

From Precollege to Career: Barriers Facing Historically Marginalized Students and Evidence-Based Solutions

Kelsey C. Thiem*

Ball State University

Nilanjana Dasgupta

University of Massachusetts Amherst

Although the United States population is growing increasingly diverse, the diversity within higher education is not keeping pace. Contributing to the underrepresentation of students from historically marginalized groups are a variety of interconnected systemic barriers that prevent students from entering college, from thriving while there, and from persisting through to graduation. Here, we use the stereotype inoculation model as a guiding framework not only to identify these barriers and their psychological effects on students but also to highlight evidence-based solutions that colleges and universities can implement to lower these barriers. As a function of our chosen model, we focus on features of educational environments that signal a lack of psychological fit among students from historically marginalized groups. Furthermore, we highlight interventions that can be implemented at the institutional level to change the educational environment and make higher education settings more inclusive and equitable.

Although the population of the United States is growing increasingly diverse, higher education, as a whole, does not reflect this diversity. Individuals from historically marginalized groups—including Black, Hispanic, and Indigenous people, people from low-income or working-class families, and people whose parents do not have a bachelor’s degree or higher (i.e., first-generation college students)—continue to be underrepresented within higher education. For instance, Black,

*Correspondence concerning this article should be addressed to Kelsey C. Thiem, Department of Counseling Psychology, Social Psychology, and Counseling, Ball State University, Muncie, IN. [e-mail: kthiem@bsu.edu].

Hispanic, and Indigenous students enter and graduate from college at lower rates than White and Asian students (U.S. Department of Education, 2019). Black, Hispanic, and Indigenous students are also more likely than White students to be first-generation students (Center for First-Generation Student Success, 2016), and the college completion rate for first-generation college students is lower than for continuing-generation students (Cataldi et al., 2018). Even women, who are overrepresented in higher education relative to their proportion in the U.S. population (comprising 57% of college students in 2019; U.S. Department of Education, 2020b), are noticeably underrepresented in the physical sciences, technology, engineering, and mathematics (STEM). Only 36% of college students who earn bachelor's degrees in STEM fields are women, and this number is even smaller for women of color (U.S. Department of Education, 2020c).

For each of these groups, underrepresentation in higher education is driven by a variety of interconnected social, economic, educational, and structural factors that prevent students from thriving and persisting in college, putting their degree completion at risk and making it difficult to reach for professional jobs that require college degrees (U.S. Department of Education, 2020a). Even when students successfully navigate these barriers and graduate from college, they may encounter new barriers as they transition into careers. These new challenges limit access to high-quality jobs after college graduation that come with higher salaries and open doors to upward social mobility (Castilla et al., 2013a, 2013b; Castilla & Rissing, 2019).

Importantly, these barriers are not separate and isolated. Rather, they are interconnected, which means that many barriers impact the same group of marginalized students, tripping them up in small and large ways that compound over time and holding them back despite individual effort and motivation to succeed. These barriers are also interconnected in the sense that they have a common set of systemic roots arising from socioeconomic, political, and educational inequalities in the United States that have a long history (Jack, 2019; McGhee, 2021). As one example of interconnected barriers that compound over time, consider K-12 education that is the foundation of young people's educational journey. Inequality in elementary and secondary education is a common root cause of many barriers discussed in this article. Because funding for K-12 public schools in the United States comes from local property taxes, economically comfortable communities with lucrative residential and commercial properties generate a higher tax base that flows to local K-12 public schools. This money funds well-trained teachers, smaller class sizes, more and varied advanced courses, frequent enrichment opportunities, and robust school infrastructure—all of which expand students' educational horizons. In contrast, economically distressed communities have less lucrative properties and thus a lower tax base. This means less funding flows to local K-12 schools, resulting in fewer trained teachers, larger classes, fewer advanced placement courses, fewer enrichment programs, and crumbling classrooms and

facilities. Graduates of underfunded schools typically do not receive high-quality secondary education, nor do they typically receive high-quality guidance counseling to prepare them for the next chapter of their life in higher education (Lee & Ekstrom, 1987).

Students from under-resourced schools who come from low-income families are also unlikely to have family knowledge and social capital to help them through the college selection and application process. Students who manage to make it to college despite the initial high barriers at the starting gate are likely to feel overwhelmed when they arrive at college for many reasons including the unfamiliarity of college cultural norms built around middle and upper-middle class expectations, inadequate social support, invisibility of peers from similar identity groups, incomplete academic preparation, the need to juggle paid work and college attendance, and looming student loans (e.g., Broton & Goldrick-Rab, 2016; Dasgupta, 2011; Jack, 2019; Mishra, 2020; Stephens, Fryberg, et al., 2012). This second layer of barriers experienced upon entering college reduces students' sense of belonging in college, decreases confidence in their own potential, increases stress and anxiety, and hinders their performance.

All this feeds into the negative stereotypes and low academic expectations that circulate on university campuses and are, to lesser or greater extent, harbored by some faculty and fellow students. These compounding barriers set the stage for a downward spiral whereby low-income first-generation students are at risk of withdrawing from higher education. This withdrawal reduces representation of such students on campus, further compounding the message that students from these groups do not belong in college. This example demonstrates how the same group of students often navigate multiple interconnected and compounding barriers that originate from common systemic roots. Students from a variety of historically marginalized groups are faced with a similar web of barriers, preventing them from achieving their full potential.

Using the stereotype inoculation model as an overarching theoretical framework (Dasgupta, 2011), the goal of this article is two-fold. First, we highlight critical barriers facing students from historically marginalized groups, when they occur in students' lives, why they are psychologically impactful, and how they are interconnected to each other. Second, we identify evidence-based solutions that change key features of educational environments in which students are immersed and show how these changes yield positive psychological and behavioral outcomes. We explain how these solutions are interconnected and how their benefits may compound over time. The stereotype inoculation model proposes that features of local environments (e.g., academic and professional spaces) in which people are immersed have profound impacts on their feelings of belonging and legitimacy in those worlds, which in turn affect their confidence, motivation to stay, and future aspirations when the going gets tough. Among other things, these environmental features include visible representation of ingroup members, access to

resource-rich social networks, inclusive definitions of talent, and emphasis on the cultural fit between environments and the people in them. When these environmental features are consistent with people's values, identities, and personal history, they feel a sense of psychological fit in that environment, strengthening their belonging, confidence, and motivation to engage. In contrast, when the environment appears inconsistent with people's values, identities, and personal history, they feel a lack of fit, reducing their sense of belonging, confidence, and motivation, and pulling them away from the environment. The model also proposes that environmental cues that signal a lack of psychological fit are particularly salient during periods of transition when individuals move from familiar environments to new environments with unfamiliar norms, customs, and expectations.

Applied to higher education, if young people feel a lack of fit in college classrooms, residence life, or social environments in college, it reduces their sense of belonging, raises self-doubt, impairs performance, and makes them question their desire to stay in that environment—be it a specific class, an area of study, or college in general. In this article, we use this model to identify types of environmental cues that signal a lack-of-fit for students from historically marginalized groups, contributing to their isolation, alienation, and attrition from college. Consistent with this model, we shine a light on transition periods of life when students are most vulnerable to lack-of-fit and when these experiences are most consequential.

We also employ the stereotype inoculation model to identify evidence-based interventions that can lower or remove these barriers and make higher education more accessible for all—the second purpose of this article. Because this model emphasizes features of local contexts, we focus on interventions that target the structure and climate of higher education to make these settings more welcoming, inclusive, and equitable. Notably, this differs from interventions that target students' mindsets to help them better navigate and fit within the traditional college environment. Our focus on interventions that change educational environments is driven by the acknowledgement that colleges and universities possess more structural power and resources to create change than do individual students. Although individuals may change their mindsets and behavior to fit into existing institutional structure, structural change requires institutions to rethink their programs, policies, and processes to become more inclusive of all students. In other words, the responsibility for change resides with institutions first, which have a responsibility and a greater potential to reach a large number of students.

Following the stereotype inoculation model, many of the interventions we identify involve: (i) increasing the representation of ingroup members in influential roles, like peer mentors and faculty, who allow students to envision possible future selves similar to those individuals (Dasgupta, 2011; cf. Markus & Nurius, 1986; Markus & Wurf, 1987); (ii) brokering relationships to expand marginalized students' social and professional networks and create a sense of community; (iii) connecting the content of academic learning to social good; and (iv) training

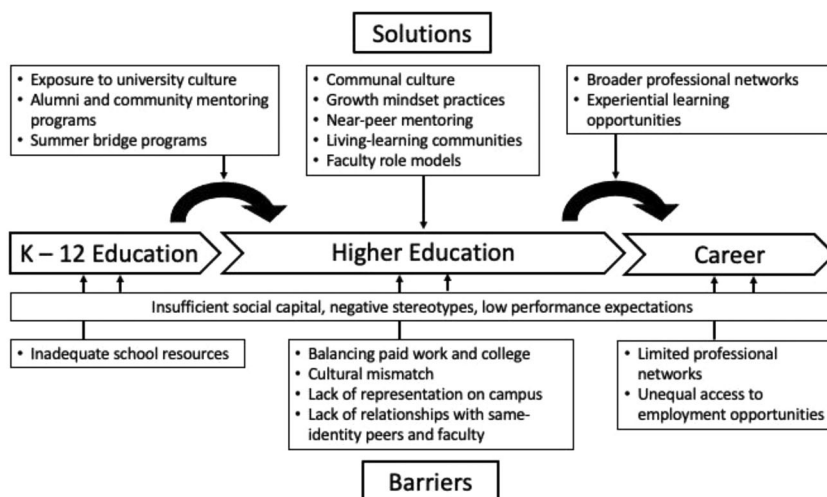


FIGURE 1. Identified barriers and solutions mapped out across time

faculty to develop inclusive classes, labs, and student mentoring procedures. Moreover, because interventions can be particularly beneficial during transition periods in which students' sense of fit is especially precarious, our article is organized around two transitions that bookmark student experiences in college—entrance into college and exit from college into the workforce. In addition, we also identify barriers and interventions in between these transition points, throughout students' college experience (see Figure 1).

Barriers

Choosing and Applying to College

Insufficient social capital: An important barrier to college entry is a lack of knowledge and guidance about how to navigate the process of choosing and applying to college. Prospective college students often learn about colleges and their reputations, the importance of campus visits, the cost of college, how to choose a college, and how to navigate the application and financial aid process from family members, schoolteachers, and guidance counselors (Mishra, 2020). Access to this type of advice is often called information-related social capital, though social capital can also take the form of social support, including validation and encouragement from social network members (Mishra, 2020). Together, these forms of

social capital help prepare students financially, socially, and psychologically for entry to higher education.

Low-income students, first-generation college students, and Black, Hispanic, and Native American students often have less college-related social capital than their middle- and upper-class, continuing-generation, and White peers, respectively (Mishra, 2020; Simmons, 2011; Stephens et al., 2015). This is perhaps most evident in the case of first-generation college students, who mostly come from low-income families and whose family members do not have first-hand college experience (Collier & Morgan, 2008; Jury et al., 2017; Stephens et al., 2015). If these students attend underresourced high schools in low-income communities, they are also less likely to have access to skilled guidance counselors who will educate them about the college landscape (Lee & Ekstrom, 1987). Precarious family and school resources related to college preparation means that these students are likely to get inadequate guidance through the application process, advice on how to make informed choices about which college to attend, and information on ways to access scholarships and financial aid. Specifically, low-income first-generation students may be unaware of how to judge college quality and may inadvertently target lower-quality institutions that do not provide strong preparation for career opportunities. They may not consider applying to elite colleges and universities because of high tuition costs without realizing that these well-endowed institutions are best positioned to provide generous need-based scholarships. Research shows that the choice of which college to attend is as important as getting a college degree; attending high-quality colleges predicts long-term earnings post-graduation, and the magnitude of that effect increases over time (Long, 2010). Moreover, the benefits of a high-quality college education on post-graduation earnings is stronger for African Americans, Hispanics, and men (Long, 2010). Relatedly, students without information-related social capital may inadvertently take on high-interest private loans to pay for college without realizing that compounding high interest over time creates ballooning debt at college graduation that is difficult to pay off, hurting their long-term financial wellbeing.

Young people make choices based on what they see as possible in their local environments. They emulate the actions taken by, and recommended by, adults and peers they admire. When students in middle and high school meet alumni from their school who are college students or encounter other professionals and learn about their career journey, it allows them to imagine a similar future for themselves. In line with the stereotype inoculation model, it is important for students to see successful professionals and near-peers who share their background because these individuals are most likely to be relatable, to inspire, and to motivate the desire to pursue a similar path that starts with college and strengthens the confidence that one can get there (Dasgupta, 2011; Simons et al., 2004). Exposure to relatable role models who are college-educated professionals may come from enrichment activities occurring in schools and from students' own family

social network. However, for young people from families in which no one attended college, such role models are sparse. Assuming these young people attend underresourced schools, it is less likely that these schools have the resources to invite guest speakers and alumni who are college educated, are engaged in upwardly mobile and interesting careers, and can be inspirational and relatable role models. Low exposure or no exposure to relatable professional role models in one's local environment may signal to precollege students that people like them do not go to college. This may reduce their motivation to imagine a college-bound future for themselves and reduce their confidence to take steps to make that a reality.

Negative academic stereotypes and low instructor expectations: Research examining how teacher expectations influence student outcomes has a long history in the social sciences starting with the classic article by Rosenthal and Jacobson (1968). Conducted in a series of elementary schools, teachers were told that some students in their classes had been discovered to be "growth spurters" based on a test administered at the beginning of the school year whereas other students were not given this label. In reality, no such test had been administered; teacher expectations were based purely on researchers' random assignment of students to the treatment group (spurters) or control group (nonspurters). Teacher expectations were so powerful that by the end of the school year, children labeled as "growth spurters" showed significant increase in intelligence quotient (IQ) scores as compared to children not labeled as "spurters."

Consistent with this classic work, contemporary research shows that elementary school teachers' implicit attitudes toward ethnic minorities in the Netherlands (Turks and Moroccans) were associated with gaps in their expectations of children in their classes who were of Turkish or Moroccan versus Dutch ancestry (van den Bergh et al., 2010). That is, the stronger teachers' implicit bias against Turkish or Moroccan ethnic minorities, the lower their academic expectations of students of Turkish or Moroccan origin (compared to students of Dutch origin). Moreover, these gaps in expectations were associated with subsequent gaps in student achievement in math and reading. This research suggests that teachers' implicit ethnic bias influenced their low expectations of ethnic minority children, which in turn influenced children's subsequent academic achievement. Although, of course, one cannot make causal claims given the correlational nature of this study. Positive correlations between what teachers expected and what students ultimately accomplished might simply have resulted from teachers being skilled observers. In practice, distinguishing between accurate and biased expectations is difficult because both teacher expectations and student outcomes are likely influenced by factors that researchers are unable to observe.

More recent research comes closer to demonstrating causation and shows that differences in high school teachers' expectations of Black and White students explains some of the race gaps in college enrollment and completion in the United States. Papageorge and colleagues (2020) analyzed the federal

Education Longitudinal Study of 2002, which followed a cohort of 10th-grade students for a decade. High school teachers were asked whether they expected their students to complete a 4-year college degree. Race gaps in teachers' expectations were compared to the objective reality of students' college completion. Results showed that students' college completion rates were systematically higher if their high school teachers had higher expectations for them. Moreover, White teachers, who comprise the vast majority of American educators, had far lower expectations for Black students than similarly situated White students. To examine if the race gap in teacher expectations reflected stereotype-induced low expectations for Black relative to White students as compared to real differences in the objective probability of college completion, Papageorge and colleagues conducted follow-up analyses comparing college outcomes of students whose high school teachers made conflicting predictions about their future. Results suggest that teacher expectations do not simply forecast student outcomes but that they also shape outcomes by becoming self-fulfilling prophecies, and White teachers' expectations place Black students at a disadvantage. For a student with a given objective probability of college completion, White teachers were less optimistic when the student was Black than when the student was White, and they were significantly less likely than their Black colleagues to expect Black students to earn a college degree.

In sum, multiple sources of evidence converge to suggest that teachers' beliefs and expectations influence student success. In particular, teachers' optimism about their students' future success has a significant impact on student achievement and students' likelihood of going to college. Typically, teachers heap greater optimism on the prospects of White students compared to Black students; these race gaps in teacher expectations set in motion self-fulfilling prophecies that magnify the Black–White gaps in college completion.

Entering And Persisting Through College

Insufficient social capital: The barriers hounding students prior to college enrollment continue to follow them through their college experience. For example, inadequate social capital continues to constrain student success even after college enrollment, although these constraints may take different form at this stage. Upon arriving at college, insufficient information-related social capital may cause students to struggle to understand campus norms and expectations. This may confirm their anticipatory doubts about belonging in college, particularly if they are surrounded by peers who appear to adeptly navigate college life. Doubts about belonging, in turn, may impair students' confidence and nudge them to make internal attributions for academic difficulty in college (e.g., "I'm not smart enough") instead of making external attributions (e.g., "all students struggle in college at least some of the time—I'm no different"; Walton & Cohen, 2007). Doubts about

belonging and fragile confidence threaten to reduce students' motivation to persist in college, setting off a negative, downward spiral.

Low utilization of campus resources: Further compounding the downward spiral is that many students are unaware of campus resources available to help them (peer tutoring, supplemental advising, etc.), and those who are aware may be reluctant to take advantage of them lest they be perceived as weak or unprepared (Housel & Harvey, 2009). Not proactively using academic and social resources on campus hampers students' academic and social success in the transition to college, allowing belonging uncertainty, fragile confidence, and flagging motivation to take a stronger hold. To the extent that students' families have limited knowledge of university norms and resources, as is the case for families of low-income and first-generation college students, family members are unable to informally advise students, direct them toward university resources, or help them develop a "college student" identity (Iyer et al., 2009; Mishra, 2020). If universities do not act quickly and preemptively to augment inequities in students' family social capital, both before and during the transition to college, they may contribute to the challenges faced by students from historically marginalized groups.

Balancing paid work and college: A structural barrier facing many students, especially those from low-income families, is economic hardship, which compels them to work for pay while attending college (Broton & Goldrick-Rab, 2016; Goldrick-Rab, 2016; St. John, 2003). In fact, more than 50% of undergraduate students work for pay while attending college and report that they could not afford college without working, according to a National Postsecondary Student Aid Study of a nationally representative sample of undergraduate students (U.S. Department of Education, n.d.). Not surprisingly, a recent review revealed that working long hours while attending college takes a toll on student success, and more intensive work yields worse academic outcomes (Neyt et al., 2019). Balancing work and college creates a "time bind" that leads some working students into academic difficulties and higher rates of dropping out (Stinebrickner & Stinebrickner, 2003, 2004). Full-time employment also hinders social integration into college by limiting time for interaction with fellow students and faculty and increases drop-out rates (Tinto, 1993).

Negative academic stereotypes and low faculty expectations: The same negative cultural stereotypes and expectations related to students' marginalized identities at the K-12 level remain at the college level. Often, these stereotypes take the form of beliefs about who is innately "brilliant" within an academic domain, and these stereotypes can influence the extent to which students from groups not generally stereotyped as brilliant choose to pursue education within certain domains. For instance, correlational evidence reveals that the fields that are presumed to require innate brilliance have fewer women and Black PhD holders than other fields where talent is not assumed to require innate brilliance (Leslie et al., 2019; Storage et al., 2016). Experimental evidence suggests that this finding is driven

by students' choice to avoid brilliance-focused fields because they do not see themselves as the type of student who might pursue, and succeed in, such a field (Bian et al., 2018). For instance, when the pursuit of a certain major is framed as requiring brilliance-related characteristics (e.g., "at ease with complex, abstract ideas") rather than dedication-related characteristics (e.g., "someone who never gives up"), women judge themselves to be less capable at succeeding, anticipate greater anxiety and lower belonging, and report less interest in pursuing the opportunity (Bian et al., 2018). Men, however, are generally unaffected by how the educational opportunity is framed. Given that faculty within a given field often endorse beliefs about the importance of inborn brilliance for success in their field (Leslie et al., 2019; Storage et al., 2016), faculty may communicate these beliefs to students (either explicitly or implicitly), influencing the extent to which students from historically marginalized groups choose to pursue that area of study. We speculate that, not only might these beliefs repel historically marginalized students from certain programs and majors (e.g., math, computer science, economics), students may lose interest in higher education as a whole if they encounter these beliefs across several disciplines. For example, if a student decides not to pursue their first-choice major upon encountering such beliefs only to find the same beliefs in their second-choice and third-choice majors, the student may eventually conclude that all higher education pursuits require innate brilliance and decide not to persist in college at all. Thus, in line with the environmental focus of the stereotype inoculation model, we view these "brilliance" stereotypes as another component of the educational environment that can be a barrier to success within higher education.

Cultural mismatch: University culture in the United States emphasizes independence and self-reliance. By prioritizing self-determination, university culture encourages students to follow their personal passions, seek out knowledge for individual advancement, and make their mark on the world (Stephens, Fryberg, et al., 2012). This culture is often expressed in university branding with slogans like "Challenge convention, change our world," (Clark University, 2021) and is particularly evident in STEM contexts that highlight individual curiosity and seeking new knowledge for knowledge's sake (Conrad et al., 2009; Henrion, 1997). For most middle and upper-middle class American students, the cultural values they are steeped in at home are oriented toward independence and are in sync with American college norms. However, low-income students often come from families and cultures that emphasize interdependence and communality (Stephens et al., 2019). These communal values are often shared by first-generation students, students of color, and female students (Diekman et al., 2010; Gaines et al., 1997; Fryberg & Markus, 2007; Phillips et al., 2020; Stephens, Fryberg, et al., 2012). Students with an interdependent cultural focus typically view college as a means to support their family and give back to their community (Stephens,

Fryberg, et al., 2012) which is out of step with American university norms, creating a cultural mismatch.

Specifically, first-generation college students report being dissatisfied with aspects of college that reflect an independent culture, including large lecture courses and the associated lack of relationships with faculty (Inkelas et al., 2007). This cultural mismatch is also associated with increased stress and negative emotions (Stephens, Townsend, et al., 2012), reduced self-efficacy (Stephens et al., 2019), and low feelings of belonging that persist through college graduation and contribute to low academic performance (Ostrove & Long, 2007; Phillips et al., 2020; Stephens, Fryberg, et al., 2012). Furthermore, the cultural mismatch specific to STEM fields often deters women, Black students, Hispanic students, and Native American students from pursuing or persisting in STEM (Boucher et al., 2017). In line with the stereotype inoculation model, if students feel that success in college requires a mindset and a set of values that are different from their own, they may not view exemplars of success encountered in college as similar to themselves and may not feel inspired to follow in their footsteps.

Notably, although students from low-income backgrounds are likely to experience a cultural mismatch in college, whether they do depends on the types of experiences they have prior to college matriculation. Low-income adolescents who attend elite college preparatory high schools through needs-based scholarships learn independent cultural norms and expectations and how to navigate independence-focused institutions while in high school (Jack, 2016). These students, dubbed “the privileged poor,” learn the rules of the game while enrolled in elite schools, and they carry knowledge of these rules forward into university life. For instance, they report knowing how important it is to advocate for themselves in order to get assistance from faculty members (Jack, 2016). In contrast, other low-income students who attend local, often economically disadvantaged, high schools are “doubly disadvantaged” in the sense that they are both poor and unaware of the norms and expectations of elite institutions. They experience culture shock upon entering college because they do not know the unspoken rules of the road (Jack, 2016). Therefore, it is important to keep in mind that past experiences, in conjunction with social identities, jointly influence how students navigate the culture of higher education.

Lack of representation on campus: Because students from historically marginalized groups are underrepresented in higher education, they are frequently one of a few or the only member of their identity group in a given educational context. According to the stereotype inoculation model, this experience of tokenization or being a solo group representative creates vulnerability. When students are in the numeric minority, their tokenized identity—and often the negative stereotypes associated with them—become particularly salient (Dasgupta, 2011; Dasgupta et al., 2015; Sekaquaptewa et al., 2007). Accordingly, these students experience increased social isolation and decreased belonging (Dasgupta, 2011;

Derricks & Sekaquaptewa, 2021; Murphy et al., 2007). Tokenization produces academic consequences as well, particularly in light of the negative stereotypes made salient from the experience. For example, for engineering students who were the only woman working in an all-male group of peers, the more implicit stereotypes associating engineering with men were activated in their minds, the lower their confidence in their own engineering abilities (Dasgupta et al., 2015). For women in engineering teams with a critical mass of other women, implicit stereotype activation did not predict lower confidence. In other words, the presence of other women in those teams protected their sense of self. Similarly, Black (but not White) women's academic performance suffered when they were the only member of their race present compared to when they were in a group of same-race peers (Inzlicht & Ben-Zeev, 2000; Sekaquaptewa & Thompson, 2002). Negative self-relevant stereotypes made more prominent through the experience of being a numeric minority induces performance apprehension (Sekaquaptewa et al., 2007) and feelings of threat (Dasgupta et al., 2015), resulting in lower self-efficacy and hampered performance.

Lack of access to high-value relationships: As a consequence of several previously listed barriers, students from historically marginalized groups may be unable to cultivate meaningful relationships with faculty members and senior peers. These relationships are critical for opening doors to important opportunities, like mentored research or internship positions, career advice, and future letters of recommendation (e.g., Castilla et al., 2013a, 2013b). Students with low college-related social capital, however, may not recognize the importance of forming these relationships and/or may not know how to go about cultivating them. Visiting office hours, for example, is one way students can establish more substantial relationships with faculty, yet students with low social capital may not understand the benefits of this practice (Collier & Morgan, 2008; Jack, 2016). Even students who do recognize the importance of forming relationships with faculty, however, may be uncomfortable doing so. Students who are unfamiliar or uncomfortable with the independent norms of college often feel self-conscious approaching faculty members for fear that doing so will make them be perceived as a “suck-up” (Collier & Morgan, 2008; Jack, 2016). Out of a motivation to save face, students often avoid approaching faculty members and lose out on the advantages that these relationships bring.

Students from historically marginalized groups may be most comfortable forming interpersonal relationships with same-identity faculty and senior peers (Blake-Beard et al., 2011), but with relatively few peers and faculty members on campus from historically marginalized groups, students have fewer opportunities to connect with them. Moreover, the limited number of faculty members with historically marginalized identities tend to be overextended and overworked in terms of mentorship responsibilities given that they are highly sought after from students of the same background (Hirshfield & Joseph, 2012; June, 2015;

Padilla, 1994; Stanley, 2006). Therefore, limited representation at the faculty level can contribute to the limited professional networks of students from historically marginalized groups.

Finally, further compounding this problem of limited access to relationships is the need among many students to balance time on campus with paid employment. Even students who recognize the importance of faculty interactions and who feel comfortable seeking them out do not have the time to do so if they work long hours. Students who do not have the time to join in the kinds of campus activities that would help them build their social network (e.g., attending office hours, participating in faculty-led extracurricular activities) lose out on the kinds of opportunities to which their peers with greater social capital have access.

Transitioning to the Workforce

Limited professional networks and unequal access to employment opportunities: Even as students near the end of their college experience and begin to consider their next steps after graduation, many of the barriers they faced throughout their time in college remain and produce novel impediments in the search for postcollege employment. For instance, negative stereotypes and low performance expectations continue to serve as an obstacle for students from historically underrepresented groups to contend with during job applications and interviews. Field studies have revealed that when the same or similar resume is sent to employers, they are less likely to extend interview invitations to applicants whose name is stereotypically Black than others whose name is stereotypically White (Bertrand & Mullainathan, 2004) and less likely to judge the applicant as competent and hireable for a STEM position if the resume belongs to a woman rather than a man based on the name on the resume (Moss-Racusin et al., 2012). Similarly, employers are more likely to extend interview invitations to male applicants of high socioeconomic status (SES) than to female applicants of high socioeconomic status or to low-SES applicants of either sex (Rivera & Tilcsik, 2016). These hiring biases are likely driven, at least in part, by the stereotypes applied to members from each of these groups. Stereotypes about academic performance are likely to generalize to negative expectations about group members' ability to excel at the job by performing required tasks and learning new skills. For example, negative stereotypes about women's STEM abilities have been shown to produce low performance expectations for women on STEM-related tasks in the minds of employers (Reuben et al., 2014). Additionally, employers may rely on cultural stereotypes to make judgments about who will "fit" with the company culture (Rivera, 2012; Rivera & Tilcsik, 2016). When employers rely on stereotypes in making decisions about who to interview and hire, applicants—including soon-to-graduate or recently graduated college students—from negatively stereotyped groups may be passed over for employment opportunities.

Although one way to challenge these negative stereotypes in the minds of employers is by cultivating an extensive professional network and accompanying job applications with strong referrals from high-value professionals (Castilla et al., 2013a; Castilla & Rissing, 2019; Reuben et al., 2014), students from historically marginalized groups have relatively smaller professional networks than their nonmarginalized peers, as discussed above. Without near-peers or faculty members in their professional networks who can endorse them for a position, either through word-of-mouth or through formal letters of recommendation, students have limited means through which to challenge negative stereotypes in the minds of employers. Moreover, due to their smaller professional networks, students from underrepresented groups may have insufficient social capital to assist them with their search for employment. One function of a social network is to refer job applicants to job opportunities, especially high-quality job opportunities (Castilla et al., 2013a, 2013b). Possessing a large, resource-rich professional network, then, increases an applicant's chances of employment, yet students from historically underrepresented groups lose out on these opportunities.

This is yet another example of interconnected barriers affecting the same groups of students that compound over time. Together, these barriers produce a college and job search environment that signal a lack of fit to students from historically marginalized groups, as described by the stereotype inoculation model. These cues may lead students to presume that they do not belong in the types of professional environments they are applying to, resulting in low confidence that they can find and acquire high-quality employment and low motivation to try for it. Both practically and psychologically, these barriers can keep students from finding the high-quality employment they are qualified for as a function of their college degree.

Solutions

Though the environmental and systemic barriers facing students from historically marginalized groups in higher education are numerous, research points to several theory-informed and empirically tested interventions that lower or remove these barriers. We describe several of these solutions here. We also note challenges that colleges and universities may encounter when implementing them in order to provide university administrators, faculty, and staff with an honest picture of the resources necessary to put these interventions into effect on their own campuses. In line with the stereotype inoculation model which prioritizes changing local environments to promote the success of marginalized groups, we focus on programs and initiatives targeting local university environments that need to be implemented by institutional leaders rather than interventions geared towards training students to fit into existing higher education culture. Reorganizing campus resources and culture to meet the needs of marginalized students promises

to enhance their psychosocial and academic experiences, allowing them to reach their full potential.

Choosing and Applying to College

Provide exposure to university culture and research experiences in middle and high school: One early intervention colleges and universities can implement is to partner with K-12 schools, especially underresourced ones, by hosting fully funded on-campus immersive experiences for middle and high school students. Programs like this often take place during several weeks in the summer when students are not in school and have available time to commit to the program. Typically, these programs involve faculty-supervised hands-on research experiences, often in STEM fields (Avent et al., 2018; Phelan et al., 2017; Salto et al., 2014; Witzel et al., 2020), and some programs recruit faculty from historically marginalized groups to serve as research mentors (Phelan et al., 2017). Programs sometimes also include structured coursework (Kabacoff et al., 2013), research- or course-related field trips (Knox et al., 2003; Markowitz, 2004), career exploration activities (Phelan et al., 2017), meetings with college counselors (Phelan et al., 2017; Witzel et al., 2020), and meetings focused on community-building and professional development (Kabacoff et al., 2013; Witzel et al., 2020). Some programs also invite students to stay in the campus dorms, providing a window into residential life. Many of these programs proactively recruit students from historically underrepresented groups in higher education, including underrepresented racial minorities and low-income students (Avent et al., 2018; Kabacoff et al., 2013; Salto et al., 2014; Witzel et al., 2020), and some focus on recruiting high school girls with the goal of increasing female participation in STEM (Dasgupta & Stout, 2014; Phelan et al., 2017).

By addressing several of the barriers identified earlier in this article, these immersive on-campus summer programs serve as powerful interventions combining many elements to promote the kind of psychological fit described by the stereotype inoculation model that fosters feelings of belonging and legitimacy in higher education. Students gain information-related social capital through exposure to the campus environment, orientation to research lab and campus norms, and interactions with faculty or graduate student mentors (Avent et al., 2018; Witzel et al., 2020). Indeed, students reported that participation in campus research experiences increased their knowledge of the college admissions process and college selection criteria and increased their college application skills (Phelan et al., 2017; Witzel et al., 2020). Some programs even provide opportunities for parents and families of program participants to attend information sessions about the college admissions process to align families' knowledge with that of their college-bound adolescents (Phelan et al., 2017). This practice builds a network of support for middle and high school students, saving them from taking sole responsibility for

understanding and using college-related information. By combining social support and practical knowledge about the college application process and how college campuses look and feel, these programs may also boost students' confidence and motivation (specific to the application process) and increase anticipated feelings of belonging upon college attendance. The psychological effects of summer programs can have long-term implications as well, including high rates of college matriculation and graduation. For instance, 28 out of 29 participants in the ENGAGES high school program at the Georgia Institute of Technology matriculated into college (Avent et al., 2018), and college matriculation and graduation rates among participants in the High School Intern Program at the University of California San Francisco were higher than the national average matriculation and graduation rates (Witzel et al., 2020). Specifically, 99% of High School Intern Program participants attended college (exceeding the expected 60% based on the national average) and 71% graduated from college (exceeding the expected 59% based on the national average).

Additionally, participation in on-campus summer research experiences fosters students' interest and mastery in the subject matter and falsifies negative stereotypes casting doubt on their ability. For example, through post-program surveys administered to students who participated in STEM-focused summer programs, students reported increased confidence (Avent et al., 2018; Knox et al., 2003; Salto et al., 2014; Witzel et al., 2020) and increased ability to conduct scientific research (Salto et al., 2014). Importantly, these studies primarily examined the experiences of students facing negative academic stereotypes, including Black and Latine students, low-income students, and women. Also, consistent with the stereotype inoculation model, negative stereotypes are likely to be invalidated by exposing students to ingroup faculty members. Extant research shows that college students benefit from interactions with, and mentorship from, same-identity faculty members such that when students have frequent high-quality contact with, and closely identify with, these faculty members, they experience more confidence and academic engagement, and report more ambitious career goals (Asgari et al., 2010; Stout et al., 2011). Although it has not yet been empirically investigated, we expect that interactions with same-identity college faculty may have similar effects on middle and high school students during summer program participation.

In addition to exposure to faculty members, some researchers suggest that camaraderie and a sense of community with a cohort of peers is an important component of campus summer research programs (Knox et al., 2003). Social relationships with program peers may help to boost students' feelings of belonging not only in the specific summer program environment but in college more generally. This may be particularly true among programs that invite a cohort of students from the same or similar identity groups (e.g., the ENGAGES program which specifically recruits African American high school students; Avent et al., 2018).

Indeed, research building on the stereotype inoculation model reveals that immersion among a critical mass of peers who share one's marginalized identity in an academic context reduces student anxiety, increases confidence, and promotes greater academic engagement (Dasgupta et al., 2015). Much of this research on the impact of ingroup peers and professionals has been conducted with college students. More research is needed to understand the extent to which similar relationships benefit adolescents in summer research programs that precede college entry and how far these benefits carry through the college experience.

Finally, summer programs can also be used to highlight aspects of communal culture in college, including an emphasis on the social relevance of course content. For instance, a national survey of first-year college students revealed that students who participated in STEM-focused summer programs in high school were more likely than matched nonparticipants to intend to pursue a STEM career, but only when their program emphasized the real-world relevance of STEM concepts (Kitchen et al., 2018). More generally, programs that emphasize the real-world application of course material may be particularly helpful for increasing interest in and intentions to attend college among students from communal backgrounds including Black and Latine students, low-income students, and women.

Although immersive on-campus summer programs for precollege students are promising interventions, such programs may be challenging to implement. They are resource-intensive, requiring personnel including summer program directors, faculty instructors, teaching assistants, and residential staff. Moreover, depending on the length of the program and how many components are involved (e.g., faculty-supervised research experiences, field trips, career exploration workshops), implementing such programs requires organization and cooperation across various campus offices and departments and coordination with K-12 schools from where students are recruited. Clearly, such endeavors require commitment from university leadership and adequate funding. Although charging a participation fee would help offset the costs of implementation, such a policy would deter low-income students who stand to benefit the most from it. The potential of increasing future enrollment from program participants, and especially greater diversity in future applicant pools, may be an important enough incentive for university leadership to greenlight this type of program despite its costs.

Support alumni and community mentoring programs: Perhaps a less costly way for colleges and universities to support precollege students is to invest in community-based programs designed to supply K-12 students from disadvantaged groups with college-relevant social capital. One organization dedicated to such programs is Big Brothers Big Sisters of America which matches adult volunteer mentors from the community with youth mentees from elementary, middle, and high schools (Big Brothers Big Sisters of America, 2021). These mentees are often students from low-income families and one-parent households (Herrera et al., 2011); thus, they may be unlikely to have family members who have

attended college and can provide college-related social capital. Mentorship from a Big Brother or Big Sister who is a college graduate helps fill social capital gaps, both in terms of information-related social capital and in terms of social support. Specifically, mentors provide academic support to help students achieve the academic success necessary to apply for, and be admitted into, college (Levine, 2014). Indeed, results from randomized controlled trials revealed that, compared to students with no mentorship, those who received mentorship through the Big Brothers Big Sisters program had higher school attendance rates, reported greater academic self-efficacy, and earned better grades (Herrera et al., 2011; Levine, 2014). Depending on the age of mentees, mentors can also guide them through college applications by providing practical information for these applications and by providing social and emotional support throughout the application process.

Big Brothers and Big Sisters of America is not the only community-based program that can connect historically underrepresented students with college-related social capital. The College Advising Corps is another organization that has a similar goal. This organization was designed to help first-generation students, low-income students, and students from underrepresented racial groups in higher education navigate the process of college admissions (College Advising Corps, n.d., b). Through this program, recent college graduates are embedded in underserved high schools to provide mentorship to their students, including guidance for securing fee waivers for standardized tests and for completing the Free Application for Federal Student Aid, commonly known as the FAFSA (College Advising Corps, n.d., b). Mentorship obtained through the College Advising Corps is associated with higher rates of college application, scholarship application, and college acceptance, and with increased persistence into the second year of college (College Advising Corps, n.d., a). These benefits are most pronounced among Hispanic students and students from low-income families (College Advising Corps, n.d., a).

In addition to providing college-related social capital, these types of community programs tackle other barriers as well. For instance, if students are able to receive mentorship from an ingroup member, this relationship may serve to inoculate students against pernicious stereotypes about their ingroup and provide students a future “possible self” to aspire to, as predicted by the stereotype inoculation model (Dasgupta, 2011; Dennehy & Dasgupta, 2017; Wu et al., 2021; cf. Markus & Wurf, 1987). Thus, this mentorship could increase students’ confidence and motivation to pursue a college degree. Furthermore, depending on how closely the mentor and mentee remain in contact, the mentor may expand the student’s personal network, helping connect them to future internships and other experiential learning and job opportunities down the road.

Colleges and universities can proactively support these programs both by funding them and by increasing their profile on-campus. The work of the College Advising Corps is consistent with the outreach mission of many colleges and

universities, especially land grant universities, that aim to serve the local community. In that spirit, colleges can raise up the importance of community service among their student body and encourage students to join the College Advising Corps as a mentor post-graduation. Colleges and universities can also encourage their students to get involved in volunteer work through local Big Brothers Big Sisters chapters or through similar community programs by creating organized campus-wide partnerships with these organizations. Other avenues for partnership involve connecting student volunteer activities with service-learning courses taught by faculty, student clubs, campus honors societies, and Greek organizations. Both students and faculty can serve as mentors in these programs, increasing the pool of potential mentors that universities have to contribute.

Entering and Persisting Through College

Implement summer bridge programs: Summer bridge programs, which typically take place during the summer before college matriculation, help students make a smooth transition to college. Similar to summer research programs for middle and high school students, bridge programs often target historically underrepresented students in higher education (e.g., first-generation students, low-income students, racial ethnic minority students; Ramirez et al., 2020; Strayhorn, 2011) and are meant to increase college preparation. One way they do so is by providing participants with college-related social capital. In service of this goal, bridge programs typically involve an immersive on-campus experience spanning several weeks and, depending on program objectives, often involve activities to familiarize students with campus resources (Ashley et al., 2017; Bradford et al., 2021; Suzuki et al., 2012). Indeed, one survey study revealed that students reported more familiarity with campus resources at the end of their summer bridge program compared to the start of their program (Suzuki et al., 2012).

Although familiarity with resources does not always translate into actual use of resources, studies suggest that bridge programs involving interaction with faculty and peers increase student intentions to use campus resources (Ramirez et al., 2020) and actual resource use (Stephens et al., 2014). Importantly, this effect is dependent on mentors and mentees sharing a common social identity and mentors' acknowledgement of the challenges they faced and overcame as a function of their identities. For example, Ramirez and colleagues (2020) ran an experiment among a sample of summer bridge program participants in which most participants were students of color, first-generation students, and/or low-income students. Although all participants received information about resources available to them on campus (e.g., office hours, the writing center), some participants also heard from senior first-generation college students of color who told personal stories about encountering and overcoming obstacles in college related to their racial identities and first-generation status. Program participants who heard from these senior peers

reported greater interest in using campus resources compared to program participants who did not hear from them.

Difference education interventions, like the one studied in Ramirez et al. (2020), can produce additional benefits when embedded in summer bridge programs, including increased expectations of social belonging on campus and increased identification as a college student (Stephens et al., 2014). Moreover, viewing this intervention through the lens of the stereotype inoculation model helps reveal the mechanisms through which these benefits may emerge. Not only is the presence of other ingroup members likely to make the environment more inclusive and less threatening, but peers' acknowledgment of the challenges they faced as a function of their marginalized identities normalizes difficulty as part of the typical college experience and increases students' feelings of similarity to those mentors. This feeling of similarity with ingroup peers is an important factor for increasing students' sense of social belonging, among other benefits. Furthermore, by explaining how they overcame those challenges, the senior peers function as an inoculation against the negative stereotypes about marginalized students by demonstrating that these stereotypes are false and that incoming college students can also overcome the barriers they will encounter.

In addition to benefits brought about through difference education interventions embedded within summer bridge programs, participation in summer bridge programs is associated with a host of other benefits as well. A systematic review of STEM-specific summer bridge programs found that students leave these programs with increased feelings of preparedness to earn a college degree and stronger feelings of belonging in college and also found that bridge program participation is associated with higher college grade point averages (Ashley et al., 2017). Similarly, a meta-analysis of studies on STEM-specific summer bridge programs revealed that program participants have higher first-year grade point averages and higher first-year retention rates than students who do not participate (Bradford et al., 2021). Furthermore, summer bridge program participants are more likely to graduate within six years of college matriculation than a matched comparison group, especially among Black students, Hispanic students, and first-generation students (Douglas & Attewell, 2014). Thus, summer bridge programs not only assist students with the transition to college, but they also have long-lasting effects as students move through their time in college. However, more research is necessary to determine which specific components of summer bridge programs are responsible for producing which particular outcomes.

Importantly, summer bridge programs for incoming first-year college students require commitment from campus leaders and sufficient resources in order to be successful. These resources include program personnel, faculty instructors, advising staff, residential staff, and peer mentors. Cooperation and coordination across various campus offices, residence life, and academic departments is critical. In order to be broadly accessible to underrepresented students, many of whom

are likely to be from low-income families, summer bridge programs should be free for participants. Of course, this means colleges and universities need to fund these programs through their own budget or through grant funding. Despite these challenges, the benefits of these programs are clear—they help marginalized students get off to a running start, they increase thriving through the college experience, and they promote successful college completion by providing a strong foundation at the starting gate.

Elevate an interdependent and communal culture at colleges and universities: To reduce the cultural mismatch experienced by students from interdependent cultures when they arrive at higher education institutions, universities should elevate communal aspects of college culture. In keeping with cultural mismatch theory, aligning college culture with communal values familiar to many historically marginalized students can increase their sense of psychological fit when they arrive on campus (Stephens, Fryberg, et al., 2012; Stephens, Townsend, et al., 2012). This can be accomplished early by explicitly highlighting communality in university recruitment and admission materials. As a demonstration of this intervention, Stephens, Fryberg, and colleagues (2012) found that the academic achievement gap between first-generation and continuing-generation students was eliminated when students were welcomed to their university with a message framing their upcoming college experience in terms of connecting with peers socially and academically instead of a message that emphasized independent exploration of personal interests. This simple messaging intervention is easy to implement. Campus communication offices can easily revise welcome materials students receive during their initial days on campus to elevate a message of social connection. Presidents, provosts, and other university leaders can also incorporate a message of community and social connection into their matriculation speeches and other events designed to welcome new students.

In addition to these efforts, individual instructors could also take steps to create classroom environments that afford more communal experiences. Specifically, instructors could highlight the social relevance of course content and incorporate opportunities for peer collaboration in classrooms. One way in which to emphasize the social relevance of what students are learning is through utility value interventions that draw students' attention to how information learned in class helps students achieve their goals (Hulleman & Harackiewicz, 2009). This can be accomplished by having instructors explicitly explain the personal and social utility of the content they are teaching. It can also be achieved through writing exercises in which students reflect on and write about the relevance of the course content in their own lives (Harackiewicz & Priniski, 2018). For communally-oriented students, these interventions are most beneficial when they highlight how course content can be used to benefit other people. For example, emphasizing the social relevance of a math task by framing it in terms how it can be used to help people (e.g., reduce global poverty), rather than framing it terms of personal

benefits (e.g., satisfying personal curiosity), prompts greater persistence and higher performance among students who strongly identify with communal culture (Rodriguez et al., 2013). Utility value interventions also promote higher interest in the targeted domain, more engagement in class, greater persistence on tasks, and better course grades (Harackiewicz et al., 2016; Hulleman et al., 2010; Hulleman et al., 2017; Yeager et al., 2014). Adolescent research also shows that Black and Latine students in middle school classrooms are more engaged in science and math lessons when they understand how the content of the lessons is connected to helping people and society (Dasgupta et al., in press; Gray et al., 2020). Amplifying the social relevance of the course content increases adolescents' feelings of belonging, confidence, and motivation, which in turn predicts stronger identification with academics and better grades, especially for racial and ethnic minority students (Dasgupta et al., in press).

In terms of providing communal experiences through peer collaboration, instructors can accomplish this on a small scale through daily group work activities, or on a large scale through a semester-long service learning project. Indeed, among students who prioritized communal goals, a course structured around a service learning project (e.g., student teams designing a playground for the local community) prompted greater interest and enrollment intentions than a course involving a traditional independent project (Belanger et al., 2017). Furthermore, research suggests that course performance is better among communally-oriented students when working in groups than when working independently (Dittman et al., 2020). Among middle school students, collaborative learning is also associated with increased feelings of belonging in class, which in turn predicts students' greater identification with the academic domain (Dasgupta et al., in press), which may also be the case among college students.

Importantly, simply encouraging instructors to incorporate more communal experiences into their courses and teaching may not be sufficient. Some instructors may be reluctant to revamp their courses and others may not know how to incorporate real-world social relevance or group work into their classes and assignments. Others may want to make these efforts but do not have the time to do so given their full plate of teaching, research, and service responsibilities. A realistic faculty intervention may require freeing up time and offering incentives for faculty to update their courses while also creating a learning community of colleagues with whom faculty can brainstorm ideas and receive feedback. Specifically, universities could establish a faculty development program that offers a course release or a small stipend to faculty members who are interested in re-designing one or more courses they teach to make them more communal and inclusive. Faculty participating in the program could have their own individual course redesign project and could also participate in biweekly learning community meetings to share pedagogical ideas with colleagues, receive feedback, and learn from master teachers. Such a learning community can be administered and

managed by the centers for teaching and learning that exist at many colleges and universities whose staff members are usually well-informed of new pedagogical strategies. Once a critical mass of faculty in a department are engaged in course redesign to increase inclusivity, it may pick up momentum among other colleagues in the department. Notably, we believe that course redesign is particularly important for introductory “gateway” courses where students are introduced to a major. That is the early stage where students need to see the connection between the pedagogical content and its social relevance to the real world in order to reach a diversity of students. Communal pedagogy practices often produce the greatest benefits for first-generation, Black, Hispanic, and Native American students, and women, given that students from these groups typically endorse communal values more strongly than their continuing-generation, White, and male peers (Diekman et al., 2010; Gaines et al., 1997; Fryberg & Markus, 2007; Phillips et al., 2020; Stephens, Fryberg, et al., 2012). That said, other research shows that communal pedagogy practices sometimes benefit all students, including first-generation students, White students, and men (Brown et al., 2015; Dasgupta et al., in press; Harackiewicz et al., 2016).

Notably, institutions vary in the degree to which they emphasize social connection and communality. Some evidence suggests that whereas certain institutions—especially 4-year colleges—prioritize independence and underplay communality, other institutions—especially 2-year colleges—have cultures that place equal emphasis on independent and communal norms (Tibbetts et al., 2018). Therefore, communally-oriented students may not experience a cultural mismatch in higher education until they arrive at 4-year universities. In this regard, administration, faculty, and staff at 4-year colleges have a lot to learn from their colleagues at 2-year institutions.

Encourage instructional practices associated with growth mindsets: As a way to reduce the salience of stereotypes about who is innately brilliant within an academic domain (Leslie et al., 2019; Storage et al., 2016), universities can promote instructional techniques that demonstrate a growth mindset among faculty. Holding a growth mindset means endorsing the belief that intelligence and ability can be developed through effort and persistence (Dweck, 1999). In direct opposition to growth mindsets, and in line with stereotypes of innate brilliance, are fixed mindsets in which intelligence and ability are believed to be stable. With fixed mindsets, a person is believed to either have intelligence or not. Promoting pedagogical techniques that demonstrate a growth mindset, then, can work to counteract the “brilliance” stereotypes that so often undermine the self-efficacy, belonging, and interest of students from marginalized groups. Indeed, evidence from an experimental study suggests that students are more motivated in class and more optimistic about their grades when they perceive their instructors to have growth than fixed mindsets (Rattan et al., 2012). Additionally, the racial achievement gap between positively stereotyped groups in academics (White and

Asian students) and negatively stereotyped groups in academics (Black, Hispanic, and Native American students) is reduced among students whose instructors endorse growth rather than fixed mindsets, and this reduction is explained in part by the increased motivation they feel in courses taught by faculty with growth (rather than fixed) mindsets (Canning et al., 2019).

To incorporate growth mindsets within their courses, faculty can include verbal or written encouragement (e.g., in the syllabus, in assignment feedback), emphasizing that all students can excel in the course if they put in effort (Fuesting et al., 2019; Rattan et al., 2012). They can also promote help-seeking behaviors, such as visiting office hours or taking advantage of campus resources (e.g., writing centers, tutoring services), which signal to students that improvement in the course is possible (Fuesting et al., 2019). Moreover, faculty can design a course structure and course assignments that allow students to make mistakes without penalty while also providing them with the opportunity to correct their mistakes. For instance, faculty could provide completion credit for first drafts of assignments, grading assignments on quality only after they have been revised and re-submitted. They can also incorporate elaborative learning practices (e.g., hands-on activities, interactive group discussions) which students associate with faculty who have growth mindsets (Muenks et al., 2021). As with efforts to incorporate more communal experiences into courses, faculty may need more than simple encouragement to be able to weave growth mindsets into their lessons. Although it may take little effort to incorporate growth mindset language into their syllabi, we anticipate that faculty will need greater levels of support (i.e., stipends, course releases, structured learning communities) to be able to rework their courses to incorporate these larger recommendations, like revising assignments and related grading strategies and incorporating more elaborative learning practices.

Institute near-peer mentorship programs: Near-peer mentorship programs, in which incoming students are paired in informal relationships with more senior students of the same marginalized identity, serve as a way boost representation and relationships with individuals from their identity group whose experiences are proximal to the self and who model success. Evidence for this intervention stems directly from the stereotype inoculation model, which suggests that contact with successful ingroup peers safeguards a person from the impact of negative ingroup stereotypes. For students from negatively stereotyped identity groups, seeing an ingroup peer prove the stereotypes false through their own success reduces the influence of those stereotypes on the self. Academic benefits of participation in a near-peer mentorship program include increased academic self-efficacy and motivation (Dennehy & Dasgupta, 2017) as well as academic performance (Herrmann et al., 2016). Relationships with peer mentors produce social benefits as well, such as increased feelings of belonging (Dennehy & Dasgupta, 2017; Mattanah et al., 2010), and evidence from studies with a longitudinal component suggest that near-peer mentorship has long-lasting impacts. For example, compared to

having no mentor or a mentor of the other sex, one year of active mentorship from a same-sex peer during their first year of college had a variety of benefits for female engineering majors, including protection from academic anxiety, preserved emotional well-being, increased success in securing experiential learning opportunities (e.g., internships), and increased retention in STEM majors (Wu, Thiem, & Dasgupta, 2021). The benefits of same-sex mentors were particularly important in the first year of college and endured through graduation (Dennehy & Dasgupta, 2017; Wu, Thiem, & Dasgupta, 2021). Notably, having male mentors produced some delayed benefits for female engineering majors, particularly in terms of belonging and confidence, after the transition to college was over (Wu, Thiem, & Dasgupta, 2021). We suspect that women with male mentors became accustomed to working with men early in college, and this familiarity benefitted them as they moved into upper-level engineering courses in which the majority of their peers were men. Additional research is necessary to better understand when and how students can benefit from near-peer mentors who do not share their marginalized identities.

One important component of mentorship from ingroup peers is mentors' capacity to be relatable in terms of the hardships that they dealt with along the way in their academic or professional journey. Mentorship is not effective when a mentor's success appears unattainable to the mentee (Asgari et al., 2012; Lockwood & Kunda, 1997; Herrmann et al., 2016). If a mentor's success appears to have been achieved easily, mentees are deprived of evidence that challenges can be overcome and thus may not receive any particular benefits from their mentorship experience. Relatedly, other research shows that when marginalized students hear from near-peers that adversity is a normal component of college, it bolsters their persistence and performance. Specifically, Black students who learned that all college students encounter challenges, and that these challenges are short-lived, were able to attribute their struggles to the college environment and were less concerned about whether they belonged in college, thus helping them achieve higher grades and more improved well-being than Black students in a control group (Walton & Cohen, 2011).

As a corollary, it is important for mentees to hear mentors highlight the strengths they possess through their backgrounds and identities. An emphasis on the strengths that come from belonging to a historically marginalized group has been shown to have positive effects for first-generation college students (Stephens et al., 2014; Townsend et al., 2019). For instance, learning from senior first-generation students about both the positive and negative influence of their generation status on their college experience resulted in lower anxiety and better adjustment to college among first-generation students at the end of their first year in college (Stephens et al., 2014). Importantly, these results emerged when comparing the intervention group to another group of first-year first-generation students who heard senior first-generation students answer questions about their college

experience without noting how their first-generation status impacted these experiences. Similarly, compared to first-generation students in a control condition, first-generation students who heard senior students discuss the identity-related challenges they faced in college and identity-associated strengths that helped them overcome those challenges felt more empowered and resilient and had higher second-year grade point averages (Townsend et al., 2019).

In addition to serving as an intervention for limited representation and relationships with similar others, near-peer mentorship programs also serve as an intervention to increase information-related social capital, promote use of campus resources (Stephens et al., 2014), and create a more communal college environment. To the extent that mentors and mentees meet regularly and mentees routinely turn to mentors for academic advice and guidance, the mentoring relationship can take on a collaborative tone. Moreover, serving as a mentor can be viewed as an act of altruism. Thus, near-peer mentorship programs can successfully reduce several barriers facing students from historically marginalized groups.

Depending on the scope of these programs, instituting near-peer mentorship relationships need not require an abundance of resources. Individual departments could institute informal mentorship programs through which more senior students volunteer as mentors and are assigned, by a faculty or staff member, to a few new student mentees. Hosting an introductory meet-and-greet event may be a helpful way to prompt mentors and mentees to initiate their relationship and could involve as few resources as a space to meet, free snacks, and some staff coordination. Following that, a few periodic reminders sent to mentors and mentees over email, reminding them to check in with each other, may be all that is needed to ensure the relationship continues past the initial meeting. Alternatively, colleges and universities could build a more "high touch" formal mentorship program. This may involve putting more effort into matching mentors with mentees based on identity and academic fit, training mentors on the importance of sharing both their challenges and successes with mentees, and hosting more regular, structured events through which the mentor-mentee relationship can grow.

Create living-learning communities: Living-learning communities also work to increase relationships with a cohort of ingroup peers who are on the same academic journey. These communities typically involve students living together in the same residence hall, attending at least one class together, and interacting together in structured activities (Brower & Inkelas, 2010). These communities are also often designed for students who share an academic interest and/or a social identity (Brower & Inkelas, 2010). As identified within the stereotype inoculation model, immersion in a community of ingroup peers is one factor that can help create an environment in which students feel a greater sense of psychological fit, especially if these students are in a small numeric minority in the context of their larger university environment. For instance, when all students within a living-

learning community share a common identity, the community can function as a space in which students are protected from tokenization and doubts about their belonging, bolstering their confidence and motivation to persist. Belonging may be further boosted by small classes typical of these programs and frequent peer interactions that occur both inside and outside of class. Indeed, living-learning community participants have more academic interactions with their peers than non-participants (Dahl et al., 2020), and they experience a stronger sense of belonging both within their specific living-learning community and within the university as a whole (Schussler & Fierros, 2008; Wawrzynski et al., 2009; Wu, Thiem, & Dasgupta, 2021). The social support students receive from their community peers has been shown to increase academic persistence (Soldner et al., 2012; Inkelas et al., 2007) and reduce academic anxiety which helps students earn higher grades (Wu, Zeigenbein, et al., 2021).

In addition to serving as a strategy to increase representation and create a community of peers, living-learning communities also serve as an opportunity for skill-building and bolstering college-related social capital. Because students in living-learning communities are introduced to campus in a more structured way than students outside of these communities, they gain more knowledge about campus norms and resources than other students. Research suggests that the learning component of living-learning communities is particularly beneficial for orienting students to campus resources. For instance, research found that students participating in living-learning communities took advantage of campus resources like computer labs, academic advisors, and peer counselors more frequently than students living in traditional residential campus communities which lacked the shared community-attended course (Dahl et al., 2020; Inkelas et al., 2007). Living-learning community participants also reported stronger intentions than their peers not living in such communities to participate in academic research, complete a senior thesis, and study abroad (Brower & Inkelas, 2010), which may be a result of increased knowledge of these opportunities and associated increased confidence. Indeed, students who participated in a living-learning community during their first year in college maintained higher academic self-efficacy up to three years later (Brower & Inkelas, 2010).

Living-learning communities may highlight communal aspects of college, as well. An important tenet of such communities is that learning is not confined to traditional classrooms. Learning also happens informally in residence halls and through extracurricular activities (Brower & Inkelas, 2010). Because these communities integrate learning environments with living environments, they allow students to make connections between the knowledge gained in class and their real-world experiences outside of class (Shapiro & Levine, 1999). Also, living-learning programs help students connect with faculty through informal one-on-one interactions (e.g., faculty attendance at extracurricular events, faculty-in-residence components of these programs; Eidum et al., 2020). Programs that cre-

ate more opportunities for faculty-student interactions are likely to attract faculty members who are more communally oriented and interested in building individualized relationships with students. Research shows that communally-oriented students often prefer to interact with communally-oriented faculty (Fuesting & Diekman, 2017), so to the extent that students can meet these faculty members through living-learning communities, they may be more satisfied with their college experience. Students from historically marginalized groups who tend to prioritize communal values may particularly appreciate and benefit from living-learning communities.

Importantly, living-learning communities may not be a blanket solution for all students from all marginalized groups. Whereas studies show that women and first-generation students typically benefit from living-learning communities (Inkelas et al., 2007; Szelenyi et al., 2013; Wu, Zeigenbein, et al., 2021), some research suggests that living-learning communities may not always be beneficial—and in some cases may be detrimental—for students of color (Eidum et al., 2020). For instance, one survey of living-learning community participants revealed that participation was not associated with positive academic and social outcomes among Black students, Middle Eastern students, and Native students and was associated with negative outcomes for Asian and Asian American students (Eidum et al., 2020). Because these results come from surveys of students across over 80 living-learning communities, it is difficult to drill down to the specific cause of these outcomes. As a potential explanation for the negative experiences of Asian and Asian American participants, Eidum and colleagues (2020) surmise that they may be vulnerable to the pressure of the model minority myth when imbedded in living-learning communities—especially if the community is focused around students' shared racial and ethnic identity—and this pressure may backfire to produce the negative outcomes. Another critique of communities based on one social identity (like race/ethnicity) is that it insulates students from the rest of campus, preventing them from establishing cross-race friendships and gaining experience navigating predominantly White spaces that they are likely to encounter once they leave the community (Von Bergen et al., 2020), which could explain Eidum et al.'s (2020) results. Alternatively, if the students of color surveyed by Eidum et al. (2020) were not embedded in race-specific living-learning communities, they may not have been protected from the negative stereotypes and other identity-related challenges that can arise when sharing space with members of racial outgroups, particularly when those outgroup members hold higher societal status (e.g., White students). Ultimately, it is difficult to know which kinds of communities Eidum et al.'s participants were a part of, and more research is needed to pinpoint which aspects of living-learning programs are beneficial, detrimental, or have no effect on students from different groups. That said, to date, the bulk of the existing research suggests that participation in living-learning communities during the first year of college offers a gentle onramp for marginalized students to help with the

acculturation process into college. Because living-learning communities target so many of the identified barriers, they can serve as a particularly impactful intervention. To make it most accessible to students who need it most, colleges and universities should not pass down the cost of this program to students by charging them extra.

Transitioning to the Workforce

Broaden professional networks and increase access to experiential learning opportunities: To expand students' access to quality employment opportunities, it is important for students to have broad professional networks. To the extent that students have enough time and money to free them up to participate in faculty-supervised research or professional development activities, doing so can be an effective way to form close ties with faculty members who can serve as nodes in students' professional networks. However, for students from marginalized groups who may not have these resources, participation in experiential learning opportunities may be a more realistic route to broadening their networks.

Experiential learning opportunities often take the form of cooperative (co-op) education experiences or internships in which students earn course credit while gaining direct employment experiences. Although co-ops and internships are similar, co-ops typically involve full-time paid work during semesters in which students do not enroll in college courses whereas internships typically involve paid summer internships or part-time paid or unpaid work during a semester in which students balance internship work with school work (Boyington & Moody, 2019). Notably, both experiences help students expand their professional network, connecting students to potential mentors and possible stable employment, although co-ops come with the added benefit of payment, which is particularly meaningful for students who have to work while also attending college because of financial constraints. Experiential learning opportunities also allow students to gain real-world job experience that students can leverage to begin their career after college graduation. Indeed, research shows that college graduates with internship experience find employment faster than those who lack this experience (Knouse et al., 1999), and those who participate in either an internship or a co-op program obtain higher starting salaries post-graduation than students who do not participate (Blair et al., 2004; Gault et al., 2000).

In addition to helping historically marginalized students gain access to professional networks and employment, experiential learning opportunities may have further benefits. These opportunities may grow students' social capital by familiarizing them with workplace norms, etiquette, and unspoken expectations. Moreover, we suspect that these applied experiences may have psychological benefits for students, such as a strengthened professional identity, greater self-efficacy, and increased sense of belonging in a future profession. Finally, these experiences

expose students to possible careers that they may not have previously considered (Velez & Giner, 2015).

In order to position students for experiential learning opportunities, colleges and universities need to host regular career fairs and workshops to educate students about the importance of participating in experiential learning opportunities in addition to their regular coursework. Many students, especially those from historically marginalized groups, may not know the importance of accruing professional work experience through internships while in college. They may not be aware that employers use summer internships as an onramp for future permanent hires and that building up a resume of work experience needs to begin early in students' academic careers, typically starting the summer after their sophomore year. This is information-related social capital that needs to be conveyed to students through career centers at universities and also through professional development courses and workshops delivered through academic departments.

Some universities have redesigned their undergraduate curriculum to allow for semester- or year-long co-op and internship participation, either strongly encouraging them or requiring them for graduation (for example, the co-op program at Northeastern University; Northeastern University, 2021). This type of institution-wide program creates a more seamless onramp between college and careers by combining academic coursework and experiential work experience. To do this successfully, the challenge for universities is to build partnerships with businesses and nonprofits that are interested in recruiting college student interns and to create a mechanism to place students. Having a well-developed co-op program ensures that all students benefit from these experiences, including students from historically marginalized groups, who otherwise may not have the social capital to find such professional opportunities by themselves.

Finally, colleges and universities can complement internship participation through near-peer mentorship programs. Our research shows that near-peer mentorship in the first year of college increases mentees' participation in professional internships (Wu, Thiem, & Dasgupta, 2021). Specifically, we found that when first-year women students in engineering were assigned a same-sex peer mentor who was a senior in the same major, the mentees showed greater motivation, reported less anxiety, and successfully completed internships at a higher rate. We speculate that near-peer mentors may have increased internship participation by accompanying their mentees to career fairs, connecting mentees to professional contacts and internship sites, and referring their mentee to organizations where they previously worked as interns, thereby growing mentees' professional networks. These supports and role modeling behaviors likely showed mentees the path forward to search for, and successfully secure, professional internships while in college.

Finally, universities could and should actively leverage their alumni networks to help make connections between current students from historically marginalized

groups and alumni. In particular, universities could help these students connect with alumni in professions of interest and with alumni who share their cultural background. These connections could broaden students' professional networks, increase their social capital, and help them explore future professional pathways. Offices of alumni relations at colleges and universities could coordinate with campus career services and academic departments to create well-organized opportunities for current students to connect with alumni virtually or in person. These connections are likely to be beneficial for all students, but especially those from less privileged backgrounds.

All-Encompassing Professional Development Programs

Some colleges and universities have instituted programs that combine a variety of the solutions discussed above. For instance, the Meyerhoff Scholars Program at the University of Maryland Baltimore County recruits students from historically underrepresented groups (mostly Black and African American students) to engage in a program involving a summer bridge experience, a first-year living-learning community, near-peer mentorship, and faculty mentored research experiences (University of Maryland Baltimore County, n.d.). This experience serves as an all-encompassing way to socialize students into college culture and the culture of science and engineering research while growing their professional identity within a supportive community that feels like a family. Other campuses have replicated this program, including the Chancellor's Science Scholars Program at the University of North Carolina at Chapel Hill, the Millennium Scholars Program at Penn State University, and Posse Programs which have been instituted at over 60 colleges and universities (The Posse Foundation, 2021). Research suggests that these types of "kitchen sink" programs positively impact students from historically underrepresented groups in higher education. A comparison of three programs (the Meyerhoff Scholars Program, the Chancellor's Science Scholars Program, and the Millennium Scholars Program), found that student retention in STEM majors and average GPAs were higher among program participants than matched nonparticipants (Domingo et al., 2019). These results held even when restricting analyses to racial and ethnic minority students only and also to women students only. Other analyses of the Meyerhoff Scholars Program reveal that, compared to matched nonparticipants, participants reported a greater sense of community in college, greater identification with science, and greater research self-efficacy (Maton et al., 2016). Furthermore, perhaps because of these psychological mechanisms, Meyerhoff participants were twice as likely as matched nonparticipants to pursue graduate or professional education after college graduation (Maton et al., 2012). These kitchen sink programs are promising, although costly, making them a challenge to get off the ground without significant financial and staff support.

Conclusion

From precollege to career, students from historically marginalized groups encounter numerous barriers to success in higher education. These barriers are often interrelated and compounding, resulting in students experiencing more than one barrier simultaneously. These barriers may be particularly challenging at college entry and at college graduation given that these transitional periods are ones in which students are moving from familiar to unfamiliar environments. Other barriers pose a challenge throughout students' college experiences. In this article we pointed to both barriers and tangible, research-informed solutions that can be implemented at the institutional level to allow students to reach their full potential. Some of the interventions we described can begin as early as middle school, whereas others continue through college. Because students encounter barriers throughout their college experience, and because these barriers are often interconnected and compounding, universities should institute programs and initiatives throughout students' time in college to provide supports and prevent students from falling through the cracks somewhere along their academic journey.

One important point worth underscoring is that these programs and initiatives to support student success must not be a financial burden for students because if so, they will become inaccessible to students who need them the most. Also related to financial hardship, institutions need to be aware that students who have to work while attending college may not be able to take advantage of some programs, even if they are free, because of their restricted time availability. Universities need to develop alternate methods of accommodating these students' needs. Without access to scholarships or other financial assistance resources, intervention programs are likely to lose out on talented students from low-income and working-class families—often the very students these programs are designed to assist.

The research reviewed here offers promising solutions for college and university stakeholders. However, we caution that there is no single intervention that is a “silver bullet” to resolve all barriers facing historically marginalized students (Binning & Browman, 2020; Walton, 2014). This is particularly true given that much of the research on interventions does not take an intersectional lens, which limits our understanding of how these interventions impact students who hold multiple marginalized identities. More research is needed to better understand when, and for whom, these interventions are most beneficial, and when, and for whom, these interventions cause unintended harm. Additionally, more research is needed on the experiences of students with other marginalized identities not discussed here, including sexual and gender minority students and disabled students. Some barriers addressed here may also apply to students from these groups (e.g., negative stereotypes and low expectations), but they may encounter other

barriers unique to their identities, as well, therefore requiring unique solutions not discussed here.

There are other notable holes in the research included here that need to be addressed through further research. For example, some of the research we referenced comes from correlational survey studies, which limits our ability to make causal conclusions about the benefits of an intervention. Increased use of field experiments and randomized controlled trials are much needed. Furthermore, there is limited research evaluating the time- and money-intensive interventions described here, particularly the benefits afforded by specific elements of all-encompassing interventions. Finally, it is time to scale up the most impactful interventions across multiple higher education institutions and evaluate their impacts on larger cohorts of students through multi-institutional collaborations. We look forward to such translational work that blends research with social impact.

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KELSEY C. THIEM is an Assistant Professor of Psychology at Ball State University. Her research explores the impact of stereotypes on people within higher education contexts.

NILANJANA DASGUPTA is a Professor of Psychology at the University of Massachusetts Amherst. Her research focuses on the ways in which changes in social contexts correspondingly change implicit attitudes, beliefs, and behavior.