to relevant information about situational factors that are pertinent to applicants' academic achievements.

Unfortunately, many admissions officers do not have consistent, high-quality data available to them about school context, such as the percentage of students who are English language learners or who qualify for free, government-subsidized school lunches (Bastedo, 2014). In addition, performance within school context—which constitutes another key situational indicator—is also difficult to track with the decline in use of class rank. In 2006, only 61% of high school counselors reported class rank to colleges on a routine basis (National Association of College Admissions Counselors [NACAC], 2007). As a result, the number of colleges reporting that class rank has a considerable influence on decisions has fallen from 42% to 15% over the past 20 years (Clinedinst, 2015).

Given this lack of contextual information, admissions officers may occasionally resort to searching for high school data on the Internet, but that information is often dated, inaccurate, or impossible to find. On a regular basis, admissions officers simply do not have the time to conduct additional research on many applications. During the busy times of the admissions cycle, participants in our study read an average of 137 files per week, and about 25% of these admissions officers reported reading at least 200 applications per week. Our participants have, on average, 15 minutes to read, evaluate, and score each file. College applications contain a limited range of information, and as Kahneman (2011) says, “what you see is all there is” (p. 86). People are biased toward information that is readily at hand, and correspondence bias leads people to draw attributions about dispositions rather than contexts. In addition, decision bias can be enacted through which applications admissions officers choose to investigate and which they do not.

Thus, in the present study, we experimentally manipulated the quality of high school information provided in simulated applications. In the limited condition, we provided enough information to assess socioeconomic status through parental education and high school graduation rate. In the more detailed condition, we provided additional data, including college enrollment rates, average standardized test scores, AP curriculum offerings, and measures of poverty, such as the percentage of

students on free/reduced lunch. As a result, participants assigned to the detailed condition had a more robust understanding of the high school context for all applicants. Because we did not provide specific instructions about how to use this information, we were able to gauge the impact of this additional information within the admissions context of the participants' colleges. Specifically, we explored the following hypotheses:

Hypothesis 1: Admissions officers will provide higher ratings for academic qualifications and essays and will be more likely to recommend admission for low-SES applicants when provided with more detailed information about high school context.

Hypothesis 2: In contrast, higher SES applicants will not receive higher ratings and participants will not be more likely to recommend admission for these applicants when they have detailed high school information.

Hypothesis 3: The higher ratings for qualifications and essays will mediate the effect of contextual detail on the admissions recommendation outcome.

We also explored various potential moderators of the effect of detailed high school information for which we had no a priori predictions (i.e., institutional selectivity, participant characteristics, and admissions office characteristics).

Method

Participants

Given that college students lack expertise in evaluating college applications and are more susceptible to psychological interventions than experts (Henry, 2008), it was vital to use working college admissions officers for this study. Therefore, we recruited admissions officers who regularly read admissions files and who work at colleges or universities within the top three tiers of Barron's (2013) selectivity ratings. The *most competitive* institutions were those that are generally characterized by: (a) students who rank in the top 10% to 20% of their high school class, with grade averages from A to B+, (b) median test scores of 655 to 800 on the SAT (math and verbal) and at least 29 on the ACT among incoming first-year students, and (c) admitting fewer than one-third of applicants. The second tier of institutions were *highly competitive*; schools in this group were generally characterized by: (a) students who are in the top 20% to 35% of their class in high school and have an average GPA of at least B or B+, (b) institutional median scores of 620 to 654 on the SAT (math and verbal) and 27 to 28 on the ACT, and (c) admitting between one-third and one-half of applicants. *Very competitive* institutions generally had these characteristics: (a) students who rank in the top 35% to 50% of their high school class with grade averages of at least B-, (b) median test scores of 573 to 619 on the SAT (math and verbal) and 24 to 26 on the ACT, and (c) admitting between one-half and three-quarters of their applicants.

A total of 311 admissions officers working at 174 different U.S. colleges and universities participated in the study. Of these, 57% were female, 77% were White/Caucasian, 10% were Black/African American, 9% were Latino/Hispanic/Chicano, 6% were

Asian American/Pacific Islander, 1% were American Indian/Alaska Native, and 2% were from other racial/ethnic groups (these racial/ethnic figures add up to slightly more than 100% since participants were allowed to choose multiple categories). Participants were recruited from attendees of the 2014 annual meeting of the primary professional organization for admissions officers, the National Association of College Admissions Counseling. In addition, the leadership of CACHET (College Admissions Collaborative Highlighting Engineering and Technology), a subgroup within NACAC, encouraged its members attending the annual meeting to participate. Admissions officers received \$50 gift cards for their participation. No census data exist on admissions officer characteristics, so it is unclear to what extent these participants are representative of college admissions officers nationally.

Procedure

Admissions officers were informed that they would review three simulated admissions files and that they should use the same standards and criteria that they would use when reading files at their own institution. Participants were then presented files that contained information about each applicant's high school, academic qualifications (i.e., unweighted and weighted high school GPA, number of honors/AP courses taken, scores for each section of the SAT and/or ACT [including ACT composite], AP examinations and scores, and the names and grades of all academic courses during their four years), extracurricular activities, and personal statement. Each file was scored in order, as would be done in normal admissions practice.

Participants read a total of three applications: One student had strong academic credentials (in terms of high school grades, difficulty of coursework, and standardized test scores) and attended an upper-middle-class high school. Another applicant also attended an upper-middle-class high school, but his grades, coursework, and standardized test scores were all lower than those of the first applicant. Another received good grades and took among the most difficult courses offered at the lower SES high school that he attended. However, his courses were less advanced, and his standardized test scores were lower than those of the first applicant. This correspondence between high school SES and applicant SES reflects the high levels of residential segregation by socioeconomic status that is prevalent in the United States (Reardon & Bischoff, 2011). The order in which these applications were reviewed was counterbalanced. Moreover, to avoid confounding these key aspects of the admissions file and students' race/ethnicity or gender, all applicants were White and male, and the major identified for all applicants was engineering.

The amount of information about the high school and applicants' performance relative to their high school peers varied across experimental conditions. Participants in the limited-information condition ($n = 154$) were provided with the following: high school name (fictitious), state, institutional control (public), number of students, and graduation rate. This last piece of information is especially important because graduation rates are very strongly associated with the average socioeconomic status of students at the high school (Freeman & Simonsen, 2015). Participants were also given the applicants' parental

education; all parents of the higher SES applicants had at least a master's degree, whereas neither of the low-SES applicant's parents had attended college.

All information provided in the limited condition was also provided in the detailed condition ($n = 157$). Moreover, the applications in the detailed-information condition contained additional data about the high school: enrollment rates at four-year and two-year colleges, average ACT composite score and SAT score (critical reading plus mathematics), percentage of students who meet federal eligibility criteria for free or reduced-cost lunch, percentage of students with limited English proficiency, number of AP courses offered, and percentage of students who take AP examinations who receive a score of at least 3 (which is considered a passing grade at many institutions). These measures of socioeconomic status within high schools are available from the U.S. government or other national organizations (e.g., The College Board) and are used by some colleges to assess high school context. The detailed condition also contained each applicant's percentile within his high school for weighted and unweighted high school GPA, which provides a more accurate and reliable measure of class rank. The median ACT and SAT scores at the high school were also shown for each section of these exams (including ACT composite). By providing information about students' high school overall and their performance relative to high school peers, we sought to give admission officers multiple forms of information in which applicants' performance could be considered in the context of their high school environment.

Clearly, admissions officers at the most competitive schools would typically reject some applicants that would often be accepted by those at less selective schools. Therefore, students' academic qualifications and extracurricular activities were adjusted by selectivity tier so that they would be competitive at these different levels of selectivity. Details about the creation of simulated admission files, pilot testing, and other logistics are provided in the supplemental material available on the journal website.

Measures

The primary dependent variable was participants' admissions recommendation for each applicant (1 = deny, 2 = wait list, 3 = accept). Many students who are placed on wait lists at selective institutions are never ultimately accepted (Clinedinst, 2015), so the accept decision is particularly important. Therefore, additional analyses used a binary decision outcome (0 = deny or wait list, 1 = accept). Participants rated each applicant's academic record, extracurricular activities, and personal statement on a 6-point scale (1 = *very poor*, 2 = *poor*, 3 = *fair*, 4 = *good*, 5 = *very good*, 6 = *excellent*).

For independent variables, experimental condition was indicated with a dichotomous variable (0 = limited high school information, 1 = detailed high school information). For measuring selectivity tier in the regression analyses, dummy-coded variables were used for highly competitive and very competitive, with most competitive as the referent group. Binary variables were also used in moderation analyses to measure participants' gender (0 = male, 1 = female) and race/ethnicity (given the small sample sizes for some racial/ethnic groups, a single variable was used: 0 = White/Caucasian, 1 = participant of color). Parental

education was computed as the average of mother's and father's education (1 = elementary school, 9 = graduate degree). Experience working in admissions was rated on a 7-point scale (1 = less than 1 year, 7 = 21 years or more). Whether committees are used to make final admissions decisions was indicated with a binary variable (0 = no, 1 = yes). The average number of minutes spent reading each admissions file and the number of files read per week during busy times were measured through open-ended responses, and they were coded as continuous variables. A few participants reported ranges for these variables (e.g., 10–15 minutes per file); when this occurred, the median was computed and used (e.g., 12.5). Given the skewed distribution for number of files read, a natural-log transformation of this variable was also examined. Finally, to explore moderation effects of the detailed-information intervention, the variable for the experimental condition was multiplied by each potential moderating variable to create interaction terms (Jaccard & Turrisi, 2003).

Analyses

The initial analyses were conducted separately for the ratings of each applicant. Ordinal logit regression analyses were used to predict each applicant's admissions recommendations (admit, wait list, or deny), and logistic regression analyses were used to predict each applicant's acceptance recommendation, a binary variable indicating whether an accept recommendation was provided (Long, 1997; O'Connell, 2006). In these analyses, the first model included only detailed information as a single predictor, while the second model included selectivity tier to explore the unique potential effects of experimental condition; this sensitivity check is especially important given that the simulated applications were adjusted across selectivity tiers to be relatively competitive. The parallel line assumption was met for all ordinal logit regression analyses ($ps > .07$). The statistical equation for predicting the binary acceptance recommendation is the following (with the highest selectivity tier as the referent group):

$$\ln \frac{p(y_{ij})}{1 - p(y_{ij})} = \beta_0 + \beta_1 DETAILED_j + \beta_2 TIER2_j + \beta_3 TIER3_j + e_{ij}, \text{ where } e_{ij} \sim N(0, \sigma^2), \quad (1)$$

and $p(y_{ij})$ is the probability of an acceptance recommendation for applicant i provided by participant j , β_0 is the intercept, and e_{ij} is the error term. Ordinary least squares multiple regression analyses were also conducted to predict ratings of the intermediate outcomes for each applicant: academic qualifications, extracurricular activities, and personal statements.

The preceding analyses can determine the effect for each applicant, but it cannot test whether the effect of high school information on admissions recommendations was significantly greater for the low-SES applicant. Therefore, hierarchical generalized linear models were conducted with applicant recommendations (Level 1) nested within participants (Level 2) (Raudenbush & Bryk, 2002; Snijders & Bosker, 2012). A substantial proportion of variance in admissions and acceptance recommendations occurred between participants (intraclass correlation coefficients were .32 and .24, respectively). To model

the interaction appropriately (Jaccard & Turrisi, 2003), a dichotomous variable indicating the low-SES applicant was included at Level 1, and variables indicating selectivity tier and detailed condition were at Level 2. The key analysis was a slopes-as-outcomes model that explored whether the effect of the detailed condition differed between the low-SES and higher SES applicants. Stated differently, detailed information served as a predictor of the Level 1 slope for the relevant applicant. The equation for predicting acceptance recommendations at each level was the following:

$$\text{Level 1: } \ln \frac{p(y_{ij})}{1 - p(y_{ij})} = \beta_{0j} + \beta_{1j} (LSAPP_i) + r_{ij}, \text{ where } r_{ij} \sim N(0, \sigma^2) \quad (2)$$

$$\begin{aligned} \text{Level 2: } \beta_{0j} &= \gamma_{00} + \gamma_{01} (DETAILED_j) + \gamma_{02} (TIER\ 2_j) + \gamma_{03} (TIER\ 3_j) + u_{0j}, \text{ where } u_{0j} \sim N(0, \tau_{00}) \\ \beta_{1j} &= \gamma_{10} + \gamma_{11} (DETAILED_j) + u_{1j}, \\ \text{where } u_{1j} &\sim N(0, \tau_{11}), \end{aligned} \quad (3)$$

and $p(y_{ij})$ is the probability of an acceptance recommendation for applicant i provided by participant j , β_{0j} is the intercept, and r_{ij} , u_{0j} , and u_{1j} are error terms.

Additional analyses examined cross-level interactions between detailed condition and each of the two higher SES applicants to explore whether the effect for the low-SES applicant was significantly different from each of the higher SES applicants. Two dummy variables were entered at Level 1 representing each of the higher SES applicants (with the low-SES applicant serving as the referent group). Chi-square analyses were also used to test the bivariate relationship between detailed condition and acceptance recommendation. These cross-level interaction analyses examined whether the effect of providing detailed high school information (at Level 2) varied significantly across applicant ratings (at Level 1). In some ways, the interpretation of these results is similar to single-level interactions in multiple regression except that the predictors of interest occur at multiple levels. That is, it explores whether the link between a predictor and an outcome varies as a function of another predictor. The cross-level interaction here differs somewhat from many uses of this approach since the multilevel models in this study contain ratings nested within individuals as opposed to individuals nested within groups or organizations (Raudenbush & Bryk, 2002; Snijders & Bosker, 2012).

Limitations

The main limitation of the study is that it is a simulation of admissions decision making, not a field experiment using real-world conditions. As a result, it is possible that participants did

not make the same scoring and admissions recommendations they would make if their decisions had real consequences. Low-SES applicants who receive high admissions scores and recommendations may ultimately not be admitted once final decisions are made. Thus, the results here on admissions *scoring* and admissions *recommendations* should not be construed as final admissions *decisions*, which are generally made by deans and enrollment managers. In particular, enrollment management practices to ensure revenue and improve academic qualifications and rankings strongly disadvantage low-SES applicants.

Because this experiment was a simulation, it is also possible that participants were more willing to “take a chance” on a low-SES applicant than they would under real-world conditions or that participants were more inclined than the average admissions officer to admit low-SES applicants, especially when given additional information about high school context. A number of actions were taken to minimize this possibility. Participants were told that the study only sought to better understand admissions decision making, and the study materials did not indicate that the analytic focus was applicant SES. Participants were instructed to read each application as a “real file” for their school, not in some hypothetical context.

It is also possible that participants evaluated applications in relation to each other rather than on their own merits, resulting in a “joint evaluation” or “preference reversal” problem (Hsee, Loewenstein, Blount, & Bazerman, 1999). To mitigate this effect, we randomized the order that applications were provided to participants, and supplemental analyses did not identify any order effects for admissions or acceptance recommendations. Moreover, participants were not instructed to accept or deny a certain number of recommendations; indeed, almost half of participants provided the same admissions recommendation for all three applicants. Finally, if applicants were evaluated in comparison to one another, then this tendency would lead participants who rated one applicant higher to rate another lower. However, the correlations among admissions recommendations for the three applicants are positive and generally large ($r_s = .36-.63$), which also seems contrary to a joint evaluation explanation.

Three additional limitations should be noted. First, the detailed-information condition contained more information about the high school as well as providing applicants’ performance relative to their high school peers. Because these two sources of information were varied simultaneously, it is unclear whether one of these manipulations was primarily or exclusively responsible for the effects observed here. Second, applicants’ gender, race/ethnicity, and intended major were all identical across participants. This standardization has the benefit of removing the potential influence of these demographics across files. Nonetheless, it is unknown whether similar results would be obtained if different demographic variables were selected. Finally, although the concept of correspondence bias inspired the hypotheses and research design of the study, we

Table 1
Unstandardized Coefficients for Effects of Detailed High School Information on Admissions Officers' Recommendations

| Outcome and Predictor | Applicant | | | | | |
|---------------------------|-------------------|--------------------|----------------------------|--------------------|------------------------------|--------------------|
| | Low SES | | Higher SES, High Achieving | | Higher SES, Middle Achieving | |
| | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| Admissions recommendation | | | | | | |
| Detailed condition | 0.573* (0.225) | 0.577* (0.228) | -0.204 (0.356) | -0.170 (0.374) | 0.159 (0.221) | 0.093 (0.229) |
| Selectivity Tier 2 | | 0.867** (0.302) | | 2.087** (0.499) | | 1.296** (0.306) |
| Selectivity Tier 3 | | 1.104** (0.298) | | 1.725** (0.425) | | 1.969** (0.312) |
| Acceptance recommendation | | | | | | |
| Detailed condition | 0.565* (0.232) | 0.565* (0.236) | -0.230 (0.356) | -0.252 (0.376) | 0.245 (0.229) | 0.210 (0.244) |
| Selectivity Tier 2 | | 0.701* (0.322) | | 2.087** (0.499) | | 1.230** (0.347) |
| Selectivity Tier 3 | | 0.946** (0.315) | | 1.744** (0.427) | | 1.962** (0.347) |
| <i>N</i> | 311 | 311 | 311 | 311 | 311 | 311 |

Note. Standard errors are in parentheses. Ordinal logit regression analyses were used to predict admissions recommendations (1 = deny, 2 = wait list, 3 = accept), and binary logistic regression analyses were used to predict acceptance recommendations (0 = deny/wait list, 1 = accept). SES = socioeconomic status. * $p < .05$. ** $p < .01$.

cannot prove that correspondence bias is the precise mechanism driving these results. This would require a different type of laboratory experiment that tested multiple informational scenarios and was beyond the purpose of our study.

Results

As an initial step, we examined whether the randomization resulted in groups that were similar across a range of characteristics. Indeed, t tests showed that participants who were assigned to the limited and detailed-information conditions did not differ significantly by selectivity tier, gender, race/ethnicity, parental education, years of admissions experience, whether a committee is used to make admissions decisions, time spent reading files, and number of files read (original and natural-log transformed scale) ($ps > .11$).

The order in which the applications were presented was not significantly related to admissions recommendations (on a 3-point scale) or acceptance recommendations (accept vs. wait list or deny) for all three applicants ($ps > .51$). Moreover, application order did not significantly interact with high school information or selectivity tier—and it did not have a significant three-way interaction with information and tier—for any of the three simulated admissions files ($ps > .18$). Therefore, application order was not included in the primary analyses.

Ordinal logit regressions examined admissions officers' decisions to deny, wait list, or accept each applicant. As shown in Table 1, the lower SES applicant received more favorable

admissions recommendations when the simulated application contained detailed information about students' high school contexts than when it did not; the relationships were virtually identical regardless of whether the analyses controlled for institutional selectivity ($ps < .02$). This effect of detailed information did not significantly interact with institutional selectivity ($ps > .11$), which suggests that providing additional high school context may be equally effective at highly and moderately selective schools. No significant effects of high school information were observed for the two higher SES students ($ps > .47$). Multilevel analyses with applicants nested within participants showed that the effect of providing detailed information was significantly more positive for the lower SES applicant than the other applicants combined ($ps < .01$; see top numerical row of Table 2). Moreover, the effect for the low-SES applicant was significantly stronger than those for each of the two higher SES applicants when measured separately ($ps < .05$; see second and third rows in Table 2). The means for all three conditions are displayed visually in Figure 1.

As noted earlier, many students who are placed on wait lists at selective institutions are never ultimately accepted (Clinedinst, 2015), so logistic regression analyses examined a binary outcome (accept vs. wait list/deny). The main result for this binary outcome is also summarized in Table 1. With or without controlling for institutional selectivity, the lower SES applicant was more likely to be recommended for acceptance when additional high school context was provided in the application ($ps < .02$). Delta p statistics showed a 13.0 percentage point effect for the average participant; that is, the low-SES applicant had a 63.1% chance of

Table 2
Unstandardized Coefficients for Interactions Between Applicant and Detailed Information
Predicting Admissions Officers' Recommendations in Multilevel Analyses

| | Admissions Recommendation | | Acceptance Recommendation | |
|--|-----------------------------|-------------------------|-----------------------------|-------------------------|
| | Controlling for Selectivity | No Selectivity Controls | Controlling for Selectivity | No Selectivity Controls |
| Detailed Information × Low-SES Applicant | 0.687** (0.249) | 0.671** (0.242) | 0.707** (0.249) | 0.680** (0.237) |
| Detailed Information × Higher SES, High Achieving Applicant | -1.127* (0.503) | -1.102* (0.487) | -1.256** (0.472) | -1.185** (0.450) |
| Detailed Information × Higher SES Middle Achieving Applicant | -0.800** (0.304) | -0.739* (0.290) | -0.587* (0.289) | -0.526+ (0.271) |
| <i>N</i> | 933 | 933 | 933 | 933 |

Note. Standard errors are in parentheses. Hierarchical generalized linear modeling analyses were conducted with applicant ratings (Level 1) nested with participants (Level 2). The results in the first numerical row compare the effect of detailed information for the low-SES applicant to those of the two higher SES applicants simultaneously (who serve as the referent group). In contrast, the results in the second and third numerical rows compare the effect of detailed information for each of the higher SES applicants to that of the low-SES applicant (who serves as the referent group). All analyses included the main effects for the relevant interactions: detailed high school information at Level 2 and binary indicators for the corresponding application(s) at Level 1. When applicable, selectivity tiers were also entered at Level 2. Admissions recommendations were treated as ordinal (1 = deny, 2 = wait list, 3 = accept), and acceptance recommendations were treated as binary (0 = deny/wait list, 1 = accept). SES = socioeconomic status.
 + $p < .05$. * $p < .05$. ** $p < .01$.

acceptance in the detailed high school information condition versus 50.1% chance in the limited condition when accounting for selectivity tier. As another way of describing this effect, low-SES applicants were 26% more likely to receive acceptance recommendations when detailed information was provided. Moreover, analyses that explored interactions between high school information and selectivity showed no significant moderation effect ($ps > .16$). For the higher SES applicants, the overall effect of high school information on acceptance recommendations was nonsignificant ($ps > .28$) (Figure 1). Using chi-square analyses that did not account for selectivity, the lower SES applicant had higher acceptance rates in the detailed condition (63.5%) than the limited-information condition (49.7%), $\chi^2(1) = 5.979$, $p = .014$. The chi-square analyses did not find significant effects of condition for either of the higher SES applicants ($ps > .28$). Moreover, as shown in Table 2, the impact of high school information on acceptance recommendations was significantly greater for the lower SES applicant than the higher SES applicants combined in multilevel analyses ($p \leq .005$). The effect for the low-SES applicant was also stronger than those for each of the two higher SES applicants when measured separately ($ps \leq .05$).

Numerous moderators of the impact of high school information were explored for the lower SES applicant, including the parental education, race/ethnicity, gender, and years of admissions experience of the participant as well as the number of admissions applications read per week, the amount of time spent reading an average application, and whether committees are used to make final admissions decisions. None of these variables significantly interacted with high school information to predict admissions recommendations ($ps > .50$).

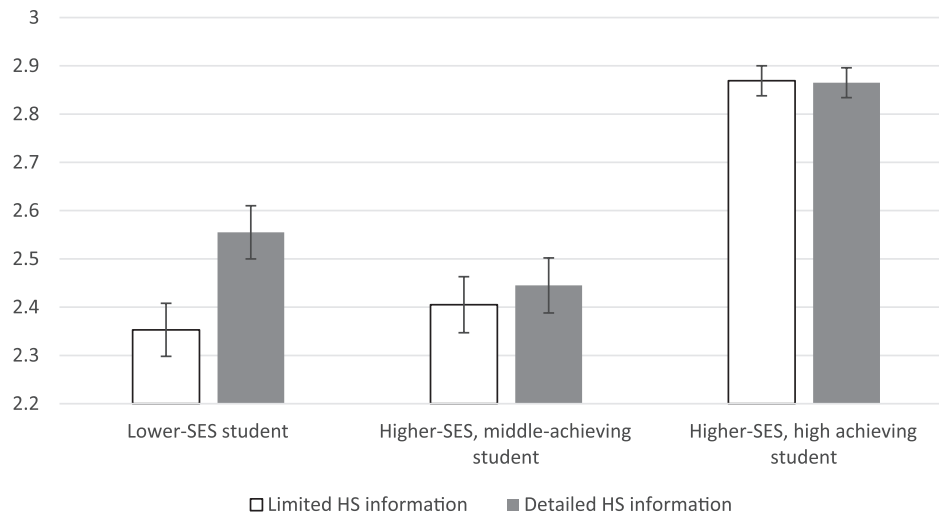
The impact of high school information on the lower SES applicant was mediated by perceptions of academic qualifications and personal statements (see Table 3 and Figure 2). In multiple regression analyses controlling for institutional selectivity, admis-

sions officers gave higher ratings of academics ($p = .024$, $d = .22$) and marginally higher ratings of personal statements ($p = .062$, $d = .21$) when additional high school information was provided, but this effect was nonsignificant for extracurricular activities ($p = .93$). (Corresponding analyses of these three intermediate outcomes for the two higher SES applicants were generally nonsignificant; the borderline exception was that the personal statement of the middle achieving applicant was rated marginally higher in the detailed condition than the limited-information condition, $p = .091$.) In bootstrap mediation analyses for the low SES applicant (see Hayes, 2013; Preacher & Hayes, 2008), academic and personal statement ratings both significantly mediated the link between high school information and admissions recommendation; with the addition of these mediators to the model, the direct effect of high school information became nonsignificant. This finding was similar regardless of whether the dependent variable was modeled as ordinal or dichotomous. Sensitivity analyses (not reported here) also showed that these mediation results were substantively identical with and without accounting for institutional selectivity.

Discussion

Our results suggest that the quality of contextual information can play a substantial role in the evaluation of low-SES applicants in college admissions. Consistent with the philosophy of holistic review, admissions officers showed a willingness to reward applicants for overcoming obstacles rather than penalizing applicants for attending an insufficiently rigorous high school. This finding suggests that the lack of access for low-SES students in selective colleges may be partially due to a lack of high-quality information rather than an unwillingness to consider class-based disparities or an overreliance on any litmus test for admission (e.g., taking AP calculus). The nonsignificant

Admissions Recommendations



Acceptance Recommendations

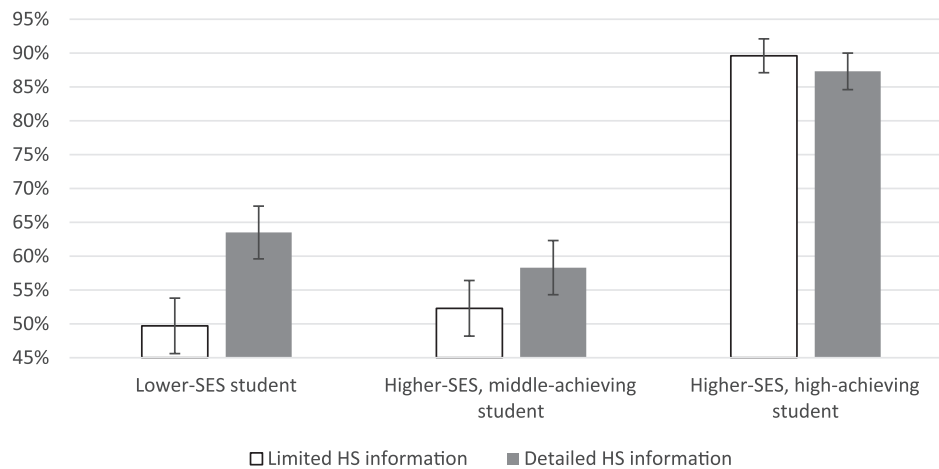


FIGURE 1. Admissions and acceptance recommendations as a function of applicant and high school information (detailed vs. limited). Error bars represent standard errors. Admissions recommendations were coded as 1 = deny, 2 = wait list, and 3 = accept; acceptance recommendations represent the proportion of participants who recommended accepting the applicant. The values are for raw means and proportions; the results are virtually identical when controlling for institutional selectivity

results for higher SES applicants suggest that admissions officers do not seem to reward or penalize higher SES students for attending high schools with more rigorous curricula.

Perhaps surprisingly, there are no moderating effects based on institutional selectivity, admissions office practices, or admissions officer characteristics. The effects in the study were consistent across all other measured characteristics of the admissions office or the admissions officer. The results are robust across elite and less elite colleges, and they do not depend on whether admissions offices use committees, read more applications, or spend less time reading each application.

There is also strong evidence that the admissions officers in this study were reading and judging the application in context because they rated academics and essays more positively in the detailed-information condition. In addition, the direct effect of detailed information on admissions recommendations was fully

mediated by these academic and essay ratings, which suggests that perceptions of these aspects of the application materials may entirely explain the observed effects. Thus, admissions officers did not seem to have used a more lenient admissions standard for lower SES applicants, which some sociologists have called “compensatory sponsorship” (Grodsky, 2007). If this were the case, then perceptions of academic qualifications and personal statements would not have mediated the effect of high school information.

Interestingly, admissions officers read applications from low-SES students more favorably in the detailed condition, but they did not read the high-SES applicant less favorably in the same condition. This could suggest that correspondence bias has only affected the evaluation of the low-SES applicant, but there are several alternative interpretations for this result. First, it could be that the higher SES applicant’s SES simply was not high enough

Table 3
Unstandardized Coefficients for Bootstrap Multiple Mediation Analyses of Detailed High School Information Predicting Admissions Recommendation (Ordinal) and Acceptance Recommendation (Dichotomous) for the Low-SES Applicant

| Dependent Variable | Mediator | Effect of Detailed Information on DV | | Effect of Detailed Information on Mediator (a Path) | Effect of Mediator on DV (b Path) | Bootstrap Point Estimate of Indirect Effect | 95% Bootstrap Confidence Interval for Point Estimate | R ² for Model Predicting DV |
|---|---------------------------|--------------------------------------|--------------------------|---|-----------------------------------|---|--|--|
| | | Without Mediators (c Path) | With Mediators (c' Path) | | | | | |
| Admissions recommendation (deny, wait list, accept) | Academic rating | | | 0.184* (0.081) | 0.371*** (0.049) | 0.068 (0.032) | 0.0109, 0.1353 | 0.261*** |
| | Personal statement rating | 0.192* (0.076) | 0.101 (0.069) | 0.213+ (0.114) | 0.119*** (0.035) | 0.025 (0.016) | 0.0011, 0.0646 | |
| | Combined paths | | | — | — | 0.094 (0.036) | 0.0262, 0.1698 | |
| Acceptance recommendation (wait list/deny, accept) | Academic rating | | | 0.184* (0.081) | 1.230*** (0.221) | 0.227 (0.110) | 0.0323, 0.4607 | 0.279*** |
| | Personal statement rating | 0.565* (0.236) | 0.330 (0.262) | 0.213+ (0.114) | 0.462*** (0.134) | 0.099 (0.062) | 0.0002, 0.2445 | |
| | Combined paths | | | — | — | 0.325 (0.130) | 0.0816, 0.5977 | |

Analyses used 5,000 resamples with institutional selectivity as control variables. Statistical significance of indirect effects is determined by whether the bootstrap confidence interval contains zero. Nagelkerke pseudo R² is displayed for the dichotomous outcome. DV = dependent variable; SES = socioeconomic status. *p = .06. *p < .05. **p < .01. ***p < .001.

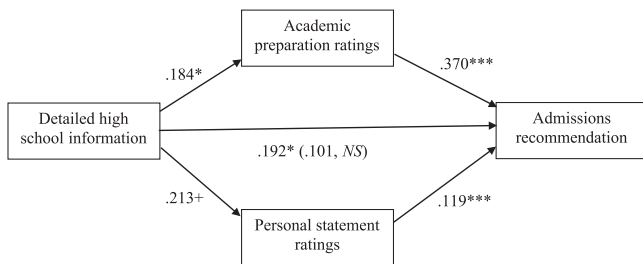


FIGURE 2. Unstandardized coefficients for bootstrap multiple mediation analysis predicting admissions recommendation for the lower socioeconomic status applicant. Analysis used 5,000 resamples with institutional selectivity as control variables. Values in parentheses indicate the direct effect when the mediators were included in the model. *p = .06. *p < .05. **p < .01. ***p < .001

to suffer any penalty. Further, admissions officers may believe that applicants cannot control the circumstances of their birth and thus should not be penalized for having greater opportunities that they cannot control. High-SES students are also well represented in applications to selective institutions, so providing information that simply confirms this norm may not influence admissions officers' perceptions. Finally, enrollment management policies to ensure revenue may have filtered to decision making among admissions officers, ensuring more favorable consideration for high-SES applicants who are capable of paying "list price" tuition.

This study's findings have substantial implications for decision making in selective college admissions offices. Today, admissions officers often have low-quality information about high school contexts based on anecdotal information, personal

experience, or photocopies of school-produced "profile sheets" that contain inconsistent and even propagandistic information (Bastedo, 2014). Low-quality information leads to incomplete correction of dispositional inferences; even when admissions officers know they should account for contextual information, normal human biases ensure that they will often fail to do so sufficiently under these circumstances (Gilbert & Malone, 1995).

This simulation suggests that specific interventions with admissions officers have the potential to increase the number of low-SES students in selective science and engineering programs. Consistent, high-quality data on high school contexts can and should be provided to admissions offices around the country; a number of organizations have this capacity, particularly The College Board, ACT, and The Common Application. Prior research has shown that higher quality information can reduce correspondence bias and improve decision quality even among expert decision makers (Moore et al., 2010; Swift et al., 2013). Information can thus provide a "nudge" (Thaler & Sunstein, 2009) to reduce correspondence bias and improve decision making. Better contextual information can also supplement dashboards or indexes of disadvantage (Gaertner & Hart, 2013) that are being used to influence admissions decisions.

These results describe one possible intervention to improve access and admission of low-income students in selective colleges. Existing research demonstrates that there has been little progress in increasing low-income student enrollment over the past 30 years, and the admissions office can be a crucial gatekeeper (Karen, 1990; Stevens, 2009). The literature has tended to focus on changing student information and incentives in the hopes of increasing the number of applications from low-income

students (e.g., Hill & Winston, 2010; Hoxby & Turner, 2013). We seek to address the institutional side of the equation by focusing on practices inside admissions offices that may unintentionally impede equity (Bastedo, 2016).

Our results also have important implications for research on college match. Much of the existing research has been focused on recruitment and application, but low-SES students face significant obstacles across the enrollment process (Bastedo & Flaster, 2014; Bastedo et al., 2016; Espinosa, Gaertner, & Orfield, 2015). Although admissions offices that use holistic review instruct application readers to consider high school and family context during the reading process, our research suggests that cognitive biases lead people to discount consideration of these contexts when making decisions. So in addition to formal policy barriers in admissions that disadvantage low-income students (e.g., the additional consideration provided to legacies and development cases), we must also consider the unconscious biases that disadvantage low-SES applicants. Our research suggests that providing high-quality contextual information in every college admissions file can ameliorate these biases. Further laboratory research should also be conducted to prove the existence of correspondence biases and eliminate other possible sources of the effects described here.

In college admissions, holistic review is described as the primary tool by which admissions officers ensure that all applicants, regardless of their family circumstances or high school quality, have an opportunity to be admitted to a selective college. The holistic approach, however, can only be successful when it is informed by individualized and comprehensive assessments of high school context. With a fairly simple intervention, holistic review can better fulfill the promises that its proponents have made to improve equity and opportunity in college admissions.

NOTE

This research was funded by the National Science Foundation, Research on Engineering Education (Grant No. F033963). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. We also greatly appreciate the research assistance of Allyson Flaster, Kristen Glasener, Jandi Kelly, and Molly Kleinman, graduate students at the University of Michigan, as well as consultations with faculty colleagues Lisa Lattuca, James Holloway, and Richard Nisbett. Thanks also to David Hawkins at the National Association of College Admissions Counselors and Kristin Tichenor at Worcester Polytechnic Institute for their crucial support of this project.

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Manuscript received August 16, 2016
 Revisions received November 30, 2016, and
 February 22, 2017
 Accepted February 22, 2017