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College Financial Resources Shape the Impact of a Cultural Match for Working-Class Students

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Abstract

College students from working-class backgrounds often experience a cultural mismatch between their interdependent cultural norms and the independent cultural norms typically endorsed by U.S. colleges. Research has not yet considered how critical features of the college context, such as colleges' financial resources, may shape the impact of cultural mismatch or match. Importantly, most students from working-class backgrounds attend colleges with lower resources. The current research examines the role of the level of college financial resources available. Specifically, in an online study, we examine the short-term effects of creating a cultural match on students' performance on a verbal task (Study 1). In a longitudinal intervention, we create a cultural match at the beginning of college, and then examine the impact on students' GPAs at the end of the first year (Study 2). The current research highlights the powerful role of the college context in shaping the efficacy of psychological interventions. (149 words)

Keywords: social class, cultural mismatch, intervention, inequality, financial resources

College Financial Resources Shape the Impact of a Cultural Match for Working-Class Students

Educational achievement is one of the most important factors in promoting upward social mobility in the U.S. (Stephens, Markus, & Phillips, 2014; Torche, 2011). Yet, social class background powerfully influences the likelihood of students' success (Croizet, Goudeau, Marot, & Millet, 2017; Wilbur & Roscigno, 2016). College students from working-class (WK) backgrounds—such as those who are the first in their family to attend college or those who have low household incomes—experience significant challenges in navigating university environments (Covarrubias & Fryberg, 2015; Goudeau & Croizet, 2017). For example, they receive lower grades and are more likely to drop out from college than students from middle-class (MD) backgrounds (Bailey & Dynarski, 2011; Sirin, 2005). These disparities between students from WK and MD backgrounds are referred to as the *social class achievement gap* (e.g., Stephens, Fryberg, Markus, Johnson, & Covarrubias, 2012).

Social scientists have identified many factors that contribute to and sustain the social class achievement gap, including disparities in students' financial resources (Page & Scott-Clayton, 2016). Compared to students from MD backgrounds, students from WK backgrounds are more likely to experience financial obstacles that limit their achievement in college. To afford tuition, fees, books, transportation, housing and food, students from WK backgrounds often have to work while enrolled in college and receive less financial support from their parents (Engle, 2007; Page & Scott-Clayton, 2016; Pascarella, Pierson, Wolniak, & Terenzini, 2004). As a result, they have less time to devote to academic pursuits, including studying or taking advantage of student support services (Stinebrickner & Stinebrickner, 2003; Walpole, 2003). These financial obstacles can prevent students from WK backgrounds from performing up to

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3 their potential (George, Dixon, Stansal, Gelb, & Pheri, 2008, Kuh, Cruce, Shoup, Kinzie &
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5 Gonyea, 2008).

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8 Addressing these financial obstacles is necessary but not sufficient for promoting the
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10 academic achievement for students from WK backgrounds (Dittmann & Stephens, 2017;
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12 Johnson, Richeson, & Finkel, 2011; Stephens, Markus, & Fryberg, 2012). For example, if
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14 students do not have the time to study because they have to work, this likely hinders their
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16 academic performance. Yet, simply removing these financial obstacles is not enough to ensure
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18 that students have the opportunity to perform up to their potential. Indeed, even at colleges that
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20 provide ample financial support to students (e.g., tutoring programs, generous financial aid),
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22 students from WK backgrounds still experience *psychological* obstacles that can undermine their
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24 academic performance (Ostrove & Long, 2007; Stephens, Markus, & Phillips, 2014).

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28 One particularly consequential psychological obstacle for students from WK
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30 backgrounds is experiencing a cultural mismatch between their own cultural norms and those
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32 espoused by U.S. colleges and universities. Cultural norms include understandings of what it
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34 means to be a good person and how to relate to others (Cross & Madson, 1997; Markus &
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36 Kitayama, 2010). Research has identified two divergent sets of cultural norms that are
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38 differentially distributed across U.S. social class contexts: independence and interdependence
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40 (Stephens, Markus et al., 2014). Middle-class contexts, such as U.S. colleges and universities,
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42 tend to promote independent cultural norms, which assume that people should act freely, be
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44 distinct from others, and influence the context (Fryberg & Markus, 2007; Stephens, Fryberg, et
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46 al., 2012). However, working-class contexts tend to promote interdependent cultural norms,
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48 which assume that people should respond to others' needs, be connected to others, and adjust to
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3 the context (Kraus, Piff, Mendoza-Denton, Rheinschmidt & Keltner, 2012; Piff, Kraus, Côté,
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5 Cheng, & Keltner, 2010; Stephens, Markus, & Townsend, 2007).

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8 The cultural mismatch between the independent cultural norms that pervade U.S. college
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10 settings and the interdependent cultural norms common among students from WK backgrounds
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12 has important consequences in educational settings (Fryberg & Markus, 2007; Stephens,
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14 Fryberg, et al., 2012). Specifically, this cultural mismatch leads students from WK backgrounds
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16 to feel greater stress, perceive tasks as more difficult, and ultimately perform less well on
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18 academic tasks compared to their counterparts from MD backgrounds (Stephens, Fryberg, et al.,
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20 2012; Stephens, Townsend, Markus, & Phillips, 2012).

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24 However, lab studies have shown that creating a cultural match (i.e., reframing an
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26 independent university welcome letter to include *interdependent* language) leads WK students to
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28 perform just as well as MD students on academic tasks (Stephens, Fryberg, Markus, Johnson, &
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30 Covarrubias, 2012; Stephens, Townsend et al., 2012). This previous research suggests the
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32 potential efficacy of a relatively simple psychological intervention to improve the academic
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34 achievement of students from WK backgrounds: creating a cultural match. Consistent with the
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36 literature on wise interventions (Stephens, Hamedani, & Townsend, 2018; Walton & Wilson,
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38 2018), we use the term *intervention* to refer to efforts to change students' psychological
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40 experience to improve their academic outcomes.

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44 Though such an intervention appears promising, studies testing a cultural mismatch or
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46 match have been conducted at highly selective colleges with higher financial resources (Johnson
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48 et al., 2011; Stephens, Fryberg, Markus, Johnson, & Covarrubias, 2012; Winston, 1999). Indeed,
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50 previous research has not yet considered how basic features of the college context may shape the
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52 impact of cultural mismatch or match. One particularly important feature of the college context
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3 for students' academic achievement is the level of financial resources that the college has at its
4 disposal (Ryan, 2004; Titus, 2004). In the current research, we propose that colleges' relative
5 level of financial resources influences the impact of a cultural mismatch or match for students
6 from WK backgrounds.
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12 Colleges with higher financial resources can use those resources to help students' from
13 WK backgrounds overcome the financial obstacles that can undermine their academic
14 performance. For example, they can provide generous financial aid packages, scholarships, or
15 guidance on making decisions about financial opportunities such as grants and work-study
16 packages (Castleman & Page, 2015; McKinney & Novak, 2013; Scott-Clayton, 2015; Swecker,
17 Fiftolt, & Searby, 2013; Titus, 2006). These financial resources can enable students from WK
18 backgrounds to concentrate on academic pursuits, thereby providing the necessary foundation for
19 academic success.
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31 We theorize that psychological interventions, such as creating a cultural match, will have
32 the most impact on WK students' academic performance at colleges with higher financial
33 resources. In contrast, at colleges with lower financial resources that are therefore less able to
34 address the financial obstacles faced by WK students, we theorize that creating a cultural match
35 should have less of an impact on WK students' performance. Accordingly, we propose the
36 following hypothesis:
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44 Colleges' relative level of financial resources will shape the impact of a cultural
45 mismatch or match.
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49 a. At colleges with higher financial resources, a cultural mismatch or match will be
50 more influential for the academic achievement of students from WK backgrounds.
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- b. At colleges with lower financial resources, a cultural mismatch or match will be less influential for the academic achievement of students from WK backgrounds.

Current Research

The current investigation makes at least two key contributions. First, we test whether a cultural mismatch or match will have a differential impact at colleges with higher vs. lower financial resources. Second, in a novel cultural match intervention, we examine whether creating a cultural match has potential to produce long-term improvements in the academic achievement of students from WK backgrounds at colleges with higher resources, but not those at colleges with lower resources.

The present investigation is both theoretically and practically important. Not only are students from WK backgrounds rarely the focus of psychological research, but, when they are, researchers typically draw from populations of students at colleges with higher financial resources. Yet, the majority of students from WK backgrounds attend colleges with lower financial resources (Rothwell, 2015; Carnevale & Srohl, 2013; Pell Institute, 2016; U.S. Department of Education, 2014). Studying this population (i.e. students from WK backgrounds at colleges with lower financial resources) can shed light on how the college context can shape the efficacy of psychological interventions.

Study 1: Online Experiment

To test the hypothesis that colleges' relative level of financial resources will shape the impact of a cultural mismatch or match, we administered a pre-registered online experiment with college students at the beginning of their first year. We examined the short-term effects of creating a cultural mismatch or match on students' performance on a verbal task.

Method

Participants. We computed our sample size *a priori* to obtain 80% power to detect a small effect typically observed in previous related research ($d=0.28$). As such, we sought to obtain a sample size of approximately 400 participants. Via Facebook, we recruited 411 college students enrolled at a diverse range of U.S. colleges who were in the first few weeks of their first year to complete an online survey about their first year of college (72% female). We excluded participants who did not report their college name ($n=78$) and those who failed at least one of two attention check items ($n=38$) and were left with a final sample of $N=292$ participants. A sensitivity analysis indicated that the remaining sample size provided us with 80% power to detect a small effect of $d=0.33$.

In this study, following previous research on cultural mismatch, we utilized parental educational attainment as our binary measure of participants' social class background (i.e., whether a participant was the first person in their family to go to college; Stephens, Fryberg, et al., 2012). Thirty-nine percent of participants were categorized as from WK backgrounds. Participants from WK backgrounds were more likely to have a family household income of less than \$50,000 (65%) than participants from MD backgrounds (25%), $\chi^2(1, N=290)=44.92, p<.001$ ($n=2$ participants did not report family household income). We created a dummy variable based on participants' racial and ethnic backgrounds, following previous research (e.g., Townsend et al., 2018). Whites and Asians or Asian Americans (75%) were classified as academically advantaged (1) and African Americans, Latinos, and Native Americans (25%) were classified as academically disadvantaged (0). Participants from WK backgrounds were more likely to be from disadvantaged racial backgrounds (40%) than participants from MD backgrounds (16%), $\chi^2(1, N=292)=21.14, p<.001$.

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Procedure. We pre-registered our study on OSF (https://osf.io/d4jsy/?view_only=998ab57154f3477ab5781848d688acc5). Participants clicked on a link from a Facebook ad to participate in the study. After consenting and verifying that they were starting their first year of college, participants read a series of messages outlining how to succeed in college, ostensibly from junior and senior college students enrolled at colleges and universities across the country. Following previous cultural match studies (Stephens, Fryberg, et al, 2012; Stephens, Townsend et al., 2012), participants were randomly assigned to read stories that were framed in an independent (cultural mismatch) or an interdependent (cultural match) manner.

After the manipulation, participants were asked to complete a *saying-is-believing* exercise, in which they were wrote down three key messages from the stories to encourage them to internalize the intervention (Stephens, Hamedani et al., 2014). Participants then completed an academic achievement measure (i.e., an anagram task) used in previous research (Apfelbaum, Stephens & Reagans, 2016; Lee & Nass, 2012; Stephens, Fryberg, et al., Covarrubias, 2012). Specifically, participants were asked to complete a series of 12 anagrams. Achievement scores on the task were calculated as the number of anagrams participants solved correctly ($M=8.59$, $SD=4.17$). Finally, participants completed a questionnaire assessing their anticipated experiences in college (see supplementary materials).

Materials. The messaging in this study differed from that of previous cultural match studies in one key way. Specifically, previous studies were conducted with participants attending the same college, and therefore provided a message that came from that college or university (e.g., a welcome message from Stanford University). However, given that participants in the current study were from a broad range of universities, the message needed to be more general so

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3 that it would be relevant to participants at a wide range of universities. We therefore adapted the
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5 manipulation so that the messages came from “junior and senior college students from around
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7 the country,” rather than a message from their specific college.
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10 Both conditions emphasized the same set of six activities. The key difference between the
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12 two message conditions was whether the content of the message itself emphasized
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14 interdependent or independent cultural norms as ways to succeed in college. In the *independent*
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16 condition, students read that to be successful in college, students should “use campus resources
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18 to pave your own path” and “learn to be a leader by working in groups.” In contrast, in the
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20 *interdependent* condition, students learned about the same set of activities, but they were framed
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22 interdependently: “use campus resources to build a community” and “learn to be a team player
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24 by working in groups” (see supplementary materials for full text of manipulation).
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28 **College financial resources.** We utilized universities’ endowment per full-time enrollee
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30 (FTE) as a proxy for the college’s level of financial resources (i.e., higher vs. lower).
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32 Endowment per FTE is a meaningful proxy for level of resources because a university’s
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34 endowment reflects a stable amount of financial resources, over and above the resources afforded
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36 by tuition dollars that the university can use to directly remove financial obstacles often faced by
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38 students from WK backgrounds (e.g., financial aid, scholarships, and academic programs;
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40 American Council on Education, 2014; Seltzer, 2019). Selective private research universities
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42 tend to have very large endowments, while less selective regional colleges and community
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44 colleges may have no endowment. We therefore assume that colleges with higher financial
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46 resources are more likely to remove financial obstacles for students from WK backgrounds than
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48 colleges with lower financial resources.
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To utilize college endowment data, we matched participants' self-reported college name with publicly available data obtained from the National Center for Education Statistics Integrated Postsecondary Education Data System on college's endowment per FTE (IPEDS; *Median*_{Studies 1-2}=\$13,783)¹. Using the endowment per FTE data across the two studies, we created a dichotomous measure to capture the higher vs. lower college financial resources available at the wide range of schools that students attended (i.e., $N=297$ colleges). Specifically, we created a dummy variable that represented whether the college had financial resources that were higher than the median (1) or lower than the median (0). Using a dichotomous variable enabled us to compare the impact of cultural mismatch or match at categorically different types of colleges (i.e., those with higher vs. lower financial resources).

Analyses

To test the effect of the message condition for participants from different social class backgrounds at colleges that had higher vs. lower financial resources, we conducted three-way ANOVAs, examining the interaction between social class (WK vs. MD) \times message condition (independent vs. interdependent) \times college financial resources (higher vs. lower).²

Results

Anagram Performance. Consistent with our hypothesis that college financial resources shape the impact of a cultural mismatch or match on students' academic performance, we obtained a significant social class \times message condition \times college financial resources interaction on participants' anagram performance, $F(1, 284)=5.08, p=.03, \eta^2=.02$ (see Figure 1 and Table 1).

¹ To test the robustness of our effects, we also used the national average endowment ($M=\$26,345$) as a cutoff point. Results follow the same general pattern (see supplementary material).

² Results are largely equivalent when controlling for race, gender, and high school GPA (see supplementary material).

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We decomposed the interaction by comparing the anagram performance of participants from WK backgrounds by message condition at colleges with higher and lower financial resources.

Table 1. *Three-way ANOVA results for anagram task performance in Study 1.*

Variable	<i>F</i>	<i>p</i>	η^2
Message Condition	3.85*	.05	.01
Social Class	3.40†	.07	.01
College Resources	1.54	.22	.01
Message × Social Class	0.45	.50	0
Message × College Resources	0.05	.82	0
Social Class × College Resources	2.25	.14	.01
Message × Social Class × College Resources	5.08*	.03	.02
Means, standard deviations and 95% CIs of anagrams solved	<i>M (SD)</i>	<i>95% CI</i>	
Higher Resource Colleges			
WK, Interdependent Message	9.92 (2.91)	[8.30, 11.55]	
WK, Independent Message	7.56 (4.53)	[5.99, 9.12]	
MD, Interdependent Message	8.61 (4.27)	[7.51, 9.72]	
MD, Independent Message	9.21 (4.06)	[8.17, 10.25]	
Lower Resource Colleges			
WK, Interdependent Message	7.50 (4.61)	[6.11, 8.89]	
WK, Independent Message	7.19 (4.60)	[5.60, 8.79]	
MD, Interdependent Message	10.00 (3.26)	[8.52, 11.48]	
MD, Independent Message	8.09 (4.23)	[6.71, 9.46]	

Note. †*p* < .10. **p* < .05. ***p* < .01. ****p* < .001.

First, we examined the effect of the message condition on the performance of students from WK backgrounds at colleges with higher financial resources. In support of our prediction that creating a cultural match would improve the academic achievement of students from WK backgrounds at colleges with higher financial resources, and replicating the pattern of results observed in previous research on cultural mismatch (Stephens, Fryberg, et al., 2012), the two-

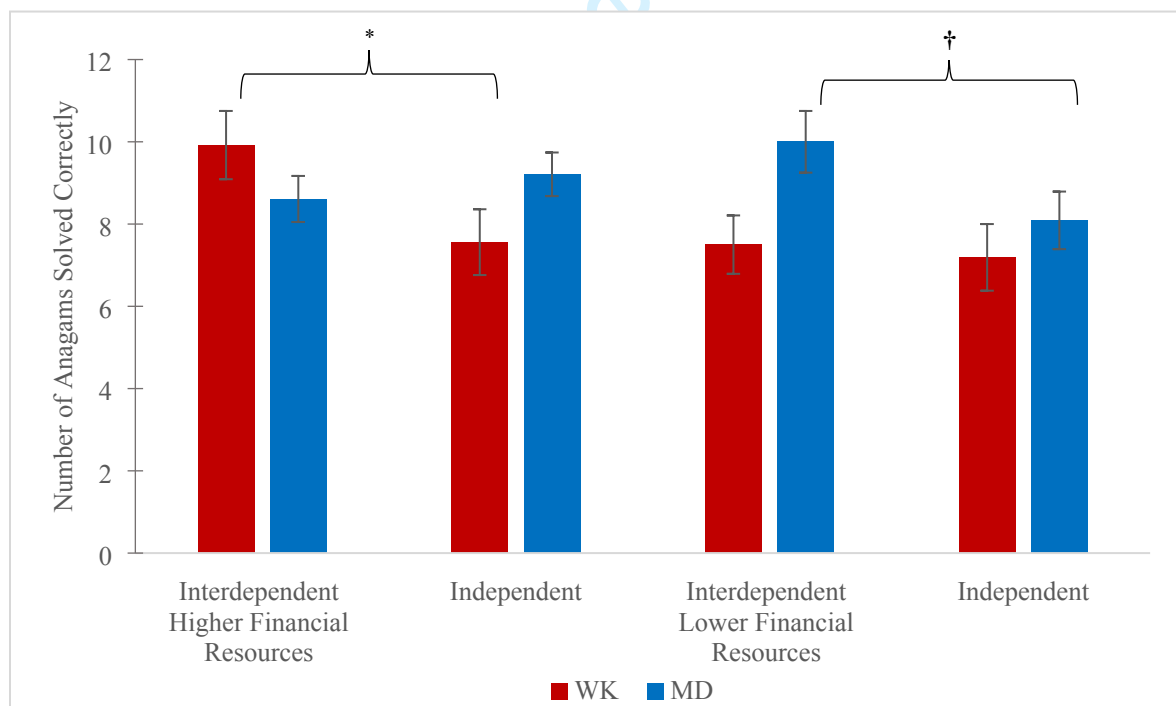
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way interaction between social class \times message condition was significant, $t(284)=2.15, p=.03$, 95% CI [0.25, 5.69]. Also consistent with previous research, participants from WK backgrounds in the *interdependent* condition (cultural match) performed significantly better ($M=9.92, SD=2.91, 95\% \text{ CI } [8.30, 11.55]$) than those in the *independent* condition (cultural mismatch; $M=7.56, SD=4.53, 95\% \text{ CI } [5.99, 9.12]$), $F(1, 284)=4.26, p=.04, \eta^2=.02$.

Next, we examined the effect of the message condition on the performance of students from WK backgrounds at colleges with lower financial resources. In support of our prediction that the message condition would be less influential for the academic achievement of students from WK backgrounds at colleges with lower financial resources, the two-way interaction between social class \times message condition was not significant, $t(284)=-1.60, p=.28, 95\% \text{ CI } [-4.53, 1.32]$. In other words, a cultural mismatch or match had less of an impact on the performance of participants from WK backgrounds at colleges with lower financial resources.

Figure 1. Anagram performance results in Study 1. Error bars represent $\pm 1 \text{ SE}$.



Discussion

In Study 1, we obtained initial experimental evidence that a college's financial resources shape the impact of a cultural mismatch or match. At colleges with higher financial resources, the results generally replicated previous research. Specifically, we found that creating a cultural match improved students from WK backgrounds' performance on an academic task. In contrast, and consistent with our hypothesis, at colleges with lower financial resources, creating a cultural match was less influential for the performance of students from WK backgrounds on an academic task.

Study 2: Online Intervention

Study 2 sought to replicate and extend our findings from Study 1. We tested the effect of a novel cultural match intervention on the academic achievement (i.e., first-year GPA) of college students from WK backgrounds over time. Specifically, in the first few weeks of college, we administered an online intervention in which we changed students' perceptions of the cultural norms of college. We subsequently investigated the impact of this intervention on students' GPAs. Given our focus on the differential impact of creating cultural match for WK students at colleges with higher vs. lower financial resources, in this study we focused exclusively on students from WK backgrounds (i.e., first-generation and/or low-income students).

Method

Participants. To recruit participants from WK backgrounds (in this case, those who were first-generation and/or low-income), we partnered with a national chain of charter high schools that primarily serves students from low-income and/or disadvantaged racial or ethnic backgrounds. In the first month of the academic year, we recruited as many participants as possible with the goal of obtaining enough participants to detect a small effect. We recruited 247

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3 participants who had previously attended these charter schools and had transitioned to college in
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5 the last month, and of this initial sample, $N=141$ also completed the end-of-first-year survey and
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7 had identifying college information provided by the charter schools.³ Participants (67% female)
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9 were enrolled at a diverse range of U.S. colleges. Eighty-one percent of participants were first-
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11 generation, and 72% had a family household income of \$50,000 or less. Using the same method
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13 as in Study 1 to categorized students' race/ethnicity, 99% of the sample were from disadvantaged
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15 racial or ethnic backgrounds.
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Procedure.

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21 ***Online intervention and Time 1 survey.*** Participants were emailed and provided a link to
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23 participate in the study. Study 2's procedure was identical to Study 1, aside from two key
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25 differences: in Study 2, we included a no-message control condition and we measured academic
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27 achievement at the end of students' first year (in a Time 2 survey), rather than directly after the
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29 manipulation (as in Study 1). After consenting, participants were randomly assigned to one of
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31 three conditions: an independent message (i.e. cultural mismatch), an interdependent message
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33 (i.e. cultural match), or a no-message control condition.
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38 For those participants in the independent or interdependent condition, the messages were
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40 ostensibly from junior and senior alumni of the same charter high schools that participants had
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42 previously attended. For participants in the no-message control condition, after consenting, they
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44 did not receive a message about tips to succeed in college and instead proceeded directly to
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46 answering questions about their anticipated experiences in college.
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50 ***End-of-first-year (Time 2) survey.*** We emailed participants who participated in the Time
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52 1 survey and asked them to take part in the end-of-year survey. Participants completed this
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56 ³ We did not pre-register this study because these data were collected before doing so had become standard practice
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58 (i.e., start of 2014-15 academic year).
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survey online and reported their academic engagement and achievement throughout their first year in college (see supplementary material for full list of measures). Attrition did not differ by condition: no message, 31%, independent, 26%, interdependent, 32%, $\chi^2(2, N=247)=0.63, p=.73$. A sensitivity analysis indicated that the remaining sample ($N=141$) provided us with 80% power to detect a moderate effect of $d=0.48$. However, because some of our key analyses involved examining the simple effects of interactions, we were underpowered to estimate these smaller effects.

Academic Outcome Measures.

Cumulative GPA (Time 2). Participants were asked to report their cumulative year-end GPA on a 4.0 scale. Previous research has found that undergraduates' self-reported GPAs are highly accurate when compared to official grades (Cassady, 2001).

College financial resources. We followed the same matching procedure utilizing the endowment per FTE data as in Study 1 to construct our measure of college financial resources.⁴ To ensure that our definition is consistent across the two studies, we dichotomized the measure using the same median as in Study 1 to create a dummy variable that represented relatively higher vs. lower financial resources.

Analyses

We conducted two-way ANOVAs, examining the interaction between message condition (independent vs. interdependent vs. no message) \times college financial resources (higher vs. lower)⁵.

Results

⁴ As in Study 1, due to sample size constraints, we opted to split the data at the median of the two studies. Similar to Study 1, results are largely similar when instead using the national average endowment as a cutoff point, but are underpowered to test our full model (see supplementary material for these results).

⁵ Results are largely equivalent when controlling for gender and high school GPA (see supplementary material).

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Cumulative GPA. Supporting our prediction that colleges' financial resources shape the impact of a cultural mismatch or match on students' academic performance, we obtained a significant message condition \times college financial resources interaction on participants' cumulative GPA, $F(2, 135)=3.25, p=.04, \eta^2=.05$ (see Table 2 and Figure 2). We decomposed this interaction by message condition at colleges with higher vs. lower financial resources (see Table 2). While some of the simple effects did not reach statistical significance, likely because the study was underpowered due to our sample size, the pattern of results is generally consistent with our hypotheses and the results of Study 1. These results, however, should be interpreted with caution and future research should use a larger sample to have the statistical power required to detect the small to medium effects observed in previous research.

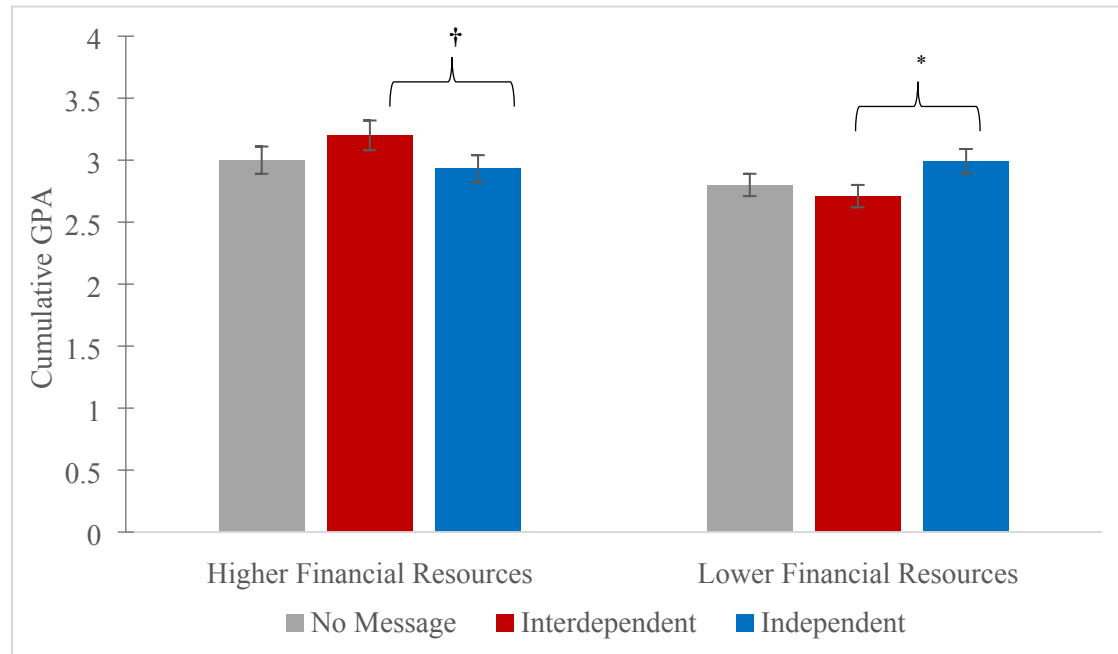
Table 2. Two-way ANOVA results for Cumulative GPA in Study 2.

Variable	<i>F</i>	<i>p</i>	η^2
Main and interactive effects			
Message Condition	0.21	.81	0
College Resources	6.31*	.01	.05
Message \times College Resources	3.25*	.04	.05
Means, standard deviations, and 95% CIs of GPA			
	<i>M (SD)</i>		<i>95% CI</i>
Higher Resource			
Interdependent Message	3.20 _{a,c} (0.36)		[2.96, 3.45]
Independent Message	2.93 _a (0.49)		[2.71, 3.15]
No Message Control	3.00 _a (0.33)		[2.78, 3.23]
Lower Resource			
Interdependent Message	2.71 _b (0.60)		[2.52, 2.89]
Independent Message	2.98 _a (0.43)		[2.78, 3.19]
No Message Control	2.80 _a (0.57)		[2.63, 2.96]

Note. Means that have different subscripts differ based on post hoc tests of adjusted means ($p < .05$). GPA = grade point average.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

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Figure 2. Cumulative GPA results in Study 2. Error bars represent $\pm 1 SE$.

Discussion

Study 2 makes at least two important contributions. First, with a rarely studied sample of students from WK backgrounds a diverse range of colleges, we obtained longitudinal evidence to suggest that the effects of creating a cultural mismatch or match vary based on an important—yet previously unexamined—feature of the college context: level of financial resources. Second, in the first intervention of its kind, the results suggest that a cultural match intervention could have the potential to improve the grades of students from WK backgrounds at colleges with higher resources.

General Discussion

Across two studies, we find that a college's relative level of financial resources shapes the impact of cultural mismatch or match for students from WK backgrounds. In Study 1 in particular, at colleges with higher financial resources, we replicated results from previous studies and found that a cultural mismatch or match influenced the academic performance of students

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3 from WK backgrounds. In contrast, at colleges with lower financial resources, creating a cultural
4 mismatch or match had less of an impact on the academic performance of students from WK
5 backgrounds. These results suggest that basic features of the college context—in particular,
6 colleges' relative level of financial resources—are likely to shape the success of social-
7 psychological interventions aimed at helping students from WK backgrounds succeed.

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15 The current research contributes to the growing literature on social-psychological
16 interventions (Walton & Wilson, 2018; Yeager & Walton, 2011) by demonstrating the
17 importance of taking into consideration the context in which these interventions are deployed.
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19 Previous research on psychological interventions sometimes examines whether the results of an
20 intervention extend to a new context (e.g., Paunesku et al., 2015; Yeager et al., 2016). Yet, it is
21 rare for research on psychological interventions to systematically examine and theorize about the
22 role of contextual factors in shaping the efficacy of the intervention across contexts. Identifying
23 when and under what contexts social psychological interventions are likely to produce positive
24 effects is important for understanding how to tailor future interventions to diverse contexts.

35 **Limitations & Future Research**

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38 The current research represents an initial step in understanding the role of features of the
39 context for a cultural mismatch or match and social psychological interventions more broadly.
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41 Nevertheless, this research leaves some unanswered questions that should be investigated in
42 future research. Most importantly, *why* does relative level of financial resources shape the impact
43 of a cultural mismatch or match?

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45 We argue that colleges with lower financial resources are less likely to address the
46 financial obstacles that students from WK backgrounds typically face in college, and therefore,
47 that a cultural mismatch or match will be less influential for performance. Yet, colleges that vary
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COLLEGE FINANCIAL RESOURCES AND CULTURAL MATCH

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3 in financial resources also differ in other important ways. For example, colleges with lower
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5 financial resources tend to have a greater percentage of students who commute to campus or take
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7 online classes and therefore these students may be less chronically exposed to the university
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9 culture of independence (Fike & Fike, 2008; Kuh, Gonyea, & Palmer, 2001; Mattern & Wyatt,
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11 2001). Additionally, colleges with lower financial resources may promote less independence and
12
13 more interdependence overall, given that there tend to be more students from WK backgrounds
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15 attending these types of colleges (Engle & Tinto, 2008). Irrespective of the exact mechanism,
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17 these features of colleges with lower financial resources are all consistent with the idea that a
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19 cultural mismatch or match should be less influential for the academic achievement of students
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21 from WK backgrounds. Future research should examine these possibilities directly to identify the
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23 specific experiences or features of the college context that contribute to or undermine the
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25 efficacy of creating a cultural match.
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31 In the current investigation, we examined important academic outcomes in an
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33 underrepresented and hard-to-reach population. As such, we confronted difficulties with
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35 recruiting and retaining these participants and therefore in both studies, our sample size was
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37 relatively small. These small sample sizes meant that we were underpowered to decompose the
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39 interaction observed in Study 2. Additionally, we were not able to examine the precise threshold
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41 of resources that are necessary for psychological interventions, such as creating a cultural match,
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43 to have an impact. Future research should replicate our studies with larger sample sizes to
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45 examine whether there is an objective threshold of university financial resources that represents a
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47 “sufficient” level to help students from WK backgrounds overcome financial obstacles.
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Conclusion

COLLEGE FINANCIAL RESOURCES AND CULTURAL MATCH

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3 To reduce the social class achievement gap, social psychologists often theorize that
4 structural resources are necessary before any psychological intervention will have potential to
5 improve achievement (Dittmann & Stephens, 2017; Stephens, Fryberg, & Markus, 2012; Walton
6 & Wilson, 2018). Our studies support this proposition, suggesting that access to colleges with
7 relatively higher financial resources may be necessary before psychological interventions, such
8 as creating a cultural match, will be effective for students from WK backgrounds. At colleges
9 with lower financial resources, interventions may need to focus first on ensuring that more
10 fundamental features of the context are in place before changing students' understanding of the
11 university culture can have an impact on students' academic performance.
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47
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56
57
58
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References

- American Council on Education. (2014). *Understanding college and university endowments*. Retrieved from <https://www.acenet.edu/news-room/Documents/Understanding-Endowments-White-Paper.pdf>
- Apfelbaum, E. P., Stephens, N. M., & Reagans, R. E. (2016). Beyond one-size-fits-all: Tailoring diversity approaches to the representation of social groups. *Journal of Personality and Social Psychology, 111*, 547–566. doi:10.1037/pspi0000071
- Bailey, M. J., & Dynarski, S. M. (2011). Gains and gaps: a historical perspective on inequality in college entry and completion. In G. J. Duncan & R. J. Murnane (Eds.), *Whither Opportunity? Rising Inequality, Schools, and Children's Life Chances* (pp. 117–132). New York, NY: Russell Sage Foundation.
- Carnevale, A. P., & Strohl, J. (2013). *Separate and unequal: How higher education reinforces the intergenerational reproduction of White racial privilege*. Washington, DC: Center on Education and the Workforce, Georgetown University.
- Cassady, J. C. (2001). Self-reported GPA and SAT: A methodological note. *Practical Assessment, Research, & Evaluation, 7*, 1-6.
- Castleman, B., & Page, L. C. (2015). Summer nudging: Can personalized text messages and peer mentor outreach increase college going among low-income high school graduates? *Journal of Economic Behaviour & Organization, 115*, 144–160. doi:10.1016/j.jebo.2014.12.008
- Cominole, M., Siegel, P., Dudley, K., Roe, D., & Gilligan, T. (2004). National Postsecondary Student Aid Study (NPSAS: 04) Full Scale Methodology Report (NCES 2006-180). *National Center for Education Statistics, Institute of Education Sciences, US Department of Education. Washington, DC*.
- Covarrubias, R., & Fryberg, S. A. (2015). Movin' on up (to college): First-generation college students' experiences with family achievement guilt. *Cultural Diversity and Ethnic Minority Psychology, 21*, 420-429. doi:10.1037/a0037844
- Croizet, J.-C., Goudeau, S., Marot, M., & Millet, M. (2017). How do educational contexts contribute to the social class achievement gap: Documenting symbolic violence from a social psychological point of view. *Current Opinion in Psychology, 18*, 105-110. doi:10.1016/j.copsyc.2017.08.025
- Cross, S. E., & Madson, L. (1997). Models of the self: Self-construals and gender. *Psychological Bulletin, 122*, 5–37. doi:10.1037/0033-2909.122.1.5
- Dittmann, A. G., & Stephens, N. M. (2017). Interventions aimed at closing the social class achievement gap in education: Changing individuals, structures, and construals. *Current Opinion in Psychology, 18*, 111–116. doi:10.1016/j.copsyc.2017.07.044

COLLEGE FINANCIAL RESOURCES AND CULTURAL MATCH

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- 1
2
3 Engle, J. (2007). Postsecondary access and success for first-generation college students.
4 *American Academic*, 3, 25–48.
5
6
7 Engle, J., & Tinto, V. (2008). *Moving beyond access: College success for low-income, first-*
8 *generation students*. Washington, DC: Pell Institute for the Study of Opportunity in Higher
9 Education (ERIC Document Reproduction Service No. ED504448).
10
11 Fike, D. S., & Fike, R. (2008). Predictors of first-year student retention in the community
12 college. *Community College Review*, 36, 68–88. doi:10.1080/01463377209369063
13
14 Fiske, S. T., & Markus, H. R. (Eds.). (2012). *Facing social class: How societal rank influences*
15 *interaction*. Russell Sage Foundation.
16
17
18 Fryberg, S. A., & Markus, H. R. (2007). Cultural models of education in American Indian, Asian
19 American and European American contexts. *Social Psychology of Education*, 10, 213–246.
20 doi:10.1007/s11218-007-9017-z
21
22
23 George, D., Dixon, S., Stansal, E., Gelb, S. L., & Pheri, T. (2008). Time diary and questionnaire
24 assessment of factors associated with academic and personal success among university
25 undergraduates. *Journal of American College Health*, 56, 706–715.
26 doi:10.3200/JACH.56.6.706-715
27
28
29 Goudeau, S., & Croizet, J.-C. (2017). Hidden advantages and disadvantages of social class: How
30 classroom settings reproduce social inequality by staging unfair comparison. *Psychological*
31 *Science*, 28(2), 1–9. doi:10.1177/0956797616676600
32
33
34 Johnson, S. E., Richeson, J. A., & Finkel, E. J. (2011). Middle class and marginal?
35 Socioeconomic status, stigma, and self-regulation at an elite university. *Journal of*
36 *Personality and Social Psychology*, 100, 838–852. doi:/10.1037/a0021956
37
38 Kraus, M. W., Piff, P. K., Mendoza-Denton, R., Rheinschmidt, M. L., & Keltner, D. (2012).
39 Social class, solipsism, and contextualism: how the rich are different from the
40 poor. *Psychological review*, 119(3), 546.
41
42
43 Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects
44 of student engagement on first-year college grades and persistence. *The Journal of Higher*
45 *Education*, 79, 540-563. doi:10.1353/jhe.0.0019
46
47
48 Kuh, G. D., Gonyea, R. M., & Palmer, M. (2001). The disengaged commuter student: Fact or
49 fiction. *Commuter Perspectives*, 27, 2-5.
50
51
52 Lee, J. E. R., & Nass, C. (2012). Distinctiveness-based stereotype threat and the moderating role
53 of coercion contexts. *Journal of Experimental Social Psychology*, 48, 192–199.
54 doi:10.1016/j.jesp.2011.06.018
55
56
57
58
59

COLLEGE FINANCIAL RESOURCES AND CULTURAL MATCH

23

- 1
2
3 Markus, H. R., & Kitayama, S. (2010). Cultures and selves: A cycle of mutual constitution.
4 *Perspectives on Psychological Science*, 5, 420–430. doi:10.1177/1745691610375557
5
6
7 Mattern, K., & Wyatt, J. N. (2009). Student choice of college: How far do students go for an
8 education? *Journal of College Admission*, 203, 18-29.
9
10 McKinney, L., & Novak, H. (2013). The relationship between FAFSA filing and persistence
11 among first-year community college students. *Community College Review*, 41, 63–85.
12 doi:10.1177/0091552112469251
13
14
15 Ostrove, J. M., & Long, S. M. (2007). Social class and belonging: Implications for college
16 adjustment. *The Review of Higher Education*, 30, 363–389. doi:10.1353/rhe.2007.0028
17
18
19 Page, L. C., & Scott-Clayton, J. (2016). Improving college access in the United States:
20 Barriers and policy responses. *Economic of Education Review*, 51, 4-22.
21 doi:10.1016/j.econedurev.2016.02.009
22
23 Pascarella, E. T., Pierson, C., Wolniak, G., & Terenzini, P. T. (2004). First-generation college
24 students: Additional evidence on college experiences and outcomes. *Journal of Higher*
25 *Education*, 75(3), 249–284. doi:10.1353/jhe.2004.0016
26
27
28 Paunesku, D., Walton, G. M., Romero, C., Smith, E. N., Yeager, D. S., & Dweck, C. S. (2015).
29 Mind-set interventions are a scalable treatment for academic underachievement.
30 *Psychological Science*, 26, 784–793. doi:10.1177/0956797615571017
31
32 The Pell Institute. *Indicators of Higher Education Equity in the United States*. Retrieved from
33 [http://www.pellinstitute.org/downloads/publications-](http://www.pellinstitute.org/downloads/publications-Indicators_of_Higher_Education_Equity_in_the_US_2016_Historical_Trend_Report.pdf)
34 [Indicators of Higher Education Equity in the US 2016 Historical Trend Report.pdf](http://www.pellinstitute.org/downloads/publications-Indicators_of_Higher_Education_Equity_in_the_US_2016_Historical_Trend_Report.pdf)
35
36
37 Piff, P. K., Kraus, M. W., Côté, S., Cheng, B. H., & Keltner, D. (2010). Having less, giving
38 more: the influence of social class on prosocial behavior. *Journal of personality and social*
39 *psychology*, 99(5), 771.
40
41 Rothwell, J. (2015). The stubborn race and class gaps in college quality. *Brookings Institute*.
42 Retrieved from [https://www.brookings.edu/research/the-stubborn-race-and-class-gaps-in-](https://www.brookings.edu/research/the-stubborn-race-and-class-gaps-in-college-quality/)
43 [college-quality/](https://www.brookings.edu/research/the-stubborn-race-and-class-gaps-in-college-quality/).
44
45
46 Ryan, J. F. (2004). The relationship between institutional expenditures and degree attainment at
47 baccalaureate colleges. *Research in Higher Education*, 45, 97-114.
48
49
50 Scott-Clayton, J. (2015). The role of financial aid in promoting college access and success:
51 Research evidence and proposals for reform. *Journal of Student Financial Aid*, 45, 7–22.
52
53
54 Seltzer, R. (2019). Endowment Returns Slow; Survey Offers Peek at Spending. *Inside Higher*
55 *Education*. Retrieved from [https://www.insidehighered.com/news/2019/01/31/college-](https://www.insidehighered.com/news/2019/01/31/college-endowments-returned-82-percent-2018-annual-survey-adds-some-insight-how)
56 [endowments-returned-82-percent-2018-annual-survey-adds-some-insight-how](https://www.insidehighered.com/news/2019/01/31/college-endowments-returned-82-percent-2018-annual-survey-adds-some-insight-how)
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58
59
60

COLLEGE FINANCIAL RESOURCES AND CULTURAL MATCH

24

- 1
2
3
4 Sirin, S.R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of
5 research. *Review of Educational Research*, 75, 417–453. doi:10.3102/00346543075003417
6
7
8 Stephens, N. M., Fryberg, S. A., & Markus, H. R. (2011). When choice does not equal freedom:
9 A sociocultural analysis of agency in working-class American contexts. *Social*
10 *Psychological and Personality Science*, 2, 33–41. doi:10.1177/1948550610378757
11
12 Stephens, N., Fryberg, S., & Markus, H. (2012). It's your choice: How the middle-class model of
13 independence disadvantages working-class Americans. In S. T. Fiske & H. R. Markus
14 (Eds.), *Facing social class: How societal rank influences interaction* (pp. 87–106). New
15 York, NY: Russell Sage Foundation.
16
17
18 Stephens, N. M., Fryberg, S. A., Markus, H. R., Johnson, C. S., & Covarrubias, R. (2012).
19 Unseen disadvantage: How American universities' focus on independence undermines the
20 academic performance of first-generation college students. *Journal of Personality and*
21 *Social Psychology*, 102, 1178–1197. doi:10.1037/a0027143
22
23
24 Stephens, N. M., Hamedani, M. H., & Destin, M. (2014). Closing the social-class achievement
25 gap: A difference-education intervention improves first-generation students' academic
26 performance and all students' college transition. *Psychological Science*, 25, 943–953.
27 doi:10.1177/0956797613518349
28
29
30 Stephens, N. M., Hamedani, M. G., & Townsend, S. S. M. (2018). Difference matters: Teaching
31 students a contextual theory of difference can help them succeed. *Perspectives on*
32 *Psychological Science*, 14, 156–174. doi:10.1177/1745691618797957
33
34 Stephens, N. M., Markus, H. R., & Fryberg, S. A. (2012). Social class disparities in health and
35 education: Reducing inequality by applying a sociocultural self model of behavior.
36 *Psychological Review*, 119, 723–744. doi:10.1037/a0029028
37
38
39 Stephens, N. M., Markus, H. R., & Phillips, L. T. (2014). Social class culture cycles: How three
40 gateway contexts shape selves and fuel inequality. *Annual Review of Psychology*, 65, 611–
41 634. doi:10.1146/annurev-psych-010213-115143
42
43
44 Stephens, N. M., Markus, H. R., & Townsend, S. S. M. (2007). Choice as an act of meaning: The
45 case of social class. *Journal of Personality and Social Psychology*, 93, 814–830.
46 doi:10.1037/0022-3514.93.5.814
47
48
49 Stephens, N. M., Townsend, S. S. M., Markus, H. R., & Phillips, L. T. (2012). A cultural
50 mismatch: Independent cultural norms produce greater increases in cortisol and more
51 negative emotions among first-generation college students. *Journal of Experimental Social*
52 *Psychology*, 48, 1389–1393. doi:10.1016/j.jesp.2012.07.008
53
54
55 Stinebrickner, R., & Stinebrickner, T. R. (2003). Working during school and academic
56 performance. *Journal of Labor Economics*, 21, 473–491. doi:10.1086/345565
57
58
59
60

COLLEGE FINANCIAL RESOURCES AND CULTURAL MATCH

25

- 1
2
3 Swecker, H. K., Fifolt, M., & Searby, L. (2013). Academic advising and first-generation college
4 students: A quantitative study on student retention. *NACADA Journal*, *33*, 46–53.
5 doi:10.12930/NACADA-13-192
6
7
8 Titus, M. A. (2006). Understanding college degree completion of students with low
9 socioeconomic status: The influence of the institutional financial context. *Research in*
10 *Higher Education*, *47*, 371–398. doi:10.1007/s11162-005-9000-5
11
12 Torche, F. (2011). Is a college degree still the great equalizer? Intergenerational mobility across
13 levels of schooling in the United States. *American Journal of Sociology*, *117*, 763–807.
14 doi:10.1086/661904
15
16
17 Townsend, S. S. M., Stephens, N. M., Smallets, S., & Hamedani, M. G. (2018). Empowerment
18 through difference: An online difference-education intervention closes the social class
19 achievement gap. *Personal and Social Psychology Bulletin*, 1–16.
20 doi:10.1177/0146167218804548
21
22
23 U.S. Department of Education. (2018). *The Integrated Postsecondary Education Data System*
24 *(IPEDS)*. Retrieved from <https://nces.ed.gov/ipeds/use-the-data/download-access-database>
25
26
27 U.S. Department of Education. (2014). *Profile of undergraduate students: 2011-2012* (NCES
28 2015-167). Retrieved from <https://nces.ed.gov/pubs2015/2015167.pdf>.
29
30
31 Walpole, M. (2003). Socioeconomic status and college: How SES affects college experiences
32 and outcomes. *Review of Higher Education*, *27*, 45–73. doi:10.1353/rhe.2003.0044
33
34
35 Walton, G. M., & Wilson, T. D. (2018). Wise interventions: Psychological remedies for social
36 and personal problems. *Psychological Review*, *125*, 617–655. doi:10.1037/rev0000115
37
38
39 Wilbur, T. G., & Roscigno, V. J. (2016). First-generation disadvantage and college
40 enrollment/completion. *Socius*, *2*, 1–11. doi:10.1177/2378023116664351
41
42
43
44 Winston, G. C. (1999). Subsidies, hierarchy and peers: The awkward economics of higher
45 education. *Journal of Economic Perspectives*, *13*, 13-36.
46
47
48 Yeager, D. S., & Walton, G. M. (2011). Social-psychological interventions in education: They're
49 not magic. *Review of Educational Research*, *81*, 267–301. doi:10.3102/0034654311405999
50
51
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Supplementary Materials

Study 1: Online Experiment

Student Stories

Participants in both conditions read six student stories (i.e., one story from each of six students). Across both conditions, the students were intentionally diverse in gender and race/ethnicity, including a Hispanic male, a White female, an Asian female, a Black female, a Black male, and a White male.

After providing informed consent, participants were first presented an introduction page outlining six “Keys to College Success,” followed by all six student stories in a standardized order.

For Peer Review

Interdependent Message Condition Story Samples

The interdependent condition introduction page read:

KEYS TO COLLEGE SUCCESS

We talked to junior & senior college students from around the country and they shared some tips on how to succeed in college:

USE CAMPUS RESOURCES TO BUILD A COMMUNITY.

BUILD MENTORING RELATIONSHIPS WITH YOUR PROFESSORS DURING OFFICE HOURS.

LEARN TO BE A TEAM PLAYER BY WORKING IN GROUPS.

MAKE YOUR FAMILY PART OF YOUR COLLEGE EXPERIENCE.

PARTICIPATE IN COLLABORATIVE RESEARCH.

MAKE FRIENDS THROUGH EXTRACURRICULAR ACTIVITIES.



An example of one of the six student stories:



Use Campus Resources to Build a Community.



David, junior | Class of 2019
Major: Theater
Fun Fact: Has an identical twin brother.

"I remember losing focus after a month of college because I felt like everyone else around me was a lot better and smarter than I was. I had to change my mindset if I was going to survive. I went to the school counseling center and they explained that there are tons of resources on campus **that are there to help students**. I went to the career center and **they helped me figure out some options** for my major. Now I know that the **campus community is an important part of my education**. I really recommend **being involved** in campus resources. It'll help you to become part of a **community** if you just ask for help when you need it."

Independent Message Condition Story Samples

The independent condition introduction page read:

KEYS TO COLLEGE SUCCESS

We talked to junior & senior college students from around the country and they shared some tips on how to succeed in college:

USE CAMPUS RESOURCES TO PAVE YOUR OWN PATH.

VOICE YOUR IDEAS AND OPINIONS IN YOUR PROFESSORS' OFFICE HOURS.

LEARN TO BE A LEADER BY WORKING IN GROUPS.

KEEP YOUR FAMILY UP-TO-DATE ON YOUR COLLEGE EXPERIENCE.

PARTICIPATE IN INDEPENDENT RESEARCH.

EXPLORE YOUR INTERESTS THROUGH EXTRACURRICULAR ACTIVITIES.



An example of one of the six student stories:

Use Campus Resources to Pave Your Own Path.



David, junior | Class of 2019
Major: Theater
Fun Fact: Has an identical twin brother.

"I remember losing focus after a month of college because I felt like everyone else around me was a lot better and smarter than I was. I had to change my mindset if I was going to survive. I went to the school counseling center and they explained that there are tons of resources on campus **where students can explore their unique personal interests**. I went to the career center and **told them what I was interested in**, which helped me choose my major. Now I know that **I'm really the one in charge of my education**. I really recommend **taking advantage of campus resources**. It'll help you to **stay in control** if you just ask for help when you need it."

Additional Measures

In addition to the measures included in the main text, participants also responded to the following measures.

Open-ended measures.

Saying is believing. Participants were asked to write three open-ended key messages recounting the most important things they had learned from reading the stories.

Who Am I? task. Participants responded to a 10-item open-ended measure adapted from previous research that asks participants to respond to the question “Who am I?” (Hartley, 1970; Kuhn & McPartland, 1954).

Perceptions of stories. Participants responded to three items assessing their general reaction to the stories: “Do you think the information presented will be useful to new college students?,” “Did you enjoy reading the students’ stories?,” and “Did you feel like you could relate to the students who shared their stories?”

Psychosocial outcomes.

Belonging. Participants responded to a 8-item measure adapted from previous research (Stephens, Fryberg, Markus, Johnson & Covarrubias, 2012; Walton & Cohen, 2011). The items were: “I feel like I belong as a student at my college,” “I feel a part of the college community” “I expect that the social experience in college will be difficult for me” (reverse-coded), “I feel like there are other students like me at my college,” “My college is a place for students like me,” “I think my perspective will be valued at my school,” “The values of my family are compatible with the values of my college,” and “There are different ways to be a successful college student” (Scale: 1 = *Strongly disagree*, 7 = *Strongly agree*; $\alpha = .81$)

Reasons for attending college. Participants responded to a 12-item measure developed in previous research (Stephens et al., 2012). Participants first read that “There are many reasons why people attend college. Please read the following list of possible motivating factors, and rate the importance of each one.” Six items reflected independent motivations: “Explore new interests,” “Expand my knowledge of the world,” “Become an independent thinker,” “Explore my potential in many domains,” “Learn more about my interests,” “Expand my understanding of the world” ($\alpha = .84$). Six items reflected interdependent motivations: “Help my family out after I’m done with college,” “Be a role model for people in my community,” “Bring honor to my family,” “Show that people with my background can do well,” “Give back to my community,” “Provide a better life for my own children” (Scale: 1 = *Not at all important*, 7 = *Very important*, $\alpha = .73$).

Frequency of college activities. Participants responded to ten items approximating how many hours per week (on a scale from 0 to 25) they anticipated that they would spend time on the following activities: “classwork (working on your own),” “classwork (working together with peers),” “socializing with friends,” “extracurricular activities,” “working at a job for pay,” “talking on the phone with family,” “talking on the phone with friends from home,” “community service (e.g., volunteering in a homeless shelter),” “religious worship or related activities,” and “total time spent on your college campus” ($\alpha = .70$)

Tendency to seek college resources. Participants reported on eight items approximately how many times per month (on a scale from 0 to 5) they would spend time on the following items: “email a professor to ask a question” “meet with a professor outside of class” “go to the writing center” “meet with other students to work on homework outside of class” “meet with other students to study for tests or exams outside of class” “meet with a mentor or advisor to seek feedback or advice on course assignments” “meet with a mentor or advisor to seek feedback on

advice on choosing classes or picking a major” “meet with a mentor or advisor to seek feedback on advice on future aspirations or career goals” ($\alpha = .81$).

College community measures. Participants were then asked to respond to a series of measures that assessed perceptions of the college community as they pertained to students in general at their college.

School belonging. Participants responded to a 5-item measure adapted from previous research (Walton & Cohen, 2011): “Students at this school have a strong sense of belonging to this college,” “Students at this school have a lot of pride in this college and its accomplishments,” “Students at this school feel a strong attachment towards this college,” “Students at this school want to belong to the campus community,” and “For students at this school, being a university student is a primary identity,” (Scale: 1 = *Strongly disagree*, 7 = *Strongly agree*, $\alpha = .89$).

Perceptions of college community. Participants responded to one item: “to what extent does your college have a campus community?” (1 = *Not at all*, 7 = *Very much*).

Forced choice community item. Participants responded to a single forced-choice item: “My college has a campus community” vs. “My college does NOT have a campus community.”

Forced choice reason for attending. Participants responded to one item: “Most students attend my college to learn new skills that will help them to get a good job” vs. “Most students attend my college to explore and develop who they are as a person.”

Sources of community. Participants responded to a measure assessing 7 college/on-campus and 7 non-college/off-campus sources of community. The 7 college/on-campus items were: “College as a whole,” “Friends from college,” “Job on-campus (e.g., work study),” “Church on-campus,” “Extracurricular activities (e.g., clubs, student organizations),” “Sports teams (collegiate, intramurals),” and “Other, please specify” ($\alpha = .66$). The 7 non-college/off-campus items were: “Family (immediate and extended),” “Friends from home (e.g., high school),” “Job off-campus,” “Church off-campus,” “Activities off-campus (e.g., organizations from home),” “Sports teams (e.g., sports from home),” and “Other, please specify” ($\alpha = .76$).

Results and Discussion

Anagram performance utilizing national average endowment. We conducted a 2 (social class: MD vs. WK) \times 2 (condition: independent vs. interdependent) \times 2 (college financial resources: higher vs. lower) ANCOVA, instead utilizing the national average endowment ($M = \$26,345$) as a cutoff point. The three-way interaction on participants’ anagram performance was nonsignificant but still in the same direction as the results included in the main text, $F(1, 284) = 1.83, p = .18, \eta^2 = .01$. We decomposed the three-way interaction by comparing the anagram performance of participants from WK backgrounds by message condition at higher and lower resource colleges.

First, we examined the effect of the message condition on the performance of students from WK backgrounds at relatively higher resource colleges. The two-way interaction between social class \times message condition was nonsignificant, $t(284) = 1.48, p = .14$.

Next, we examined the effect of the message condition on the performance of students from WK backgrounds at relatively lower resource colleges. The two-way interaction between social class \times message condition was not significant, $t(284) = -0.40, p = .76$.

Anagram performance with covariates. We conducted a 2 (social class: MD vs. WK) \times 2 (condition: independent vs. interdependent) \times 2 (college financial resources: higher vs. lower) ANCOVA, including high school GPA, gender, and underrepresented minority status as covariates. Consistent with the results presented in the main text, the three-way interaction on

participants' anagram performance remained marginally significant, $F(1, 276)=3.24, p=.07, \eta^2=.01$. We decomposed the three-way interaction by comparing the anagram performance of participants from WK backgrounds by message condition at higher and lower resource colleges.

First, we examined the effect of the message condition on the performance of students from WK backgrounds at relatively higher resource colleges. Consistent with the results in the main text, the two-way interaction between social class \times message condition was marginally significant, $t(276)=1.79, p=.07$. That is, participants from WK backgrounds in the *interdependent* condition (cultural match) performed marginally better than participants from WK backgrounds in the *independent* condition (cultural mismatch), $F(1, 276)=2.85, p=.09, \eta^2=.01$.

Next, we examined the effect of the message condition on the performance of students from WK backgrounds at relatively lower resource colleges. Consistent with the results in the main text, the two-way interaction between social class \times message condition was not significant, $t(276)=-0.78, p=.43$.

Perceptions of stories. To examine perceptions of the stories, we conducted a 2 (social class: MD vs. WK) \times 2 (condition: independent vs. interdependent) \times 2 (college financial resources: higher vs. lower) univariate ANOVA. There were no significant main effects or interactions, $F_s < 2.10, p_s > .15, \eta_p^2s < .01$.

Psychosocial measures. To examine the psychosocial measures, we conducted a 2 (social class: MD vs. WK) \times 2 (condition: independent vs. interdependent) \times 2 (college financial resources: higher vs. lower) multivariate ANOVA. There were no significant main effects or interactions, $F_s < 1.90, p_s > .13, \eta_p^2s < .02$.

College community measures. To examine the college community measures, we conducted a 2 (social class: MD vs. WK) \times 2 (condition: independent vs. interdependent) \times 2 (college financial resources: higher vs. lower) multivariate ANOVA. There was a significant main effect of college financial resources, $F(4, 280) = 5.64, p < .001, \eta_p^2 = .08$. No other significant main effects or interactions emerged, $F_s < 1.00, p_s > .40, \eta_p^2s < .02$.

Study 2: Online Intervention

Additional Measures

In addition to the measures included in the main text, participants also responded to the following measures (whether at Time 1, 2, or both is indicated after each measure in parentheses).

Manipulation check (Time 1). Participants responded to a 12-item manipulation check measure. Six items assessed independent perceptions (e.g., "To be a successful college student, students should be a leader"; $\alpha = .91$). Six items assessed interdependent perceptions (e.g., "To be a successful college student, students should be a team player"; $\alpha = .93$).

Perceptions of stories (Time 1). Participants responded to five items assessing their general reaction to the stories: "Do you think the information presented will be useful to [charter school] alumni?," "Did you enjoy reading the students' stories?," "Did you learn from the student stories?," "Did you think the information conveyed by the student stories was positive?," and "Did you feel like you could relate to the students who shared their stories?" ($\alpha = .85$).

Open-ended measures.

Saying is believing (Time 1). Participants were asked to write three open-ended key messages recounting the most important things they had learned from reading the stories.

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Who Am I? task (Time 1). Participants responded to the same “Who am I?” task as in Study 1.

Psychosocial outcomes.

Positive and negative affect (Time 1). Participants responded to 10 items assessing positive affect (e.g., “excited,” and “comfortable”; $\alpha = .88$) and 5 items assessing negative affect (e.g., “intimated,” and “nervous”; $\alpha = .83$).

Belonging (Times 1 and 2). Participants responded to the same 8-item measure as in Study 1 (Time 1 $\alpha = .83$; Time 2 $\alpha = .83$).

Academic preparedness (Time 1). Participants responded to two items assessing academic preparedness adapted from Stephens, et al., (2014): “Even though I know that college can be challenging, I think that in the end I will be successful,” and “I am well prepared to be academically successful as a student at my college” (Scale: 1 = *Strongly disagree*, 7 = *Strongly agree*; $\alpha = .65$).

Efficacy (Times 1 and 2). Participants responded to a 3-item measure assessing perceived efficacy in college adapted from Stephens, et al., (2014): “I am able to perform the necessary activities to succeed in college,” “When I really want to do something, I usually find a way to succeed at it,” and “I’m certain I can master the skills taught at my college this upcoming year” (Time 1 $\alpha = .87$; Time 2 $\alpha = .93$).

Perceptions of what it means to be a good student (Times 1 and 2). Participants responded to two items assessing independent perceptions of what it means to be a good student adapted from Stephens, et al., 2012: “Being a good student means figuring things out on your own” and “Being a good student means being able to pave your own path to success” (Time 1 $\alpha = .65$; Time 2 $\alpha = .67$). Participants responded to two items assessing interdependent perceptions of what it means to be a good student: “Getting help outside of class is part of being a good student” and “Working well with others is part of being a good student” (Time 1 $\alpha = .79$; Time 2 $\alpha = .85$).

Motivation to attend college (Time 1). Participants responded to the same measure of motivations to attend college as in Study 1 (Independent: $\alpha = .87$; Interdependent: $\alpha = .84$).

Venn diagrams (Times 1 and 2). Participants responded to several items assessing their perceived overlap with key others: their perceived overlap with their family (Times 1 and 2), their friends from home (Time 1 only), their college community as a whole (Time 2 only), and their friends from college (Time 2 only) adapted from Aron, Aron, & Smollan, 1992.

Engagement in activities (Times 1 and 2). Participants reported on the same two sets of items pertaining to their anticipated engagement in college activities as in Study 1 at Time 1, and their actual engagement at Time 2. (Time 1 frequency of college activities: $\alpha = .72$; Time 1 tendency to seek college resources: $\alpha = .87$; Time 2 frequency of college activities $\alpha = .70$; Time 2 tendency to seek college resources: $\alpha = .80$).

Experiences in high school (Time 1). Participants responded to 13 items assessing their experiences in high school: “Overall, I had a good experience at my high school,” “The academic experience in high school was difficult for me,” “I had a lot of friends in high school,” “My high school has prepared me academically for college,” “My high school has prepared me socially for college,” “I had at least one teacher in high school who made me excited about learning,” “My teachers in high school cared about me as a person,” “In high school, I had a mentor who encouraged me to pursue my goals and dreams,” “In high school, my teachers encouraged me for my effort to improve,” “In high school, my teachers helped me to learn from my mistakes,” “My high school experience taught me the importance of being strong and

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3 resilient,” “My teachers helped me believe that someone like me could achieve my goals,” and
4 “My high school experience helped me deal with stereotypes and biases students might
5 encounter” ($\alpha = .87$).

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7 **Support from family and friends (Times 1 and 2).** Participants responded to a 9-item
8 measure adapted from previous research (Zimet, Dahlem, Zimet, and Farley, 1988): “My family
9 really tries to help me,” “I get the emotional help and support I need from my family,” “I can talk
10 about my problems with my family,” “My family is willing to help me make decisions,” “My
11 family supports my decision to go to college,” “My family helped me through the college
12 application and decision-making process,” “Throughout the college application process, my
13 family was willing to do whatever they could help me financially,” “My friends support my
14 decision to go to college,” and “My friends helped through the college application and decision-
15 making process” (Time 1 $\alpha = .83$; Time 2 $\alpha = .92$).

16
17 **School status questions (Time 2).** Participants responded to three binary items assessing
18 their status in college at the end of their first year. Participants indicated whether they had (a)
19 attended their college the entire year, (b) had never enrolled, or (c) had transferred.

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21 **Academic comfort (Time 2).** Participants responded to seven items assessing their
22 comfort engaging in seven activities: “speaking, sharing my thoughts, or asking questions in my
23 classes,” “sharing my opinions with other students,” “emailing my professors with thoughts or
24 questions after class,” “asking my professors for help outside of class,” “asking my peers for
25 advice about academic topics like studying or picking a major,” “talking about my background
26 with other students,” and “talking about my background with my professors” ($\alpha = .88$).

27
28 **College student stress (Time 2).** Participants responded to nine items assessing their
29 stress in college: “Felt anxious or distressed about personal relationships,” “Felt anxious or
30 distressed about family matters,” “Felt anxious or distressed about financial matters,” “Felt
31 anxious or distressed about academic matters” “Felt anxious or distressed about being away from
32 home,” “Questioned your ability to handle difficulties in your life,” “Questioned your ability to
33 attain your personal goals,” “Felt anxious or distressed because events were not going as
34 planned,” and “Felt overwhelmed by difficulties in your life” ($\alpha = .89$).

35
36 **Psychological distress (Time 2).** Participants responded to 12 items assessing the extent
37 to which they had felt various forms of distress in the past 30 days adapted from Kessler et al.,
38 2002 (e.g., “worried,” “frustrated,” and “stressed out”; $\alpha = .91$).

39
40 **Persistence (Time 2).** Participants responded to a 10-item measure assessing their
41 intentions to persist at their current university adapted from adapted from Pascarella, Pierson,
42 Wolniak & Terenzini, 2004: “Since coming to this university I have developed close personal
43 relationships with other students,” “The student friendships I have developed at this university
44 have been personally satisfying,” “My non-classroom interactions with faculty have had a
45 positive influence on my personal growth, values, and attitudes,” “Since coming to this
46 university I have developed a close, personal relationship with at least one faculty member,”
47 “Few of the faculty members I have had contact with are generally interested in students,” “Few
48 of the faculty members I have had contact with are generally outstanding or superior teachers,”
49 “I am satisfied with the extent of my intellectual development since enrolling in this university,”
50 “I am likely to attend a cultural event (for example, a concert, lecture, or art show) at this
51 university,” “It is important for me to graduate from college,” and “I am confident that I made
52 the right decision in choosing to attend this university” ($\alpha = .88$).

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54 **Social identity threat (Time 2).** Participants responded to a three-item measure assessing
55 the extent to which they believed others at their college were accepting of people from different
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3 backgrounds adapted from previous research: “I expect that students at my college are accepting
4 of people who have diverse backgrounds and experiences” (reverse-scored), “Other students at
5 my college sometimes make unfair assumptions about me based on my background,” and
6 “Professors at my college sometimes make unfair assumptions about me based on my
7 background and previous experiences” (Walton & Cohen, 2011; $\alpha = .69$).

8
9 **Scenarios (Time 2).** Participants read through six scenarios related to college experiences
10 and provided their emotional response to the scenarios via six items ($\alpha_s > .75$). They also
11 indicated whether they had personally experienced a similar scenario via a binary item.
12

13 14 **Results and Discussion**

15 **Cumulative GPA utilizing national average endowment.** We conducted a 2 (condition:
16 independent vs. interdependent) \times 2 (college financial resources: higher vs. lower) ANOVA,
17 instead utilizing the national average endowment ($M = \$26,345$) as a cutoff point. Consistent
18 with the results presented in the main text, the message condition (interdependent vs.
19 independent vs. no message) \times college resources (higher vs. lower) interaction on participants’
20 cumulative GPA remained marginally significant, $F(2, 135) = 2.34, p = .10, \eta^2 = .03$.

21
22 **Cumulative GPA with covariates.** We conducted a 2 (condition: independent vs.
23 interdependent) \times 2 (college financial resources: higher vs. lower) ANCOVA, including high
24 school GPA and gender as covariates. Consistent with the results presented in the main text, the
25 message condition (interdependent vs. independent vs. no message) \times college resources (higher
26 vs. lower) interaction on participants’ cumulative GPA remained marginally significant, $F(2,$
27 $132) = 2.49, p = .09, \eta^2 = .04$.

28
29 **Manipulation check.** To examine the manipulation check, we conducted a 3 (condition:
30 no message vs. independent vs. interdependent) \times 2 (manipulation check: independent vs.
31 interdependent) repeated-measures ANOVA, including participants who completed at least the
32 Time 1 survey ($N = 247$). The condition \times manipulation check interaction was nonsignificant,
33 $F(2, 244) = 1.49, p = .23, \eta_p^2 = .01$. However, within the interdependent condition, participants
34 reported significantly higher interdependent than independent perceptions, $F(1, 244) = 4.10, p =$
35 $.04, \eta_p^2 = .02$. No other differences emerged, $F_s < .10, p_s > .90, \eta_p^2_s < .001$. These results are
36 consistent with the idea that the default norms of college reflect independence, but that, for those
37 participants in the interdependent condition, the message increased the extent to which they
38 perceived interdependence as part of college norms.
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41 **Perceptions of stories.** To examine perceptions of the stories, we conducted a 2
42 (condition: independent vs. interdependent) \times 2 (college financial resources: higher vs. lower)
43 univariate ANOVA, including participants who were assigned to a message condition and
44 completed at least the Time 1 survey ($N = 123$). The condition \times college financial resources
45 interaction was nonsignificant, $F(1, 119) = 0.75, p = .39, \eta_p^2 = .01$.

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47 **Psychosocial measures.** To examine the psychosocial measures, we conducted 2
48 (condition: independent vs. interdependent) \times 2 (resources: higher vs. lower) multivariate
49 ANOVAs for psychosocial outcomes at Time 1 and Time 2, including only participants who
50 completed both Time 1 and Time 2 surveys ($N = 141$).

51 **Time 1.** We found no significant main effects or interactions, $F_s < 1.18, p_s > .25, \eta_p^2_s <$
52 $.11$.

53 **Time 2.** We found no significant main effects or interactions, $F_s < 1.32, p_s > .10, \eta_p^2_s <$
54 $.18$.

Supplementary References

- Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of other in the self scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, 63(4), 596-612.
- Hartley, W. S. (1970). *Manual for the twenty-statements problem (who am I?)*. Department of Research, Greater Kansas City Mental Health Foundation.
- Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L. T., ...Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, 32, 959-976.
- Kuhn, M. H., & McPartland, T. S. (1954). An empirical investigation of self-attitudes. *American Sociological Review*, 19(1), 68-76.
- Pascarella, E. T., Pierson, C. T., Wolniak, G. C., & Terenzini, P. T. (2004). First-generation college students: Additional evidence on college experiences and outcomes. *The Journal of Higher Education*, 75(3), 249-284.
- Stephens, N. M., Fryberg, S. A., Markus, H. R., Johnson, C., Covarrubias, R. (2012). Unseen disadvantage: How American universities' focus on independence undermines the academic performance of first-generation college students. *Journal of Personality of Social Psychology*, 102, 1178-1197.
- Stephens, N.M., Hamedani, M. H., & Destin, M. (2014). Closing the social-class achievement gap: A difference-education intervention improves first-generation students' academic performance and all students' college transition. *Psychological Science*, 25(4), 943-953.
- Walton, G. M., & Cohen, G. L. (2011). A brief social-belonging intervention improves academic and health outcomes of minority students. *Science*, 331,1447-1451.
- Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of Personality Assessment*, 52(1), 30-41.