

Abstract

The current research challenges a deficit model of social class differences, which assumes that people from working-class contexts have fewer skills than their middle-class counterparts. We theorize that one reason why people from working-class contexts often underperform is that standard U.S. measures of achievement assess people working individually. In contrast, we theorize that working together on measures of achievement will create a cultural match with the interdependent selves common among people from working-class contexts. Working together should therefore improve their sense of fit and performance, especially when they are working with other people who also experience a cultural match (i.e., people from working-class contexts). Four studies utilizing diverse methods support our theorizing. Utilizing archival data on college student grades, Study 1 finds that groups with a higher proportion of students from working-class contexts perform better than those with a lower proportion. Next, an online and in-person lab experiment (Studies 2-3) show that working together (vs. individually) leads groups from working-class contexts to outperform groups from middle-class contexts, and individuals from working-class contexts to feel a greater sense of fit than individuals from middle-class contexts. Finally, utilizing data from a nationally representative sample of collegiate student-athletes, Study 4 shows that working together is only associated with an increased sense of fit when people from working-class contexts are working with a high proportion of people from working-class contexts. These results suggest that including interdependence in practices for assessing achievement can better realize the potential of people from working-class contexts.

Keywords: social class, achievement gap, sense of fit, culture, inequality

An Interdependence Advantage: Working Together Leads Groups from Working-Class Contexts
to Outperform Groups from Middle-Class Contexts

Research on social class inequality in the U.S. often draws upon a deficit model: starting from the assumption that people from *working-class* contexts lack the skills required to succeed in society (Cammarota, 2011; Cooper & Denner, 1998; Goudeau & Croizet, 2017; Plaut & Markus, 2005)¹. For example, research has documented how people from working-class compared to middle-class contexts have lower intelligence, worse problem-solving skills, and impaired reasoning ability – skills that are linked to academic and economic success in the U.S. (Carter, 2003; Croizet & Claire, 1998; Fiske & Markus, 2012; Fryberg, Troop-Gordon et al., 2013b; Hall, Zhao, & Shafir, 2014). This research has typically assessed people’s achievement by separating them from their social contexts and requiring them to work individually (see Mackintosh, 2011; Plaut & Markus, 2005 for related arguments). We use the term *work individually* to mean acting on one’s own to complete an individual task or achieve an individual goal. It is perhaps not surprising that research often measures achievement in this way given that this represents the standard approach in the U.S. (Greenfield, 1997). However, we argue that this research implicitly assumes that assessing people working individually is the best and “right” way to measure people’s achievement (e.g., performance on academic coursework or problem-solving tasks).

Here, for the first time, we propose that assessing people’s achievement as they work individually does not represent a neutral, class-general strategy. Instead, this tactic for assessing achievement reflects a perspective that most closely matches the independent cultural models of self that are prevalent in *middle-class* U.S. contexts (i.e., understanding the self as separate from

¹ We use the term *working-class contexts* to refer to contexts where people do not have four-year college degrees. In contrast, we use the term *middle-class contexts* to refer to contexts where people have at least a four-year degree.

others and social contexts; Fryberg, Troop-Gordon et al., 2013b; Fryberg & Markus, 2007; Goudeau & Croizet, 2017; Greenfield, 1997). Working individually should better match independent models of self because working on one's own, being self-directed, and being separate from others are central components of independent models of self (e.g., Markus & Conner, 2013; Stephens, Markus, & Townsend, 2007).

Alternatively, if achievement were assessed as groups of people work together, this would reflect a perspective that more closely matches the interdependent cultural models of self that are prevalent in working-class U.S. contexts (i.e., understanding the self as connected to others and social contexts; Markus & Kitayama, 2010). By the term *working together*, we mean coordinating with other people in a group to complete a collective task or achieve a shared goal (e.g., by synchronizing individual activities, integrating each other's inputs, and/or agreeing upon joint plans and strategies; Hildreth & Anderson, 2016; McGrath, 1984; Straus, 1999). According to this definition, working together would include collaborating with others to identify a collective solution on a problem-solving task, or passing the ball back and forth between players to score points in a basketball game. Working together should better match interdependent models of self because coordinating with others, adjusting to others, and being part of a group are central components of interdependent models of self (e.g., Markus & Conner, 2013; Stephens et al., 2007).

As such, in this research, we start from the assumption that people from working-class contexts do not inherently lack the skills required to perform well on *measures of achievement*.²

² We use the term *measure of achievement* to refer to metrics that institutions use to assess people's performance. Such measures could include course assignments and exams, sports performance, or a problem-solving task. These measures can assess individuals' performance either by having people work individually or by having groups of people work together. When assessing groups working together to produce a collective outcome, the group-level achievement outcome can subsequently be used to assign the same achievement scores to the individuals who comprise the groups.

Instead, we suggest that one key reason they do not perform up to their potential on typical measures of achievement in the U.S. is because these measures tend to assess people as they work individually (e.g., people working on their own to complete an individual exam).

Conversely, we propose that if achievement were assessed as groups of people work together to achieve a collective outcome³, this should be a better match with interdependent models of self. Given this match between working together and interdependent models of self, we theorize that assessing achievement as groups of people work together will lead groups from working-class contexts to *outperform* relatively advantaged groups from middle-class contexts on measures of achievement (e.g., academic coursework and problem-solving tasks). Further, we theorize that working together will feel easier, more natural, and more comfortable to individuals from working-class contexts than it will to individuals from middle-class contexts. We operationalize this ease and comfort as a *sense of fit* (see Stephens, Brannon, Markus, & Nelson, 2015; Stephens, Fryberg, Markus, Johnson, & Covarrubias, 2012a).

Below we outline the logic underlying our central prediction: that working together to achieve a collective outcome will lead groups from working-class contexts to outperform groups from middle-class contexts on measures of achievement. We first provide an overview of research supporting the idea that U.S. institutions reflect the middle-class independent cultural ideal by assessing people's achievement as they work individually. To reveal that assessing achievement individually is culture-specific, we then outline research that shows that interdependent cultural contexts outside of the U.S. often assess the achievement of groups of people as they work together. Second, to explain why working together matches the

³ *Assessing achievement as groups work together* refers to measuring a group's achievement as they perform collectively and produce a group-level outcome. The group's outcome can then be used to assign the same achievement scores to the individuals who comprise the group.

interdependent cultural models of self common in working-class contexts, we review research showing how social class contexts foster different cultural models of self that guide how people think, feel, and act. Third, drawing from prior research and theorizing on cultural mismatch (Stephens, Fryberg, et al., 2012a; Stephens, Townsend, & Dittmann, in press), we describe our theory that working together (vs. individually) will lead groups from working-class contexts to outperform groups from middle-class contexts on measures of achievement (e.g., academic coursework, problem-solving tasks). Finally, we outline why we expect that the benefits of working together will only emerge when people from working-class contexts are working with others who experience a cultural match when working together.

Cultural Differences in Standard Measures of Achievement

Cultural models of self can shape the norms that guide people's behavior and the types of institutions that people build. By *cultural models of self*, we mean culture-specific understandings of what it means to be a good or appropriate person in the world (Cross & Madson, 1997; Markus & Kitayama, 2010). Research conducted in a variety of cultural contexts has identified two common models of self (Markus & Kitayama, 2010). *Independent* models of self assume that a normatively appropriate person should take charge and influence others and the social context, express one's own personal needs and interests, and be different and separate from others (Stephens et al., 2007). In contrast, *interdependent* models of self assume that the normatively appropriate person should adjust to others and the social context, connect to others and be socially responsive, and be similar to others and part of a group (Stephens et al., 2007). While these two models are not mutually exclusive, in the case of both people and institutions, one model tends to be more elaborated than the other.

A large body of research has documented how, in different cultural contexts, the gateway institutions of higher education and professional workplaces prioritize different cultural models of self. These gateway institutions serve as key access points to important life outcomes (e.g., valuable educational and job opportunities; Ridgeway & Fisk, 2012; Stephens, Markus, & Phillips, 2014). Research has revealed that U.S. institutions prioritize independent models of self as the cultural ideal. In contrast, institutions in cultural contexts outside of the U.S. more often prioritize interdependent models of self (Fryberg, Covarrubias et al., 2013a; Fryberg & Markus, 2007; Garcia & Tor, 2007; Groysberg, 2010; Lewis, 1995; Li, 2003, 2005; Markus & Conner, 2013; Perlow & Weeks, 2002; Shook, 2010; Stephens, Fryberg et al., 2012a; Stephens, Markus, et al., 2014; Tobin, Wu, & Davidson, 1991). Importantly for the current research, these broad cultural ideals of independence vs. interdependence are also reflected in the standard ways that institutions assess people's achievement.

U.S. institutions typically assess achievement as people work individually – further reflecting the independent cultural ideal. For example, all of the key examinations that determine students' futures in the U.S. are based on measures of achievement where people work individually (e.g., the SAT, GRE, and LSAT). Similarly, in the context of professional workplaces in the U.S., research reveals that many organizations encourage employees to set aside collaborative, relational concerns and instead focus on individual performance and efficiency (Sanchez-Burks, 2005). Furthermore, elite U.S. firms often emphasize individual achievement and specialized expertise rather than group-level achievement (Groysberg, 2010), and use these individual-focused metrics to determine important outcomes such as hiring, rewards, and promotions (Galanter & Palay, 1991). Importantly, while assessing achievement as

people work individually may be necessary in certain situations, assessing achievement in this way nevertheless reflects a specific U.S. cultural ideal, not a universal one.

Research in interdependent cultural contexts outside the U.S. reveals that assessing achievement as people work individually is not the only way. Compared to the U.S., achievement in these contexts is more often assessed as people work together toward collective goals – reflecting an interdependent cultural ideal. For example, working together on measures of achievement is quite common and normative in some Central American cultures. Indeed, when working on solving a puzzle with their children, Guatemalan Mayan mothers with little exposure to Western schooling naturally engage in a collaborative style of problem-solving, in which the group works together to jointly identify a collective solution to the problem (e.g., coordinated decision making; Chavajay & Rogoff, 2002). Japanese schools similarly reflect an interdependent cultural ideal for assessing achievement. In Japanese elementary school classrooms, assessment of students’ achievement—and the rewards they individually receive as a result—are often based on how well their small work group performs when working together on collective assignments (Holloway, 1988). Furthermore, at Japanese companies like Toyota, employee bonuses are distributed to individuals based on team-level performance, revealing that people’s achievement is often assessed as they work together (Liker & Morgan, 2006). In both of these examples, the group performs the measure of achievement collectively, and then the individuals who comprise the group receive individual achievement scores based on the group’s performance.

In sum, U.S. institutions tend to take for granted that assessing people’s achievement as they work individually represents the “right” or only way to do so (Markus & Kitayama, 2010; Stephens, Markus, et al., 2014). However, research in more interdependent cultural contexts

outside of the U.S. reveals that it is also possible to assess achievement as groups of people work together. Building upon these cross-cultural differences in how achievement is assessed, we propose that assessing achievement as people work together will enable groups from working-class contexts to outperform groups from middle-class contexts. Further, we propose that individuals from working-class contexts will feel a greater sense of fit than individuals from middle-class contexts when working together.

Social Class Contexts Shape Cultural Models of Self

We suggested above that the standard way in which U.S. institutions assess achievement reflects an independent cultural ideal: assessing people as they work individually. We propose that this standard practice of assessing people as they work individually most closely matches the independent models of self common among people from middle-class contexts, but provides less of a match with the interdependent models prevalent among people from working-class contexts. We further suggest that assessing achievement as groups of people work together should better match the interdependent models of self common among people from working-class contexts. To support this argument, in this section, we outline research showing how participating in different social class contexts can foster different cultural models of self that guide how people think, feel, and act.

Participating in different social class contexts affords different models of self (Markus & Kitayama, 2010; Plaut & Markus, 2005; Stephens et al., in press). Middle-class contexts tend to foster *independent* models of self. These independent models often shape how people from middle-class contexts think, feel, and act. For example, people from middle-class contexts more often endorse independent motives for their behavior (e.g., pave your own path), and more often display behaviors that could be characterized as independent, compared to people from working-

class contexts. For example, they more often engage in actions to benefit the individual self (Côté, 2011; Dubois, Rucker, & Galinsky, 2015; Piff, Kraus, Côté, Cheng, & Keltner, 2010), influence the social context according to personal preferences (Stephens et al., 2009; see also Calarco, 2014; Jack, 2016), and prefer to be unique and different from others (Markus & Conner, 2013) compared to their counterparts from working-class contexts.

In contrast, working-class contexts tend to foster *interdependent* models of self. These interdependent models often shape how people from working-class contexts think, feel, and act. Specifically, previous research suggests that people from working-class contexts more often endorse interdependent motives for their behavior (e.g., wanting to collaborate with others; Stephens, Fryberg, et al., 2012a), and more often display behaviors that could be characterized as interdependent, compared to people from middle-class contexts. For example, they are more socially responsive (Bjornsdottir & Rule, 2017; Dietze & Knowles 2016; Kraus & Keltner, 2009), adjust better to the requirements of the situation (Stephens et al., 2009), and better integrate different perspectives in interpersonal situations (Brienza & Grossmann, 2017) compared to people from middle-class contexts.

How Working Individually (vs. Together) Shapes the Performance of People from Different Social Class Contexts

How does working individually (vs. together) shape the experience and performance of people from different social class contexts? We propose that the standard U.S. practice of assessing achievement as people work individually most closely matches the independent models of self common among people from middle-class contexts. Conversely, we propose that assessing achievement as groups of people work together will most closely match the interdependent models of self common among people from working-class contexts. As a result,

we theorize that working individually to achieve an individual outcome will lead people from working-class contexts to perform less well than people from middle-class contexts. In contrast, we theorize that working together to achieve a collective outcome will lead groups from working-class contexts to outperform relatively advantaged groups from middle-class contexts. We also anticipate that individuals from working-class contexts will experience a greater sense of fit when working together (vs. individually) compared to individuals from middle-class contexts.

Previous studies on cultural mismatch support our theorizing (Stephens, Fryberg, et al., 2012a; Stephens, Townsend, Markus, & Phillips, 2012b). These previous studies suggest that the mismatch between the culture of independence common in U.S. higher education and the interdependent models of self common among students from working-class contexts can have negative consequences for these students' performance (Stephens, Fryberg, et al., 2012a). Specifically, in response to a university welcome letter that framed the college culture as independent (e.g., exploring personal interests), students from working-class contexts performed worse on an individual academic task than their peers from middle-class contexts (Stephens, Fryberg, et al., 2012a). However, when students read a university welcome letter that framed the college culture to include the interdependent norms common in working-class contexts (e.g., being part of a community), students from working-class contexts performed just as well on the individual task as their counterparts from middle-class contexts.

These previous studies indicated that the poorer performance of students from working-class contexts was likely due to having more negative subjective experiences with the task (e.g., greater stress, more negative affect, and greater perceptions of task difficulty). For example, in the welcome letter study described above (Stephens, Townsend et al., 2012b), the social class

difference in performance was explained in part by differences in students' perceptions of how difficult the task was. That is, students from working-class contexts who read the independent welcome letter experienced academic tasks as more difficult than those who read the interdependent welcome letter. These more negative subjective experiences with the task were theorized to indicate a lower sense of fit (Stephens, Townsend, et al., 2012b).

In these previous studies on cultural mismatch, although the college culture was framed as interdependent, the standard U.S. practice of assessing achievement as people worked individually was still employed. Since people were working individually, we theorize that the cultural match with the task was incomplete. Indeed, it is perhaps surprising that such a small change to the representation of the culture was sufficient to lead students from working-class contexts to perform just as well as their counterparts from middle-class contexts. In the present research, we go beyond simply framing the culture as interdependent: we assess achievement as groups of people work together (e.g., coordinating to achieve a collective outcome on a problem solving task). We predict that groups from working-class contexts will actually outperform groups from middle-class contexts because working together will fully match the interdependent models of self of people from working-class contexts. In other words, we theorize that requiring people to work together both signals that the cultural norm of interdependence is valued, and also puts the norm into practice.

Thus, in this research, we test a novel strategy for combating social class inequality—assessing achievement as groups of people work together, rather than as people work individually. Rather than focusing on eliminating deficits, in this research we examine whether measuring achievement as groups of people work together affords a performance advantage to

groups from working-class contexts, leading them to outperform groups from middle-class contexts.

Working Together with Others Who Experience a Cultural Match

As we outlined above, we theorize that working together (e.g., coordinating with and adjusting to others, and being part of a group) should create a cultural match for people from working-class contexts. As a result of this cultural match, we predict that working together will benefit people from working-class contexts by fostering greater fit and performance compared to people from middle-class contexts.

We theorize, however, that these benefits are more likely to emerge when people from working-class contexts are working with other people who also experience a cultural match when working together (e.g., other people from working-class contexts). Specifically, working together with others who experience a cultural match should foster a sense of fit, and make the actual process of working together relatively effective. If, in contrast, people from working-class contexts are in a group with people who do not experience a cultural match when working together (e.g., people from middle-class contexts), then working together should be less likely to foster a sense of fit, and the actual process of working together should be less effective. In other words, we expect that working together will most likely benefit people from working-class contexts when they are working with other people who are also from working-class contexts.

Measuring the Social Class of Adults and College Students

Social class is a multifaceted construct and is typically measured using one of three indicators: education, income, or occupational prestige (Winkleby, Jatulis, Frank, & Fortman, 1992). Across the four studies in this paper, we employ both adult and college student samples. In the case of adults, we use personal educational attainment, and in the case the case of college

students, we use parental level of educational attainment as a proxy for social class. We utilize educational attainment as a proxy for social class for several reasons. First, these three indicators tend to be correlated, and as such, educational attainment can serve as a good proxy for these other indicators (e.g., Snibbe & Markus, 2005). Second, researchers who are experts on the measurement of social class advise against creating composite indicators of social class (i.e., where multiple indicators are combined) and instead suggest that it is more effective to use only one of the three indicators (Graetz, 1995; Lareau & Conley, 2008; Marks, McMillan, Jones, & Ainley, 2000). Third, educational attainment (vs. occupation or income) is most closely linked with the types of experiences and outcomes that are central to the research questions we examine, and thus it is the most relevant indicator of social class in the current studies. For example, attaining a four-year college degree shapes the types of behaviors and psychological tendencies that are associated with developing independent cultural models of self (Fryberg & Markus, 2007; Greenfield, 1997; Kim, 2002; Li, 2003; Stephens, Markus et al., 2014).

In our studies that include college student participants, we follow previous research that utilizes parental educational attainment as a proxy for students' prior social class contexts (Covarrubias, Gallimore, & Okagaki, 2018; Covarrubias, Valle, Laiduc, & Azmitia, 2018; Ostrove & Long, 2007; Stephens, Fryberg et al., 2012a; Stephens, Townsend, et al., 2012b). These college students all currently have the same personal level of education (i.e., some college), so in this case, their parents' educational attainment is the most relevant indicator of their prior social class contexts. We categorize students as from *middle-class* contexts when at least one of their parents has completed a four-year college degree, and as students from *working-class* contexts when neither of their parents has completed a four-year college degree.

In contrast, in our studies that include adults who are beyond college age as participants, we follow previous research that categorizes these individuals' social class based on their own current level of personal educational attainment (Carey & Markus, 2018; Markus, Ryff, Curhan, & Palmersheim, 2004; Ryff, Singer, & Palmersheim, 2004; Snibbe & Markus, 2005; Stephens et al., 2007). We categorize adults as from *middle-class* contexts when they personally have attained at least a four-year college degree, and as from *working-class* contexts when they have completed less than a four-year college degree.

In the case of both adults and students, we use educational attainment as a binary indicator of social class (i.e., having vs. lacking a four-year college degree), rather than a continuous one, for several reasons. First, in society, education is typically measured in terms of degree attained, not number of years completed. Second, this binary distinction maps onto groups that have attained objectively different levels of education in society, rather than onto relative differences in social class within our sample. Focusing on these objective differences therefore allows us to extend and compare our results from previous research that illuminates specific ways in which having or lacking a four-year degree can shape people's experiences, behavior, and outcomes in U.S. institutions (e.g., Covarrubias & Fryberg, 2015; Covarrubias, Romero, & Trivelli, 2015; Pascarella, Pierson, Wolniak, & Terenzini, 2004; Rivera & Tilcsik, 2016; Snibbe & Markus, 2005).

The Current Research

In the current research, we test our proposed theory that the standard U.S. practice of assessing achievement as people work individually leads people from working-class contexts to perform less well than people from middle-class contexts. We further examine the idea that assessing achievement as groups of people work together will not only eliminate this

performance gap, but will actually lead groups from working-class contexts to outperform groups from middle-class contexts. When focusing on performance outcomes, we look at collective outcomes at the group level because our definition of working together centers around group-level performance and achievement⁴. We also investigate the hypothesis that individuals from working-class contexts will experience a greater sense of fit than individuals from middle-class contexts when working together. When focusing on fit, we look at individual outcomes because we seek to illuminate how working together shapes the individual psychological experiences of people from different social class contexts.

We test this theory in a series of four studies utilizing diverse methods, including both archival data and in-person and online experiments that measure actual performance. Extending social-psychological theory on cultural mismatch across these studies, we investigate two key hypotheses:

- 1a. Working individually will lead people from working-class contexts to perform less well than people from middle-class contexts on measures of achievement.
- 1b. Working together will lead groups from working-class contexts to outperform groups from middle-class contexts on measures of achievement.
- 2a. Working individually will lead individuals from working-class contexts to feel a lower sense of fit than individuals from middle-class contexts.
- 2b. Working together will lead individuals from working-class contexts to feel a greater sense of fit than individuals from middle-class contexts.

To provide initial evidence consistent with Hypotheses 1a-b, we first examine the association between working individually vs. together and an important academic outcome:

⁴ In practice, these group-level outcomes could still be used to subsequently assign the same credit to individuals who comprise the groups, as was the case for Japanese students and Toyota employees.

students' grades in a college course. To do so, we compare students' performance on individual assignments where they worked on their own to their performance on collective assignments where they worked together in groups. Next, to examine whether working together has a causal effect that leads dyads from working-class contexts to outperform dyads from middle-class contexts⁵, we conducted two experiments, one online and one in the lab. In Study 2, we assign online participants to work either individually or together in social-class-matched dyads on the same achievement task. We then assess their dyadic performance on the task, and their individual subjective experience while completing the task (e.g., individuals' sense of fit with the task). Using similar methods and the same achievement task as Study 2, in Study 3 we seek to replicate and extend the results of Study 2 to a different population (i.e., college students) and a different way of working together (i.e., in-person in the lab). Finally, in Study 4 we extend our findings to a new domain, and directly examine our theorizing that working together will be more likely to be associated with benefits for people from working-class contexts when they are working in groups with other people from working-class contexts. To do so, we utilize data from a nationally representative sample of collegiate student-athletes from different social class contexts who were surveyed about their college sports team experiences.

Study 1: Archival Analysis of College Student Course Grades

Study 1 provides an initial test of Hypothesis 1a: that the standard U.S. practice of assessing achievement as people *work individually* will be associated with the typical social class achievement gap, such that people from working-class contexts will perform less well than

⁵Across the four studies presented here, we look both at the effects of working together in dyads and in larger groups, and use the term "groups" to refer to both dyads and larger groups. While we recognize that there are important differences between dyadic and group-level processes (Levine & Moreland, 2012), our key theoretical prediction is that working together should benefit people from working-class contexts. This theorizing is the same regardless of whether people are working together in two-person dyads or in larger groups. One strength of the current investigation, therefore, is that we test the robustness of our hypotheses across both dyads and larger groups.

people from middle-class contexts. We also conducted an initial test of Hypothesis 1b by examining whether assessing achievement as people *work together* will lead groups with more people from working-class contexts to perform better than those with fewer. We did so in a preregistered archival analysis of the academic course performance of college students who completed assignments when they were either *working individually* or *together*. By comparing the performance of people from different social class contexts across these two different ways of assessing achievement, we sought to provide the first evidence that the way achievement is measured is one key factor associated with social class performance differences.

Method

Participants. We obtained access to two semesters of course grades from an introductory undergraduate organizational behavior class from a selective West Coast university. The course grades were linked to demographic information that was collected in a separate prescreen survey that students completed to be eligible for studies in one of the university's behavioral labs. We had access to their grades on all assignments in the course, as well as key demographic variables (e.g., gender, racial-ethnic minority status, year in school, etc.). The total sample consisted of 1,300 students. Of these participants, 1,130 provided the necessary information (i.e., their parents' levels of education) to determine their social class background. Using parental educational attainment as a proxy for social class, we categorized 18% of these students as from working-class contexts (i.e., neither parent had attained a 4-year degree) and 82% from middle-class contexts (i.e., at least one parent had attained a 4-year degree)⁶. About half of students identified as female (46%) and students also varied in their year in school (41% first years, 25%

⁶ Results are equivalent when instead using subjective SES as an alternate proxy of social class (see supplemental material).

sophomores, 25% juniors, and 9% seniors). We did not have access to students' specific racial identification, but did have access to a binary White/non-White variable (48% White).

As a part of this course, students were assigned to work together as groups of 6-8 students. This yielded data from 192 groups. We did not include data from groups where more than one member did not report the necessary information to determine their social class background ($N = 34$ groups). This is because, in these cases, a large portion of the group's social class composition was unknown (i.e., anywhere from 25-33%). For groups where only one member did not report the information necessary to determine their social class background ($N = 76$ groups), we retained the data in our dataset because only a small portion of the group's social class composition was unknown and we sought to minimize missing data. Following recommendations for handling missing categorical data (e.g., Cheema, 2014), we used mode substitution to impute the unknown background information with the modal social class background: middle-class. By doing so, we provide a somewhat conservative test of our effects because, if anything, we are likely to underestimate the number of students from working-class contexts. As such, for group-level analyses, our final usable sample size was $N = 158$ groups. A post-hoc sensitivity analysis indicated that the remaining sample size for individual analyses ($N = 1,130$) provided us with 80% power to detect a small effect of $d = 0.16$. The remaining sample size for group analyses ($N = 158$) provided us with 80% power to detect a medium effect of $d = 0.43$.

Procedure. We preregistered our data analysis plan on OSF (https://osf.io/u9qvg/?view_only=72fe55be31f44876a3d6d3f86bc138e1).

Measures.

Individual performance. We computed a score that represents students' performance on the course assignments on which they *worked individually* (65% of the overall course grade, $M = 81\%$, $SD = 8\%$). To ensure that this score captured the actual course value of each individual assignment, we weighted the scores according to weights in the syllabus. The individual components of the grade comprised class participation, homework assignments, and a midterm and final exam.

Group performance. We computed a score that represents students' performance on the course assignments that they completed while *working together* (35% of the overall course grade, $M = 88\%$, $SD = 3\%$). To ensure that this score captured the actual course value of each group assignment, we weighted the scores according to weights outlined in the syllabus. The *working together* components of the grade comprised group homework assignments, a final group project, and peer evaluations. Peer evaluations consisted of ratings of a student by their other group members on 20 different dimensions that assessed their contributions to group assignments, including how engaged they were in completing group assignments and the extent to which they were effective group members (e.g., quality of contribution, degree of effort, and cooperation; see supplemental material for full list of dimensions).

Importantly, the group assignments (i.e., group homework assignments, final group project, and peer evaluations) and individual assignments were similar in content and therefore required similar skills to be completed. For example, the group homework assignments were brief essays, which was exactly the same as the individual homework assignments, except that they were completed in groups. Similarly, the group final project was a written report that was similar to the essay component of the exams that students completed individually.

Social class composition of group. We created a group-level variable (i.e., Level 2) that enabled us to test the effect of a group's social class composition on group performance. This variable represented the percentage of students from working-class contexts in a given group ($M = 17\%$ students from working-class contexts, $SD = 16\%$). The range was 0-4 students from working-class contexts. Specifically, 33% of groups had zero students from working-class contexts; 34% had one student from working-class contexts; 26% had two students from working-class contexts; 4% had three students from working-class contexts; and 3% had four students from working-class contexts.

Analyses

We first tested Hypothesis 1a that the standard U.S. practice of assessing people's achievement as they *work individually* will produce the typical social class achievement gap: people from working-class contexts will perform less well than their counterparts from middle-class contexts. To do so, we regressed students' individual course performance on social class.

Second, we tested Hypothesis 1b that assessing groups of people as they *work together* will lead groups with more people from working-class contexts to perform better than those with fewer. We conducted a separate analysis of aggregate group level data because the group component of the final grade was at the level of the group and reflected group-level performance. We regressed group course performance on social class composition of the group (grand-mean centered)⁷.

Results

Individual performance. Supporting Hypothesis 1a, social class was significantly negatively associated with performance on individual assignments, $b = -0.02$, $t(1,128) = -3.20$, p

⁷ Though we do not include covariates in the results presented here, results are equivalent when controlling for gender and race (see supplemental material).

= .002, $sr = -.09$. Consistent with research documenting a social class achievement gap (Pascarella et al., 2004), students from working-class contexts ($M = 79.7\%$) performed significantly worse than students from middle-class contexts ($M = 81.6\%$) on assignments where they *worked individually* (see Table 1, left panel).

Table 1. *Effect of social class on individual performance and social class composition on group performance in Study 1.*

Individual Performance	β	t	p	sr	Group Performance	β	t	p	sr
Social Class	-.10**	-3.20	.001	-.09	Social Class Composition	.20*	2.55	.012	.20

Group performance. Supporting Hypothesis 1b, social class composition of the group was significantly positively associated with performance on group assignments, $b = 0.04$, $t(155) = 2.58$, $p = .01$, $sr = .20$ (see Figure 2). Consistent with the idea that *working together* improves the performance of groups of students from working-class contexts, the analyses revealed that a higher proportion of working-class students *working together* in a group was associated with significantly better performance on group assignments (see Table 1, right panel). To further illuminate the relationship between social class composition and group performance, we examined the effect of social class composition on groups with low and high proportions of students from working-class contexts (i.e., $\pm 1 SD$). Groups with a low proportion of students from working-class contexts ($-1 SD$, i.e., 0% students from working-class contexts) correspond to an 87.5% group performance score. In contrast, groups with a high proportion of students from working-class contexts ($+1 SD$, i.e., 33% students from working-class contexts) correspond to an 88.7% group performance score (see Figure 1).

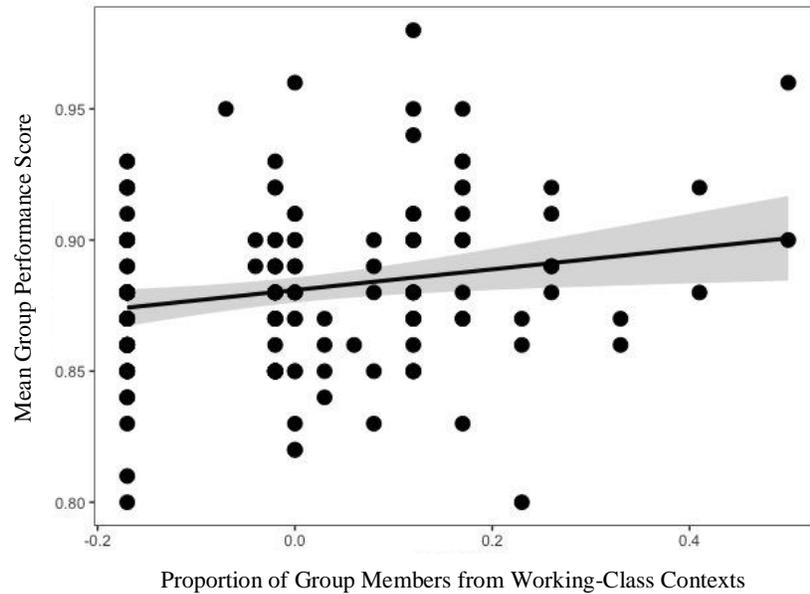


Figure 1. *Regression of group performance on social class composition of the group in Study 1 (shaded area represents 95% confidence interval of the effect).*

Discussion

Focusing on course grades, a real-world outcome with important downstream consequences, Study 1 provided initial evidence consistent with our hypotheses. Specifically, in direct support of Hypothesis 1a, we found that students from working-class contexts receive lower grades when their achievement is assessed according to the standard U.S. practice: as they *work individually*. In contrast, when instead assessing groups of people's achievement as they *work together*, we found that groups with more students from working-class contexts earn higher grades on group assignments than those with fewer. This finding is generally consistent with Hypothesis 1b that *working together* will lead groups from working-class contexts to outperform groups from middle-class contexts. Furthermore, this finding supports our claim that people from working-class contexts do not simply lack the skills required to perform well on measures of achievement – as the deficit model would predict. Indeed, if students from working-class contexts were simply less skilled than their advantaged counterparts from middle-class contexts, one would expect groups with more students from working-class contexts to perform worse than

those with fewer. Additionally, as noted above, students completed similar types of assignments both when *working individually* and *working together* in groups. Thus, the primary experience that varied across the types of assignments (individual vs. group) was whether students *worked individually* or *worked together*. This suggests that differences in the content of the tasks are unlikely to account for the different pattern of results observed for assignments on which students *worked individually vs. together*.

Together these results provide initial evidence that the way achievement is assessed may contribute to social class differences in performance. However, there are at least four key open questions in this study that we sought to address in Study 2. First, Study 1 was correlational, and did not enable us to determine whether *working together* (vs. *individually*) causally improves the performance of groups from working-class contexts. To address this issue, we next conducted two experiments in which participants from different social class contexts were assigned to *work together* vs. *individually* with a social-class-matched partner on a problem-solving task. Second, since we did not have access to a measure of fit in Study 1, we were not able to examine Hypotheses 2a-b. In Studies 2-3, we therefore included a measure of fit so that we could examine the effect of *working together* vs. *individually* on sense of fit.

Third, in Study 1, the groups who were working together naturally varied in their social class composition (i.e., they were mostly mixed social class groups). Thus, we were not able to compare the performance of working-class to middle-class groups, and could not directly test Hypothesis 1b that *working together* leads groups from working-class contexts to outperform groups from middle-class contexts. To test this hypothesis, and compare the performance of working-class to middle-class groups, the experiments therefore controlled for social class composition by assigning people to social-class-matched groups.

Finally, the social class variation in group composition in Study 1 also meant that merely having more people from the same social class context in a group, rather than working together with those people, could have explained the performance benefits. In the experiments, creating social-class-matched groups for both working-class and middle-class participants allowed us to control for working together with someone from the same social class context. As a result, Studies 2-3 makes it possible to infer that any observed benefits of *working together* for working-class groups are above and beyond those that could be attributed to working with someone from the same social class context.

Study 2: Online Experiment

By randomly assigning participants to either *work individually* or *together* on a problem-solving task, Study 2 sought to provide causal evidence to support Hypotheses 1-2. Furthermore, in contrast to Study 1 where the social class composition of groups naturally varied, Study 2 held constant the social class composition of the groups of people who were assigned to *work together*. Creating social-class-matched groups enabled us to more directly test our hypotheses about social class differences when *working together* vs. *working individually*.

Method

Participants. We computed our sample size *a priori* to have 80% power to detect a small effect similar to the average of those obtained in Study 1 ($d = 0.28$). As such, we sought to obtain a sample size of approximately 400 participants. We recruited 403 U.S. adults (i.e., beyond college age) to complete an online experiment via Amazon's MTurk in exchange for \$3, and obtained complete data from 352 participants⁸. Among the remaining pool of viable participants,

⁸ Some people who were assigned to the *working together* condition were not successfully matched with a partner through the ChatPlat software ($N = 51$). This was a technical problem due to the ChatPlat software, and has been noted in previous research utilizing ChatPlat (Huang, Yeomans, Brooks, Minson, & Gino, 2017).

we excluded 12 participants for failing attention checks embedded in the individual survey. To minimize participant exclusions, we only excluded the individuals who failed the attention checks in the individual survey, rather than both members of a dyad (i.e., when they *worked together*). We also excluded 23 individuals for whom we did not have information to accurately assign them to a social class group.

We were therefore left with a final sample of $N = 319$ ($M_{\text{age}} = 36.12$, $SD_{\text{age}} = 10.69$, 45% female, 15% underrepresented racial minorities). For this final sample, using personal educational attainment as a proxy for social class, we categorized 53% of these participants as from working-class contexts (i.e., personally had attained less than a 4 year degree) and 47% as from middle-class contexts (i.e., personally had attained at least a 4 year degree)⁹. A post-hoc sensitivity analysis indicated that the remaining sample size provided us with 80% power to detect a small effect of $d = 0.31$.

Procedure. Participants were randomly assigned to work on a problem-solving task in one of two conditions: *working individually* vs. *working together*. Participants in the *working together* condition were paired with a partner using ChatPlat software and worked together on the task (Brooks & Schweitzer, 2011). ChatPlat is an application that allows participants to be paired with a partner with whom they can chat via instant messages in an online chat room. This methodology has been used in prior research that has asked people to work together (e.g., Brooks & Schweitzer, 2011; Huang et al., 2017).

Upon entering the experiment, participants completed an initial questionnaire that included our measure of social class (i.e., personal educational attainment) embedded in a series of distractor demographic items (e.g., age, gender, race/ethnicity). For those assigned to the

⁹ Results are generally consistent, though some failed to reach significance, when instead using (a) subjective SES or (b) income as alternate proxies of social class (see supplemental material).

working together condition, participants' response to the educational attainment item was used to pair them with a social class-matched partner. If participants indicated that they had less than a 4-year college degree, they were matched with someone who also had less than a 4-year college degree; if participants had obtained at least a 4-year college degree, they were matched with someone who also had at least a 4-year college degree.

We matched partners based on social class for two reasons: first, based on our theorizing and the results of Study 1, we reasoned that we were most likely to obtain performance benefits if we paired people from working-class contexts with a partner who was also skilled at *working together* (i.e., another working-class person). Second, matching people on social class was necessary to be able to isolate the effect of social class on performance when *working together*. In other words, if people were in cross-class groups, we could not determine whether the working-class or middle-class group member was responsible for the group's performance.

After being assigned to condition, participants had 12 minutes to complete a problem-solving task on their own (*working individually* condition) or with a partner (*working together* condition). Participants then completed an online survey assessing individual sense of fit with the task and subjective perceptions of their performance. Individuals in the *working together* condition also completed a partner evaluation questionnaire. All participants then answered additional demographics questions and were debriefed, paid, and thanked for their participation.

We used the Lost at Sea task (Nemiroff & Pasmore, 2001) as the problem-solving task in this study. This task asks participants to imagine that they are stranded at sea and have a list of 15 items available to aid them in their survival. They are asked to rank the items in order of importance for their survival. We chose the Lost at Sea task because it has been used to compare the performance of people *working individually* vs. *together* in previous research on problem-

solving (e.g., Esser, 1998; Kappes, Oettingen, & Pak, 2012). It also has two additional benefits. First, when participants are *working together* on the task, the task requires that participants work together to discuss the options and choose a ranking. For example, ranking the mirror as the most important object means that no other item can be ranked as the most important. Since the ranking of each item depends on the other rankings, it is not a task that group members can divide up to work on separately. Second, the task has a clear scoring system to objectively assess task performance.

Measures. See the supplemental material for a complete list of measures from this and subsequent studies.

Performance. Following the standard scoring procedure, we calculated a performance score on the Lost at Sea task by computing how much participants deviated from the correct ranking order (i.e., a deviation score). For example, the correct answer for the mirror was to rank it as most important (i.e., ranking of 1). Therefore, if participants ranked the mirror as least important (i.e., ranking of 15), they received a score of 14 on the mirror since their ranking deviated from the correct ranking by 14. The total deviations across all 15 items were summed to form the overall score. As such, lower scores represent a lower deviation from the correct ranking, and better performance.

To be able to compare task performance across the two conditions, we employed a *yoking procedure* following prior research comparing individual to group performance (Hill, 1982). Specifically, for participants in the *working individually* condition, we yoked participants together by both (1) social class and (2) start time of the experiment to simulate the most likely pairing they would have been part of had they been randomly assigned to the *working together* condition. Then, we took the average of these two individual participants' scores to yield our

yoked deviation score ($M = 65.46$, $SD = 13.39$). As such, when describing performance results below, we will refer to participants in the *working together* condition as dyads, and participants in the *working individually* condition as yoked participants.

Subjective experience with task. We originally intended to measure two different constructs: individuals' sense of fit with the task, and individuals' sense of how well they performed on the task (i.e., subjective performance). Drawing on previous research (Stephens, Fryberg, et al., 2012a), the two items designed to measure sense of fit were: "How comfortable did you feel while working on the task?" and "How natural did it feel to work on the task?" (1 = *Not at all*, 7 = *Very*). We created three items meant to measure subjective performance. The items were: "How well do you think you did on the task?" (1 = *Not at all*, 7 = *Very much*); "To what extent did you feel you were able to perform up to your potential on the task?" (1 = *Not at all*, 7 = *Very much*); and "How well did you think you performed relative to other participants in the study?" (1 = *Bottom 10%*, 10 = *91-100%*). However, given that these two constructs were conceptually related (i.e., both assessed participants' experience with the task), we conducted a factor analysis to determine whether all of the items tapped into a single overarching construct of participants' subjective experience with the task. The factor analysis revealed that all five items loaded onto a single factor accounting for 67% of the total variance¹⁰. Due to the results of the factor analysis, we standardized and combined these items to form an index of subjective experience with the task ($\alpha = .88$).

Control variables. We also included two control variables in all analyses: a two-item measure of how seriously participants took the task (i.e., "How seriously did you take the task?" and "How careful were you on the task?"; 1 = *Not at all*, 7 = *Very much*; $r(1, 317) = .63$, $p <$

¹⁰ The two measures showed the same pattern of results when analyzed separately, and results are largely equivalent when looking at the two measures separately (see supplemental material).

.001) and one item about task familiarity (“How familiar were you with the task?”; 1 = *Not at all*, 7 = *Very much*). We reasoned that differences in how seriously participants took the task and participants’ familiarity with the task could shape people’s experiences with and performance on the task (Goodman & Leyden, 1991).

Results

Performance. We obtained a marginally significant task condition (*working together* vs. *individually*) \times social class (working-class vs. middle-class) interaction, $F(1, 313) = 3.69, p = .056, \eta^2 = .012$ (see Figure 2). Decomposing the interaction, and in support of Hypothesis 1a, in the *working individually* task condition, yoked participants from working-class contexts performed significantly worse ($M = 69.13, SD = 11.71$) than yoked participants from middle-class contexts ($M = 63.63, SD = 12.62$), $F(1, 313) = 9.60, p = .002, \eta^2 = .03$. In contrast, in the *working together* task condition, dyads from working-class contexts did not perform significantly differently ($M = 63.94, SD = 12.87$) than dyads from middle-class contexts ($M = 63.66, SD = 16.40$), $F(1, 313) = 0.004, p = .95, \eta^2 = 0$ (see Figure 2).



Figure 2. Mean task performance by social class and task condition in Study 2 (Error bars represent ± 1 SE).

Next, we compared performance within social class groups. Among participants from working-class contexts, dyads in the *working together* task condition performed significantly better ($M = 63.94$, $SD = 12.87$) than yoked participants in the *working individually* task condition ($M = 69.13$, $SD = 11.71$), $F(1, 313) = 7.19$, $p = .008$, $\eta^2 = .022$. In contrast, among participants from middle-class contexts, dyads in the *working together* task condition did not differ in their performance ($M = 63.66$, $SD = 16.40$) from yoked participants in the *working individually* task condition ($M = 63.63$, $SD = 12.62$), $F(1, 313) = 0.01$, $p = .91$, $\eta^2 = 0$.

Subjective experience with task. Mirroring the patterns of results for performance, we obtained a significant task condition (*working together* vs. *individually*) \times social class (working-class vs. middle-class) interaction, $F(1, 313) = 7.57$, $p = .006$, $\eta^2 = .024$. We decomposed the interaction to compare the simple effects across social class groups and task condition.

Supporting Hypothesis 2a, in the *working individually* task condition, individuals from working-class contexts reported a significantly worse experience with the task ($M = -0.12$, $SD = 0.88$) than individuals from middle-class contexts ($M = 0.17$, $SD = 0.76$), $F(1, 313) = 7.03$, $p = .008$, $\eta^2 = .022$ (see Figure 3). In contrast, in the *working together* task condition, though in the predicted direction, individuals from working-class contexts did not report a significantly better experience with the task ($M = 0.07$, $SD = 0.85$) compared to individuals from middle-class contexts ($M = -0.14$, $SD = 0.70$), $F(1, 313) = 1.91$, $p = .17$, $\eta^2 = .006$.

Next, we compared subjective experience with the task within social class groups. Among individuals from working-class contexts, though in the predicted direction, those in the *working together* task condition did not report a significantly better experience with the task ($M = 0.07$, $SD = 0.85$) than those in the *working individually* task condition ($M = -0.13$, $SD = 0.88$), $F(1, 313) = 2.43$, $p = .12$, $\eta^2 = .008$. In contrast, among individuals from middle-class contexts,

those in the *working together* task condition reported a significantly worse experience with the task ($M = -0.14$, $SD = 0.70$) than those in the *working individually* task condition ($M = 0.17$, $SD = 0.76$), $F(1, 313) = 5.38$, $p = .02$, $\eta^2 = .017$ ¹¹.

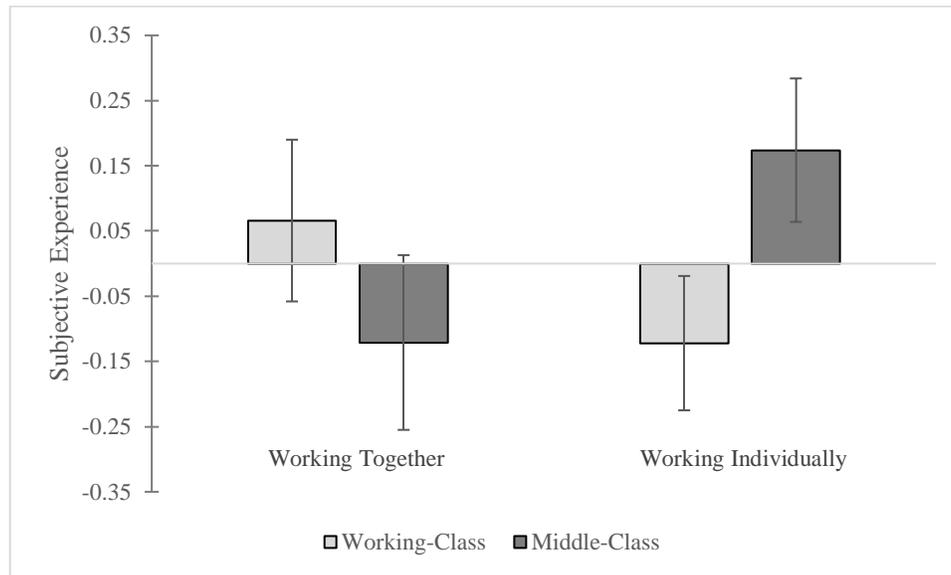


Figure 3. Mean subjective experience with task by social class and task condition in Study 2 (Error bars represent ± 1 SE).

Exploratory mediation analyses. Previous research on cultural mismatch (Stephens, Fryberg, et al., 2012a; Stephens, Townsend et al., 2012b) has theorized that sense of fit is a mediator of the observed social class differences in performance. Although in this study we measured our indicator of fit—individual subjective experience—after performance, we nevertheless explored whether subjective experience with the task might partially explain the observed performance effects. Specifically, we conducted exploratory mediation analyses to explore whether individuals’ subjective experience with the task would mediate the observed relationship between social class, task condition, and performance. We entered social class as our

¹¹ Importantly, people did not differ in their task engagement as a function of social class, $F(1, 315) = 2.01$, $p = .16$, $\eta^2 = .006$, or in their time spent on the task, $F(1, 315) = 0.59$, $p = .44$, $\eta^2 = .002$. This suggests that the social class performance differences were unlikely to be explained by simple differences in motivation. See supplemental material for details of these analyses.

predictor, task condition as our moderator, performance as our outcome, and individual subjective experience as our putative mediator. Moderated mediation analyses indicated that subjective experience did not mediate the observed relationship between social class, task condition, and performance. The index of moderated mediation did not indicate a significant indirect effect: it yielded a point estimate of 0.527 and a 95% bias-corrected CI of [-0.219, 2.169]. This interval included zero, suggesting that the indirect effect of social class on performance through subjective experience is not positively moderated by task condition.

Discussion

In Study 2 we sought to provide answers to four open questions. First, by conducting an experiment, we were able to provide causal evidence in support of our hypotheses. Second, by measuring fit, we were able to examine Hypotheses 2a-b. Third, by assigning people to social-class-matched groups, we were able to directly test Hypothesis 1b, and compare the performance of working-class to middle-class groups. Fourth, by using social-class-matched groups we were also able to rule out that simply being in a group with people from the same social class context, rather than working together with those people, could have explained the performance benefits for people from working-class contexts. Specifically, since both working- and middle-class participants *worked together* in social-class-matched pairs in Study 2, the design of the experiment controlled for *working together* with someone from the same social class context across both social class groups. As a result, we can infer that the observed benefits of *working together* for working-class groups were above and beyond those that could purely be attributed to working with someone from the same social class context.

Study 2 provided experimental evidence generally consistent with Hypotheses 1-2: how achievement is assessed differentially shapes the performance and fit of people from different

social class contexts. Although groups of working-class participants in Study 2 performed just as well as groups of their middle-class peers, we did not observe that working-class groups performed better than middle-class groups in the *working together* condition. We speculate that this may have been because the two social class groups had different levels of educational attainment. Since people in this study were adults, people who were categorized as from working-class contexts, by definition, had obtained less than a four-year college degree. In contrast, people who were categorized as from middle-class contexts by definition had a four-year college degree or more. This difference in educational attainment likely represents different baseline levels of experience with analytical problem-solving tasks like the one utilized in this study. Furthermore, given this objective difference in level of educational attainment, it is perhaps surprising that *working together* led the mostly high-school educated people who comprised the working-class groups to perform just as well as the college-educated people who comprised the middle-class groups. To control for different baseline levels of experience with this type of task, in Study 3 we conducted the same study with a sample of current college students from different social class backgrounds. As such, these participants all had similar personal levels of educational attainment, which enabled us to better isolate the effects of *working together* (vs. *individually*) on the performance of groups of people from different social class contexts.

Study 3: Lab Experiment

Study 3 provided another experimental test of our hypotheses. The goal of Study 3 was to replicate the results of Study 2 in a lab experiment where people were interacting in-person. We also sought to extend the results to a population of current college students, rather than adults. By

doing so, we were better able to isolate the effect of *working together* (vs. *individually*), controlling for different baseline levels of experience with problem-solving tasks.

Method

Participants. We computed our sample size *a priori* with the goal of obtaining a final sample size of approximately 300 participants. We recruited 355 college students from two different elite private universities, and obtained complete data from 336 participants. We extended our recruitment to the second university because there were not enough students from working-class contexts at the first university to achieve our required sample size. We excluded attention check failures ($N = 3$). We also excluded those who were not U.S. citizens ($N = 36$) because the experiences, behaviors, and cultural models associated with social class can differ across national cultures (e.g., Lamont, 1992; Miyamoto, 2013; Park et al., 2013). Finally, unexpectedly, due to the face-to-face nature of the *working together* condition compared to the virtual interaction in Study 2, we discovered effects of race, which led us to exclude the dyads that consisted of both underrepresented racial minorities ($N = 22$)¹². Using parental educational attainment as a proxy for social class, we categorized 53% of these students as from working-class contexts (i.e., neither parent had attained a 4-year degree) and 47% as from middle-class contexts (i.e., at least one parent had attained a 4-year degree)¹³. We were left with a sample of N

¹² After collecting initial data, we analyzed the data that had been collected up until a natural stopping point (i.e., the end of the academic term). We discovered a very different pattern of results for dyads comprised of both underrepresented minorities (URMs) compared to other types of dyads. We reasoned that participants in URM-URM dyads may have inferred that the study was about race, more so than other types of dyads that were not comprised of both URM members. If these participants did infer that the study was about race, this may have led to stereotype threat effects (Croizet & Claire, 1998; Steele, 1988). Several key results comparing URM-URM dyads to all other types of dyads point to this possibility. Specifically, performance was significantly lower among URM-URM dyads ($M = 69.48$, $SE = 3.38$) than for all other types of dyads ($M = 57.31$, $SE = 1.11$), $F(1, 173) = 11.61$, $p = .001$. Members of URM-URM dyads also reported experiencing significantly more stress while completing the task ($M = 3.34$, $SE = 0.38$) than members of other types of dyads ($M = 2.53$, $SD = 0.12$). Thus, we excluded those dyads comprised of both URMs, and continued data collection only recruiting non-URM dyads.

¹³ Results are generally consistent, though some failed to reach significance, when instead using (a) subjective SES or (b) family income as alternate proxies of social class (see supplemental material).

= 273 college students ($M_{\text{age}} = 20.05$, $SD_{\text{age}} = 1.89$, 64% female, 28% underrepresented minorities). A post-hoc sensitivity analysis indicated that the remaining sample size provided us with 80% power to detect a small effect of $d = 0.34$.

Procedure. Upon arriving to the lab, participants were assigned to the *working individually* or *working together* task condition. Similar to Study 2, participants in the *working together* condition were paired with a social-class-matched partner. To ensure that participants were paired with a social-class-matched partner, we used previous responses to a prescreen survey to recruit participants to come to the lab in sessions of up to four social-class-matched participants (i.e., all students in a given session were either students from working-class or middle-class contexts). Within each session, participants were assigned to a task condition using the following assignment strategy. When only one individual arrived for a given session, that person was automatically assigned to the *working individually* task condition. When two individuals arrived, they were both assigned to the *working together* task condition. When three individuals arrived, one of the three was randomly assigned to the *working individually* and two of the three were assigned to the *working together* task condition. When four individuals arrived, two were randomly assigned to the *working individually condition* and two were assigned to the *working together* task condition. We utilized this assignment strategy so that we could retain all participants who showed up to the lab, given the very low number of students from working-class contexts attending both universities.

Participants were first brought to individual rooms and given a task description form, which described instructions for the task that they would complete. The task description form either indicated they would perform a problem-solving task individually (*working individually* task condition) or with a partner (*working together* task condition). After reading the task

description form, participants in the *working individually* task condition were given the Lost at Sea task to complete individually. In contrast, participants in the *working together* task condition were brought together with a social-class-matched partner and given the Lost at Sea task to complete together. In both conditions, participants were given 12 minutes to complete the task, and an experimenter notified participants when there were two minutes remaining.

After completing the Lost at Sea task, all participants then completed the same survey items individually as in Study 2. Participants in the *working together* task condition also completed the partner evaluation measure as in Study 2. After completing the survey individually, participants were debriefed, paid, and thanked for their participation.

Measures. All measures were identical to that of Study 2. We followed the same yoking procedure for performance results as in Study 2 (i.e., averaged the performance of two social-class-matched individuals in the *working individually* condition). Again, when describing performance results below, we will refer to participants in the *working together* condition as dyads, and participants in the *working individually* condition as yoked participants. We also included the same control variables as in Study 2 in all of our analyses (i.e., how seriously participants took the task, and self-rated familiarity with the task).

Results

Performance. Mirroring the results of Study 2, we obtained a significant task condition (*working individually* vs. *together*) \times social class (working-class vs. middle-class) interaction on task performance, $F(1, 273) = 4.29, p = .039, \eta^2 = .015$. Decomposing the interaction, inconsistent with Hypothesis 1a, in the *working individually* task condition, yoked participants from working-class contexts ($M = 65.50, SE = 1.48$) performed just as well as yoked participants from middle-class contexts ($M = 66.31, SE = 1.54$), $F(1, 273) = 0.15, p = .70, \eta^2 = .001$ (see

Figure 4). Importantly, in support of Hypothesis 1b, in the *working together* task condition, dyads from working-class contexts performed significantly better ($M = 53.79$, $SE = 1.42$) than dyads from middle-class contexts ($M = 60.83$, $SE = 1.57$), $F(1, 273) = 11.14$, $p = .001$, $\eta^2 = .039$.

Next, we compared performance within social class groups. Among participants from working-class contexts, dyads in the *working together* task condition performed significantly better ($M = 53.79$, $SE = 1.42$) than yoked participants in the *working individually* task condition ($M = 65.50$, $SE = 1.48$), $F(1, 273) = 32.09$, $p < .001$, $\eta^2 = .11$. Among participants from middle-class contexts, dyads in the *working together* condition also performed significantly better ($M = 60.83$, $SE = 1.57$) than yoked participants in the *working individually* condition ($M = 66.31$, $SE = 1.54$). Importantly, however, the magnitude of this difference among middle-class participants was much smaller than the performance difference among participants from working-class contexts, $F(1, 273) = 6.15$, $p = .01$, $\eta^2 = .02$.

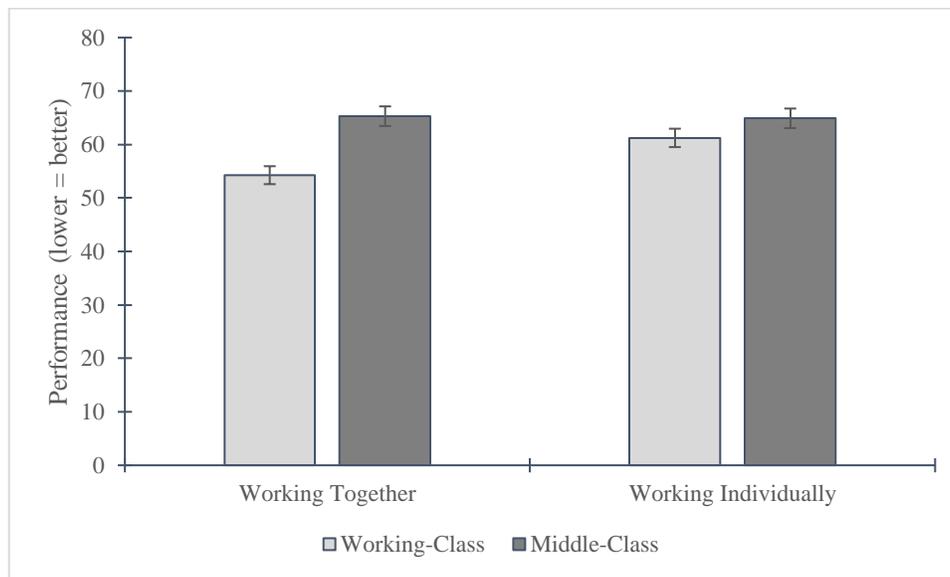


Figure 4. Mean task performance by social class and task condition in Study 3 (Error bars represent ± 1 SE).

Subjective experience with task. Similar to the performance results, we obtained a significant task condition (*working individually* vs. *together*) \times social class (working-class vs.

middle-class) interaction on subjective experience with task, $F(1, 273) = 5.82, p = .017, \eta^2 = .021$. Decomposing the interaction, and in support of Hypothesis 3a, in the *working individually* task condition, individuals from working-class contexts reported a marginally worse experience with the task ($M = -0.11, SE = 0.08$) than individuals from middle-class contexts ($M = 0.09, SE = 0.08$), $F(1, 273) = 3.08, p = .08, \eta^2 = .011$. In further support of Hypothesis 3b, in the *working together* task condition, individuals from working-class contexts reported a marginally better experience with the task ($M = 0.16, SE = 0.08$) than individuals from middle-class contexts ($M = -0.03, SE = 0.08$), $F(1, 273) = 2.75, p = .10, \eta^2 = .01$.

Next, we compared subjective experience with the task within social class groups. Among individuals from working-class contexts, those in the *working together* task condition reported a significantly better experience with the task ($M = 0.16, SE = 0.08$) compared to those in the *working individually* task condition ($M = -0.11, SE = 0.08$), $F(1, 273) = 5.99, p = .015, \eta^2 = .021$. In contrast, among individuals from middle-class contexts, though in the predicted direction, those in the *working together* task condition did not report a significantly worse experience with the task ($M = -0.03, SE = 0.08$) compared to those in the *working individually* task condition ($M = 0.09, SE = 0.08$), $F(1, 273) = 0.98, p = .32, \eta^2 = .004$.

Exploratory mediation analyses. As in Study 2, we again explored whether individual sense of fit might mediate social class differences in performance. To do so, we entered social class as our predictor, task condition as our moderator, performance as our outcome, and individual subjective experience with the task as our putative mediator. Moderated mediation analyses indicated that subjective experience with the task mediated the observed relationship between social class, task condition, and performance. The index of moderated mediation indicated a significant indirect effect: it yielded a point estimate of 0.795 and a 95% bias-

corrected CI of [0.027, 2.376]. This interval did not include zero, suggesting that the indirect effect of social class on performance through subjective experience is positively moderated by task condition.

Decomposing the moderated mediation, in the *working individually* task condition, there was a point estimate of -0.411, and a 95% bias-corrected CI of [-1.529, 0.044]. This interval included zero, suggesting that subjective experience did not significantly mediate the relationship between *working individually* and performance for students from working-class compared to middle-class contexts.

In contrast, in the *working together* task condition, there was a point estimate of 0.384, and a 95% bias-corrected CI of [-0.017, 1.293]. This interval includes zero, suggesting that subjective experience did not significantly mediate the relationship between *working together* and performance for students from working-class compared to middle-class contexts.

In sum, though the index of moderated mediation indicated that the conditional indirect effects were significantly different from one another across task conditions, when we decomposed the moderated mediation, the specific indirect effects failed to reach statistical significance.

Discussion

We extended the results from Study 2 to a sample of college students interacting face-to-face in the lab. In Study 2, we obtained evidence that assessing achievement as people *work together* leads groups from working-class contexts to perform just as well as (but not better than) groups from middle-class contexts. We suggested that this could have been due to their difference in educational attainment and thus potential differences in baseline experience with these types of problem-solving tasks. Importantly, Study 3 sought to address this concern by

controlling for participants' current level of educational attainment across social class groups (i.e., all were college students). We reasoned that current college student participants were likely to have much more similar levels of experience with problem-solving tasks. As a result, for the first time, we obtained evidence that assessing achievement as people *work together* can lead groups from working-class contexts to actually outperform relatively advantaged groups from middle-class contexts.

However, there were two key limitations. One limitation of the current study was that people from working-class contexts did not perform less well than their counterparts from middle-class contexts in the *working individually* condition. We reasoned that this could have been because all participants in this study were college students enrolled at elite universities, and thus the students from working-class contexts in our study may have been self-selected to have particularly strong individual problem-solving skills. Second, while the results of Studies 2-3 generally followed the predicted patterns, a number of the simple effects did not reach statistical significance. However, we suspect that this may have been the result of being somewhat underpowered to reliably detect the simple effects. Supporting this rationale, the sensitivity analyses for Studies 2-3 indicated that the remaining sample sizes in each study provided us with 80% power to detect a small effect of $d = 0.31$, and $d = 0.34$, respectively. Across both studies, however, our smallest observed effect size was $d = 0.20$. The results of these sensitivity analyses indicate that we were likely underpowered to reliably detect some of the key simple contrasts. Given the similar design and measures of the two studies, we next conducted an internal meta-analysis to determine whether the hypothesized simple effects would reach statistical significance when meta-analyzed across the two studies.

Internal Meta-Analysis of Studies 2-3

Method

Across Studies 2-3, we conducted an internal meta-analysis to assess the overall reliability of the task condition (*working individually* vs. *together*) \times social class (working-class vs. middle-class) interaction, as well as the relevant simple effects (Goh, Hall, & Rosenthal, 2016; Mosteller & Bush, 1954; Rosenthal & Rosnow, 1991). One-tailed p -values for each effect (weighted by the corresponding study's degrees of freedom) were used to calculate each effect's overall reliability across the two experiments. When meta-analyzed, the task condition \times social class interaction effects were significant across all of our key dependent measures: performance and subjective experience with the task, as well as the vast majority of the decomposed simple effects (see Tables 2-3 for more details).

Results

Performance. Supporting our theorizing, we found that task condition \times social class interaction was reliable when meta-analyzed across the two studies, $z = 2.81$, $p = .002$ (see Table 2). Decomposing the interaction, in support of Hypothesis 1a, in the *working individually* task condition, yoked participants from working-class contexts performed less well than yoked participants from middle-class contexts, $z = 2.42$, $p = .008$. Conversely, and in further support of Hypothesis 1b, in the *working together* task condition, dyads from working-class contexts outperformed dyads of their advantaged peers from middle-class contexts, $z = 3.32$, $p < .001$.

Next, we compared meta-analyzed performance within social class groups. Among participants from working-class contexts, dyads in the *working together* task condition performed significantly better than yoked participants in the *working individually* task condition, $z = 7.61$, $p < .001$. Among participants from middle-class contexts, dyads in the *working together* task condition performed better than yoked participants in the *working individually* task

condition, though the magnitude of this difference was smaller than that for participants from working-class contexts, $z = 2.61, p = .004$.

Table 2. *Meta-analyzed effects for performance in Studies 2-3.*

Effect	Weighted Meta Z	Meta p	Meta r
Social Class	-0.50	.69	-0.01
Task Condition	5.05***	< .001	0.21
Social Class \times Task Condition	2.81**	.002	0.12
<i>Individual</i> Task Condition: middle-class vs. working-class	2.42**	.008	0.11
<i>Together</i> Task Condition: middle-class vs. working-class	3.32***	< .001	0.13
Working-class: <i>Individual</i> vs. <i>Together</i> Task Condition	7.61***	< .001	0.32
Middle-class: <i>Individual</i> vs. <i>Together</i> Task Condition	2.61**	.004	0.10

Note: + $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Subjective experience with task. Supporting our theorizing, we found that task condition \times social class interaction was reliable when meta-analyzed across the two studies, $z = 3.61, p < .001$ (see Table 3). Decomposing the interaction, in support of Hypothesis 2a, in the *working individually* condition, individuals from working-class contexts reported a significantly worse experience with the task than individuals from middle-class contexts, $z = 4.17, p < .001$. Conversely, in the *working together* condition, in support of Hypothesis 2b, individuals from working-class contexts reported a significantly better experience with the task than individuals from middle-class contexts, $z = 3.05, p = .001$.

Next, we compared meta-analyzed subjective experience within social class groups. Among individuals from working-class contexts, those in the *working together* condition reported a significantly better experience than those in the *working individually* condition, $z = 3.88, p < .001$. Conversely, among individuals from middle-class contexts, those in the *working*

together condition reported a significantly worse experience than those in the *working individually* condition, $z = 3.46, p < .001$.

Table 3. *Meta-analyzed effects for subjective experience with task in Studies 2-3.*

Effect	Weighted Meta Z	Meta p	Meta r
Social Class	0.38	.35	0.02
Task Condition	0.97	.17	0.04
Social Class \times Task Condition	3.61***	<.001	0.15
<i>Individual</i> Task Condition: middle-class vs. working-class	4.17***	<.001	0.17
<i>Together</i> Task Condition: middle-class vs. working-class	3.05**	.001	0.13
Working-class: <i>Individual</i> vs. <i>Together</i> Task Condition	3.88***	<.001	0.16
Middle-class: <i>Individual</i> vs. <i>Together</i> Task Condition	3.46***	<.001	0.14

Note: + $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

Across three studies, we obtained evidence consistent with our hypotheses, but some of the simple effects did not reach statistical significance. However, by conducting an internal meta-analysis of Studies 2-3, we provided additional evidence of the robustness of our causal effects. Specifically, we found that people from working-class contexts perform less well than their middle-class counterparts when achievement is assessed according to the standard U.S. approach: as people *work individually*. When achievement is instead assessed as people *work together*, groups from working-class contexts can actually outperform middle-class groups. Furthermore, *working together* (vs. *individually*) also led individuals from working-class compared to middle-class contexts to feel a greater sense of fit.

However, the results of these three studies and the internal meta-analysis left open two important questions that we sought to address in Study 4. First, in Studies 2-3, participants were

asked to *work together* as a group to complete a task. The *working together* condition therefore included both the idea of being part of a group (i.e., instructions that informed participants they would be working with a partner on a problem-solving task) and the actual practice of working together (i.e., coordinating with a partner to complete the problem-solving task collectively). As a result, the design of these studies did not enable us to disentangle the effect of merely being part of a group from the effect of *working together* as a group on the task.

Second, the results of Studies 2-3 provided evidence that *working together* with someone from the same social class context could not fully account for the benefits of *working together* observed among people from working-class compared to middle-class contexts. Specifically, since both working- and middle-class participants *worked together* in social-class-matched pairs in these studies, the design of the experiments controlled for *working together* with someone from the same social class context across both social class groups. As a result, we can infer that the observed benefits of *working together* for working-class groups were above and beyond those that could purely be attributed to working with someone from the same social class context. However, because we held constant the social class composition of dyads in these studies, we were not able to directly test our theorizing that the benefits of *working together* are more likely to emerge when people from working-class contexts work with other people who experience a cultural match when *working together*.

Study 4—an archival study with data from a nationwide sample of college sports teams—allowed us to better answer both of these remaining questions. The data in Study 4 made this possible because the sports teams in the dataset varied along two key dimensions. First, the groups could be systematically categorized as ones that require *working together* vs. *working individually*. Second, in contrast to the experiments where social class composition of the groups

was held constant, the teams in Study 4 vary in terms of their social class composition. That is, these teams naturally vary in terms of the number of people from working- vs. middle-class contexts. As such, to answer the first question, we were able to disentangle the idea of being part of a group from the effect of *working together* because all respondents were part of a group (i.e., a sports team), but the groups differed systematically in whether they required people to *work together* (e.g., basketball) vs. *individually* (e.g., golf). By holding constant being part of a group, and examining variation in whether group members *work together* vs. *work individually*, these data made it possible to test whether it is the actual experience of *working together* (vs. simply being part of a group) that is associated with benefits for people from working-class contexts.

The data also enabled us to answer the second question. By looking at the interaction of whether people *worked together* vs. *individually* in teams, and the social class composition of the group, the data allowed us to test our theorizing that *working together* will be more likely to be associated with benefits for people from working-class contexts when they are working with other people who experience a cultural match when *working together* (i.e., people from working-class contexts). The group-level variation in social class composition of the teams also provided an additional opportunity to rule out that simply working with others from the same social class context can fully account for our effects.

Study 4: Archival Analysis of College Student-Athletes

In Study 4 we had two primary goals. First, we sought to answer the two remaining questions outlined above. Second, we sought to extend our prior findings to a new domain: sports teams. Specifically, we utilized survey data from a nationwide representative sample of U.S. collegiate student-athletes who participated in a survey about their athletic experiences. These sports data were particularly well-suited to test our hypotheses because all people were

part of a team, but the teams varied both in their social class composition and in whether they require people to *work individually* or *together*. For example, in the case of *working individually* teams (e.g., golf, swimming, or cross-country running), individual athletes act on their own to play the sport effectively. On the other hand, in the case of *working together* teams (e.g., basketball, soccer, and football), athletes must coordinate with others to play the sport effectively. Importantly, in this study, we focused on athletes' sense of fit with the team, rather than their performance, because we did not have access to performance variables in this dataset. However, our theory would predict that we would observe similar effects for performance.

Method

Participants. We obtained access to the 2005-2006 Growth, Opportunity, Aspirations and Learning of Students in College (GOALS) survey, the most recent survey data available. The GOALS survey assessed a variety of topics related to the student-athlete experience, including attitudinal measures about their college sports experiences. We had access to survey responses regarding their experience participating in the sport, as well as key individual and sport-level demographic variables (e.g., gender, racial-ethnic minority status, year in school, sport, NCAA Division, etc.). However, we did not have access to group-level performance. This survey included data from 19,786 NCAA student-athletes. Of these participants, 17,317 provided the information needed to determine their social class background (i.e., parental educational attainment). Of these participants, 17,008 provided responses to our key dependent measure, sense of fit. Using parental educational attainment as a proxy for social class, we categorized 38% of these students as from working-class contexts (i.e., neither parent had attained a 4 year degree) and 62% from middle-class contexts (i.e., at least one parent had attained a 4 year

degree)¹⁴. Nearly half of the sample (43%) identified as female, and students also varied in their year in school (32% first years, 26% sophomores, 25% juniors, and 16% seniors). We also had access to a binary White/non-White variable (24% non-White). A post-hoc sensitivity analysis indicated that the remaining sample size ($N = 17,008$) provided us with 99% power to detect a small effect of $d = 0.10$.

Procedure. The sampling plan for the GOALS study was designed so that a representative sample of the NCAA member institutions that sponsor a given sport would be asked to survey their student-athletes in that sport. Of the 1,026 member institutions that were asked to participate in the survey, responses were collected from 620 institutions (60% response rate). More information on the specific sampling plan can be found on the study's homepage at: <http://www.icpsr.umich.edu/icpsrweb/NCAA/studies/35031>.

Measures. See supplemental materials for full list of items to which we had access.

Team type. Participants indicated which sport they were currently playing. We coded sports using a binary variable that specified whether the athletes had to *work individually* vs. *together* in order to succeed at the sport. Specifically, sports were coded as *working individually* if players' performance and sport outcomes were based solely on individuals' performance. In contrast, sports were coded as *working together* if players' performance and sport outcomes were based on their efforts to coordinate and perform collectively with other players. For example, cross-country running was coded as *working individually* because each cross-country runner completes a race individually and then team scores are determined based on the sum of individual performances. Conversely, basketball was coded as *working together* because the players must pass the ball back and forth to score points and have a chance to win the game. Of

¹⁴ See supplemental material for analyses using Pell grant recipient status as an alternate proxy of social. These results follow the same patterns as results using parental educational attainment, but they did not reach significance.

the 15 different sports included in the data, 11 (74%) were coded as *working together*; see Table 4.

Table 4. *Breakdown of sports by team type in Study 4.*

Team Type	Sports
<i>Working Individually</i>	Cross-Country Running, Gymnastics, Golf, Swimming, Tennis, Track & Field, Wrestling
<i>Working Together</i>	Basketball, Baseball, Field Hockey, Football, Ice Hockey, Lacrosse, Soccer, Softball, Volleyball

Social class composition of team. We created a Level 2 variable that represented the percentage of students from working-class contexts on a given team ($M = 40\%$ students from working-class contexts, $SD = 20\%$, range = 0-100% students from working-class contexts). Specifically, 28% of teams had less than 20% students from working-class contexts; 30% of teams had 20-40% students from working-class contexts; 26% of teams had 41-60% students from working-class contexts; 9% had 61-80% students from working-class contexts; and 7% had 81-100% students from working-class contexts.

Sense of fit with team. We identified eight items that could serve as a proxy for students' sense of fit with their team ($\alpha = .90$). Following prior research (Stephens, Fryberg, et al., 2012a), we included items if they captured students' sense of being included, feeling comfortable, and fitting in with their team. Items were rated on a scale from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). Two example items were: "My coaches have created an inclusive environment for all members of the team." and "I always feel comfortable expressing my social and political views on this team." (see supplemental materials for full list of items).

Analyses

Given the nested structure of our data (i.e., athletes nested in teams), we conducted multilevel analyses using the MIXED command in SPSS. Study hypotheses were tested with a

two-level model (see Table 5 for intraclass correlation). All analyses were conducted using maximum likelihood estimation. Individuals (Level 1) were nested within teams (Level 2). All continuous Level 2 predictors were grand-mean centered. Specifically, we tested the effect of team type (*working individually* vs. *working together*), individual social class (from working-class vs. middle-class context), and social class composition of the team (proportion of students from working-class contexts) on individual sense of fit. In our model, we included all main effects, two-way interactions, and the three-way interaction between team type, individual social class, and social class composition of the team. These analyses helped to determine whether being on teams where people *work together* (vs. *individually*) was more likely to be associated with a greater sense of fit for individuals from working-class contexts when they were on a team with other people who experience a cultural match when *working together* (i.e., other people from working-class contexts).

Table 5. *Between- and within-group variance components and intraclass correlations in Study 4.*

Predicted Variable	Variance component		Intraclass correlation
	Between	Within	
Sense of Fit with Team	.10	.71	.13

Results

In support of our theorizing, we obtained a significant positive three-way interaction between team type, individual social class, and social class composition of the team on individual sense of fit, $b = 0.42$, $t(17,006) = 2.22$, $p = .026$ (see Table 6). To decompose this interaction, we looked at the two-way interaction between team type and individual social class on teams with low and high proportions of students from working-class contexts (i.e., $\pm 1 SD$). On teams with a high proportion of students from working-class contexts ($+1 SD$, i.e., 60%), there was a significant positive two-way interaction between team type and individual social

class, $b = 0.16$, $t(17,006) = 3.26$, $p = .001$. This suggests that, when there is a high proportion of students from working-class contexts on the team, students from working- compared to middle-class contexts feel a greater sense of fit on teams where people *work together* (vs. *individually*). In contrast, on teams with a low proportion of students from working-class contexts (-1 *SD*, i.e., 20%), the two-way interaction between team type and individual social class was not significant, $b = -0.01$, $t(17,006) = -0.15$, $p = .88$. This suggests that, when there is a low proportion of students from working-class contexts on the team, students from working-class contexts do not differ from students from middle-class contexts in their sense of fit on teams where people *work together* (vs. *individually*)¹⁵.

Table 6. *Multilevel regression analysis predicting sense of fit with team in Study 4.*

Sense of Fit with Team					
Fixed Effect	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>p</i>	95% CI
Social Class	-0.01	0.03	-0.35	.73	[-0.07, 0.05]
Sport Type	-0.16***	0.03	-5.15	<.001	[-0.22, -0.10]
Social Class × Sport Type	0.08*	0.04	2.21	.03	[0.01, 0.15]
Social Class Composition	0.33**	0.12	2.87	.001	[0.11, 0.56]
Sport Type × Social Class Composition	-0.39**	0.14	-2.78	.01	[-0.66, -0.12]
Social Class × Social Class Composition	-0.36*	0.16	-2.19	.03	[-0.68, -0.04]
Social Class × Sport Type × Social Class Composition	0.42*	0.19	2.22	.03	[0.05, 0.79]
Level 1 $n = 17,008$					
Level 2 $n = 1,403$					
Note: * $p < .05$, ** $p < .01$, *** $p < .001$.					
Sense of Fit with Team					
Random Effect	<i>B</i>	<i>SE B</i>	Wald <i>Z</i>	<i>p</i>	95% CI
Between Groups	0.10	0.01	14.70	<.001	[0.09, 0.12]
Residual	0.71	0.01	87.66	<.001	[0.69, 0.73]

Discussion

¹⁵Though we do not include covariates in the results presented here, results are equivalent when controlling for gender, race, and racial composition of the team (see supplemental material).

In Study 4 we extended our prior findings to a nationally representative sample of college student-athletes. Study 4 also helped us answer two remaining questions that were not addressed by Studies 1-3 and the internal meta-analysis. First, our results show that *working together* (vs. *individually*) is only associated with a greater sense of fit for students from working-class compared to middle-class contexts when they are on teams with a high proportion of students from working-class contexts. In contrast, *working together* (vs. *individually*) is not associated with a greater sense of fit for students from working-class compared to middle-class contexts when they are on teams with a low proportion of students from working-class contexts. These results are consistent with our theorizing that the benefits of working together are more likely to emerge when people from working-class contexts are working with other people who experience a cultural match when *working together* (i.e., other people from working-class contexts).

Second, stated differently, we find that having a high proportion of students from working-class contexts on a team is only associated with increased fit for students from working-class contexts when they are on teams that *work together*, but not those that *work individually*. In other words, the increased fit associated with a high proportion of working-class students on a team does not occur across both team types. This result is consistent with our theorizing that the benefits we observe for people from working-class contexts are specific to the actual experience of *working together*, rather than simply being part of a group.

Finally, we find that having a high proportion of students from middle-class contexts on a team (i.e., a low proportion of students from working-class contexts) is not associated with increased fit for students from middle-class contexts. This result helps to further rule out the possibility that the benefits of working together could purely be attributed to working with others from the same social class context.

General Discussion

Challenging a deficit model account of the social class achievement gap, for the first time, this research shows that the way achievement is assessed contributes to social class differences in performance. Across the studies presented here, we find support for Hypotheses 1a-b: while individuals from working-class contexts perform less well than individuals from middle-class contexts when they are working individually, groups from working-class contexts can actually outperform groups from middle-class contexts when they work together. Mirroring the performance effects, in support of Hypotheses 2a-b, we also find that individuals from working-class contexts feel a greater sense of fit than individuals from middle-class contexts when working together (vs. individually). Exploratory mediation analyses indicated that these differences in fit did not explain the social class differences in performance.

Finally, we find that working together is associated with a greater sense of fit for people from working-class contexts only when they are working with a high proportion of people from working-class contexts. This result is consistent with our theorizing that working together is more likely to afford benefits to people from working-class contexts when they are working with others who also experience a cultural match when working together. Taken together, these results suggest that assessing achievement in a way that is congruent with interdependent models of self can help to more fully realize the potential of people from working-class contexts.

Theoretical Contributions

The findings of our research have important theoretical implications that contribute to cultural mismatch theory, research on the social class achievement gap, the literature on social class differences, and the role of diversity in group performance. First, we provide evidence of a novel experience that can foster a cultural mismatch vs. match: how achievement is assessed.

Previous research supporting cultural mismatch theory has demonstrated evidence of the experience of a cultural mismatch or match via how the college culture is framed. Here we go beyond simply changing the framing of the culture to show how a cultural mismatch or a match can be created by changing whether people complete measures of achievement by working individually or working together.

Second, this research can help us to better understand the cultural sources of the social class achievement gap, as well as identify potential interventions to address it. Rather than starting from a deficit model that assumes people from working-class contexts are inherently lacking or deficient in certain skills (Bradley & Corwyn, 2002; DeGarmo, Forgatch, & Martinez, 1999; Gottfredson, 2004), we instead provide evidence that the standard way achievement is assessed in the U.S. may contribute to these perceived “deficiencies.” Ironically, though educators and policymakers often advocate for standardized measures as a route to being “objective” (i.e., through individualized standardized testing; Alvarez, 2001), the current research suggests that doing so may systematically disadvantage particular groups (e.g., people from working-class contexts; Fryberg, Covarrubias et al., 2013a). If instead we assess achievement in a way that includes the interdependent models of self common in working-class contexts, we find that people from working-class contexts can actually outperform their advantaged middle-class counterparts. These results suggest the importance of thinking carefully about how environments can be structured in a way that will more effectively harness the strengths of people from different backgrounds.

The current research also contributes to the literature on social class differences in cultural norms, psychological tendencies, and behavior (e.g., Bjornsdottir & Rule, 2017; Brienza & Grossmann, 2017; Dietze & Knowles 2016; Kraus & Keltner, 2009; Stephens et al., 2009;

Varnum, Blais, Hampton, & Brewer, 2015). Previous work shows that people from working-class contexts are more socially attuned to others (Bjornsdottir & Rule, 2017; Dietze & Knowles 2016; Kraus & Keltner, 2009), better integrate different perspectives in interpersonal situations (Brienza & Grossmann, 2017), and display greater compassion (Stellar, Manzo, Kraus, & Keltner, 2012). This previous research suggests that people from working-class contexts may be more skilled than people from middle-class contexts at working together, but the studies presented here are the first to provide direct evidence that this is the case.

Finally, we contribute to the literature on the role of diversity in group and team performance. Previous research has focused on investigating the effects of racial/ethnic (e.g., Paletz, Peng, Erez, & Maslach, 2004), gender (e.g., Joshi, 2014), and skills (e.g., Van der Vegt & Bunderson, 2005) composition of groups and teams and how this is related to their performance. Our research suggests that the social class composition of groups and teams is another key form of diversity that should be considered when investigating the effect of diversity on group and team performance. Moreover, our studies point to the potential benefits of including multiple people from working-class contexts in a given group to harness their abilities to work together.

Assessing Achievements of People Working Together as a Route to Reducing Inequality

The current findings have important implications for interventions aimed at reducing social class achievement gaps. Our results suggest that efforts to reduce these gaps should not simply focus on eliminating deficits, but also focus on structuring assessments of achievement to include diverse cultural models of self. Instead of relying solely on assessments of people as they work individually, as is the standard in the U.S., institutions might also include assessments of groups of people as they work together. To do so, institutions of higher education and professional workplaces could more seriously consider the value of people's abilities to work

together (e.g., in performance evaluations or promotion decisions). For example, organizations could incorporate the ability to work well with others as a portion of people's individual performance evaluations. The opportunity to work together may enable certain underrepresented groups, such as employees from working-class backgrounds, to feel a greater sense of fit and have a greater chance to reach their full potential.

Our results also indicate that the benefits of working together for people from working-class contexts are most likely to emerge when they are working with other people from working-class contexts (e.g., those who we expect to experience a cultural match when working together). This finding has important practical implications. Specifically, this finding suggests that simply changing how organizations assess achievement (e.g., including working together) is not a panacea. They also should consider the composition of the group and whether all individuals are likely to experience a cultural match when working together. Institutions might also consider training people from diverse social class contexts (i.e., people from middle-class contexts who have more independent models of self) to better understand and appreciate the importance of coordinating with others to achieve a collective goal or outcome. Doing so might help foster a greater sense of cultural match when they work together.

Limitations and Future Directions

For the first time, this research demonstrates that groups from working-class contexts can outperform groups from middle-class contexts. However, more research is needed to better understand the processes through which working together benefits people from working-class contexts. First, we did not find evidence that sense of fit is the process that helps to explain social class differences in performance. We speculate that this may have been due to the fact that participants first performed the task, and then completed a survey about their experience with the

task. In other words, we measured the ostensible mediator (i.e., sense of fit) after participants had already completed the performance measure. As such, it was likely that people's performance on the task influenced their retrospective recall of their sense of fit with the task, rather than the reverse. In the current research, we did not want to interrupt the actual performance of the task to have people report on their experience during the task, because we were concerned that this would have affected their performance. However, future studies could measure fit before participants complete the performance measure to determine whether the experience of fit can help to explain social class differences in performance.

Further research is also needed to better understand the types of behaviors in which people are engaging when they are working together. In Studies 2-3, we assumed people were working together according to our definition because the task itself required them to do so. Specifically, in Studies 2-3, the problem-solving task required that participants coordinate with each other in order to identify a collective solution. However, we do not actually observe their coordination behavior when they are working in groups (e.g., how often are they are communicating, integrating ideas, and responding to one another). Prior work suggests that people from working-class contexts are more socially responsive (Bjornsdottir & Rule, 2017), more attentive to others (Dietze & Knowles 2016; Kraus & Keltner, 2009), and better at taking others' perspectives (Brienza & Grossmann, 2017), compared to people from middle-class contexts. We therefore expect that the working-class groups were more frequently engaging in these behaviors while working together compared to middle-class groups. However, future research could observe and identify these specific processes more directly to determine whether these behaviors can help to explain why groups from working-class contexts outperform groups from middle-class contexts when working together.

Future research is also needed to further investigate the boundary conditions of our effects. First, while we theorize and provide evidence consistent with the idea that something specific to actually working together promotes the performance of groups from working-class contexts, only Study 4 allows us to disentangle the effect of actually working together from the effect of being exposed to the idea of working together. Specifically, in the archival analysis of college student-athletes, all participants were part of sports teams (i.e., all of the athletes were exposed to the idea of being part of a group), but we found that only being in groups where people work together is associated with benefits for fit for people from working-class contexts, as compared to groups where people work individually. Future research could employ experimental methods to causally examine the effect of simply being part of a group vs. actually working together. It could also extend the effects to different types of tasks that require people to work together.

Finally, in Study 4 we find working together is more likely to afford benefits to people from working-class contexts when they are working with other people from working-class contexts. We theorize that this is because people from working-class contexts have more interdependent models of self and, as such, are more likely to experience a cultural match when working together compared to people from middle-class contexts. Simply being in groups with people from the same social class context cannot fully account for our results. The results of Studies 2-3 provide evidence consistent with this theorizing: both working- and middle-class participants worked together in social-class-matched dyads, so we controlled for working together with someone from the same social class context across both social class groups. Furthermore, in Study 4, working-class students only benefited from being in groups with other working-class students when they were on teams where people work together – not on teams

where people work individually. Future research should more explicitly test whether our results would hold if people from middle-class contexts were trained to better coordinate with other group members and therefore to experience a cultural match when working together.

Conclusion

Research on social class inequality in the U.S. often draws upon a deficit model, and identifies people from working-class contexts as having fewer skills than their middle-class counterparts. However, this research tends to assess people as they work individually, which better matches the independent models of self that are prevalent in middle-class U.S. contexts. In contrast, in this research, we show that how we assess achievement is not class-neutral.

Assessing the achievement of groups as they work together better matches with the interdependent models of self of people from working-class contexts. When achievement is assessed as people work together, we find that groups from working-class contexts actually outperform groups of their advantaged middle-class counterparts. Our findings suggest that assessing achievement as groups of people work together may be one effective way to better realize the full potential of people from working-class contexts.

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