SOCIAL BELONGING

Where and with whom does a brief social-belonging intervention promote progress in college?

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A promising way to mitigate inequality is by addressing students' worries about belonging. But where and with whom is this social-belonging intervention effective? Here we report a team-science randomized controlled experiment with 26,911 students at 22 diverse institutions. Results showed that the social-belonging intervention, administered online before college (in under 30 minutes), increased the rate at which students completed the first year as full-time students, especially among students in groups that had historically progressed at lower rates. The college context also mattered: The intervention was effective only when students' groups were afforded opportunities to belong. This study develops methods for understanding how student identities and contexts interact with interventions. It also shows that a low-cost, scalable intervention generalizes its effects to 749 4-year institutions in the United States.

Upward mobility and economic growth depend substantially on postsecondary attainment (*1*, *2*). Yet the likelihood of earning a college degree is highly unequal across racial-ethnic and socioeconomic groups, even among students with similar preparation (*3*, *4*). A challenge to stemming intergroup inequality is that programs to promote college persistence have heterogeneous effects—they work differently for different people in different contexts. A critical goal is to systematically explain and anticipate this heterogeneity (*5*, *6*) so that programs can be designed to respond to the broad diversity of higher-education students and institutions (*7*).

Here we report the findings of a large team-science partnership involving a double-blind, randomized controlled trial conducted with two cohorts of students at 22 institutions (N = 26,911 students). This partnership between experimental psychologists and university administrators, called the College Transition Collaborative (CTC), was designed specifically to understand variability across contexts in the effects of a promising and scalable approach to reducing postsecondary inequality. We focus on a core outcome on the path to graduation: the likelihood that students complete their first year of college enrolled full-time. Participating institutions were highly diverse and selected for their potential to advance an understanding of heterogeneity. We applied advanced analytic methods to this dataset, such as preregistration of complex analyses, and a conservative, Bayesian multilevel machine-learning analysis method. Ultimately, the CTC trial makes two primary contributions. First, it provides a systematic examination of how different groups of students in different postsecondary contexts do or do not benefit from a social-psychological intervention. In doing so it reveals insights into how psychological and contextual factors come together to affect intergroup inequality and how this inequality can be remedied. Second, it presents a framework for understanding how student identities interact with contexts and, thus, the principled evaluation of heterogeneous intervention effects.

The intervention examined by the CTC was the social-belonging intervention (*8*). This is a brief (10 to 30 min) reading-and-writing act that can be self-administered by college stud over the internet. It features three elements: (i) results of a survey of older students, showing that everyday worries about belonging—such as feeling homesick, struggling academically, or having difficulty interacting with professors—are normal in the transition to college and can lessen with time (*9*); (ii) carefully curated stories from older students describing these worries and how they improved for them; and (iii) an opportunity to reflect on these stories in writing to help future students as they come to college, including how concerns about belonging are normal and typically improve with time ("saying-is-believing" exercises).

The social-belonging intervention has been tested in more than a dozen rigorous randomized controlled trials. Benefits are typically observed with regard to core academic outcomes for racial-ethnic minority and first-generation college students (*8*). In one study published in *Science*, the intervention delivered in the first year at a selective, predominantly white university raised the grade point average (GPA) of Black students relative to multiple randomized control groups, reducing by half the racialized achievement gap over the next 3 years (*10*). Further, a long-term follow-up revealed substantial gains in participants' career success and life satisfaction 7 to 11 years later. These gains were mediated by greater development of mentor relationships in college, consistent with the theory that addressing belonging concerns can unlock relationships of enduring value (*11*). Other trials have found increased progress (e.g., first-year full-time completion rates) (*12*), including among students attending broad-access institutions (*13*). In male-dominated STEM (science, technology, engineering, and mathematics) fields, the intervention has improved experiences and raised grades among women (*14*, *15*). Some rigorous trials have not shown significant effects, however, demonstrating heterogeneity (*16*).

One reason the social-belonging intervention can have beneficial effects is because higher-education outcomes are subject to psychological threats rooted in group identities. These threats evoke concerns about belonging (*17*, *18*). These concerns can become acute when students are underrepresented on campus; when their group is struggling or faces stereotypes

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that allege that it is less able or less deserving of educational opportunities than others; when they experience a campus culture that does not match their cultural values or curricula that do not value their experiences; or when they experience racism, among other factors (*19*–*23*). In turn, belonging concerns predict less persistence in college above and beyond other factors (*12*, *24*). In part, this is because these concerns function as a lens through which students make sense of adversities in college. When students are uncertain of their belonging, even common challenges experienced by students in all social groups (e.g., feeling homesick, academic struggles) can appear as evidence that people like them do not belong in college in general (*19*). However, when an intervention represents everyday challenges as normal and as improving over time, students are better able to sustain a sense of belonging on campus in the face of everyday adversities (*10*, *13*, *15*, *19*). The social-belonging intervention uses diverse stories from diverse students to convey this message as a common truth, with variation [see supplementary materials (SM)]. In representing worries about belonging as initially normal in the transition to college and as improving with time, the intervention does not deny that students can also have different experiences along group lines. In at least some circumstances, this can free students to build critical relationships, improving academic outcomes and life success long into the future (*11*, *12*, *15*).

Sociological and psychological theories do not lead to an expectation that members of a given identity group—for example, Latina students—should experience the same concerns about belonging in all contexts, nor that they will have the same opportunities to belong. A core theoretical tenet is that group identities do not have inherent meaning but rather meaning that arises in context (*25*). Experimental studies have underappreciated this fact, however, treating racial, ethnic, and socioeconomic groups as invariant in statistical analyses (*26*). For instance, even as Steele introduced stereotype threat as a "situational predicament" (*18*), both laboratory and field-experimental research on identity threat (e.g., social-belonging, values-affirmation, and difference-education interventions) have treated specific racial and gender groups as canonical and then used them as a static grouping variable in analyses, with rare exceptions (*14*, *15*, *27*).

This practice obscures variation within groups across contexts. One source of this variation involves sorting mechanisms. For instance, scholars emphasize the differences in racial socialization and, therefore, identity threat that can emerge between Black Americans who are descended from people who were enslaved in the US, relative to Black Americans who are the children of more recent immigrants (*28*). Postsecondary admissions and recruitment practices, in turn, may be influenced by this variation (*4*), altering the meaning of racial-ethnic identities in college contexts.

Institutions also serve different students differently, including in ways that shape the opportunities students have to belong (*23*). Such belonging affordances can vary as a function of classroom practices (*22*, *29*), institutional messaging (*30*), and campus cultures (*20*). One belonging affordance is the opportunity to participate in cultural and affinity groups and to develop "pride" for one's racial or ethnic group (*21*). Yet opportunities to do so, in courses, student groups, and residential communities, vary. Another belonging affordance is the opportunity for high-quality intergroup interactions, such as to develop friendships with majority-group members on campus in residences, courses, and elsewhere, which can support belonging and reduce identity threat (*22*, *31*–*33*). These, too, vary across contexts. Among other qualities, schools vary in the degree of social bias present. If a student of color seeks out mentorship, for instance, will a professor respond enthusiastically or not (*34*)? In general, the complexity of identities-in-context raises the need for both analytic methods and theoretical frameworks that can detect and understand differences in both identity threats and belonging affordances across contexts.

One contribution of the CTC trial is to overcome the limitations of the dominant static-identity approach by introducing the concept of "local-identity groups." Given our focus on social-identity threat, here we define local-identity groups as students of a given race-ethnicity, with a given first-generation status, in a given college, in a given cohort. Because some students within each of the 374 local-identity groups in our sample were randomly assigned to the treatment and some to the control, our models estimate 374 different treatment effects; we can then examine how these effects vary by qualities of these groups (table S6). This approach offers far greater statistical power and far more theoretical nuance than comparing a few canonical groups (e.g., first-generation versus continuing-generation students). It is also preferable to the common practice of clustering groups broadly defined as "disadvantaged" (e.g., underrepresented minority and first-generation students) (*12*, *13*, *22*, *29*), which can imply that disadvantage is inherent to these groups while not specifying the factors that cause a group to experience disadvantage within a specific context. Our institutional sampling plan was also designed to support well-powered, replicable, and generalizable inferences about how different local-identity groups respond to the intervention, including by partnering with highly diverse institutions (e.g., admissions rates ranged from 6 to 90%; table S4).

We used two factors to characterize variation in local-identity groups and examine contextual heterogeneity in treatment effects. At a conceptual level, these are (i) the degree to which students experience vulnerability to worries about belonging that could undermine persistence and (ii) the opportunities students have to come to belong. We expected the largest effects in contexts that prompt identity-threatening questions ("Do 'people like me' belong here?") but that make belonging possible, or afford belonging, for students in a given local-identity group. Only in these more supportive contexts can the positive answer the treatment offers to questions about belonging ("People like me can come to belong here") be "locally true" and, thus, legitimate, sustained, and useful in guiding students' interpretation of everyday experiences and continued engagement on campus (Fig. 1).

Our theorizing grew out of the emerging science on treatment heterogeneity. Past research found that growth-mindset interventions produce greater academic gains among academically struggling students (those vulnerable to asking "Am I dumb?") in school environments that afford a growth mindset (opportunity), such as schools with positive peer norms around challenge-seeking (*35*) and classrooms where teachers endorse a growth mindset (*36*).

In this study, we examined vulnerability to worries about belonging that could undermine academic progress at the group level. To do so, we assessed the local-identity group's historic level of attainment along the primary outcome: first-year full-time completion rates, in preexperimental cohorts (*27*) (table S7). This approach reflects several streams of reasoning: seeing fewer members of one's group persist could provide a basis for belonging concerns; this circumstance could reflect the presence of other factors in the college environment that undermine belonging and persistence; and, finally, students in more poorly performing groups have greater room for improvement (see SM).

To operationalize the opportunity to belong ("belonging affordances"), we assessed survey responses to measures of belonging in the spring term in the control condition only. Absent treatment, to what extent do students in each local-identity group experience a feeling of belonging toward the end of their first year? In prioritizing students' own experiences, we obtain a direct measure of the extent to which each local-identity group had an opportunity to come to belong at their college.

Our theory brings these factors together. It predicts greater treatment effects for local-identity groups that have historically performed

A

Term	Conceptual Definition	Operationalization
Local-Identity Group	Students with a shared social identity along dimensions of relevance.	Students of a given race-ethnicity, with a given first-generation status, in a given college, in a given cohort.
Vulnerability to Worries About Belonging That Could Undermine Persistence	Does the post-secondary context evoke the question, "Do people 'like me' belong here?" in ways that can undermine persistence?	Students in local-identity groups with lower rates of first-year full-time completion in prior cohorts.
Belonging Affordances	Is the hopeful message about belonging provided by the intervention legitimate in the post-secondary context and one a student can maintain and act on to succeed?	Students in local-identity groups report, absent treatment, at least a moderate level of belonging toward the end of the first year of college.

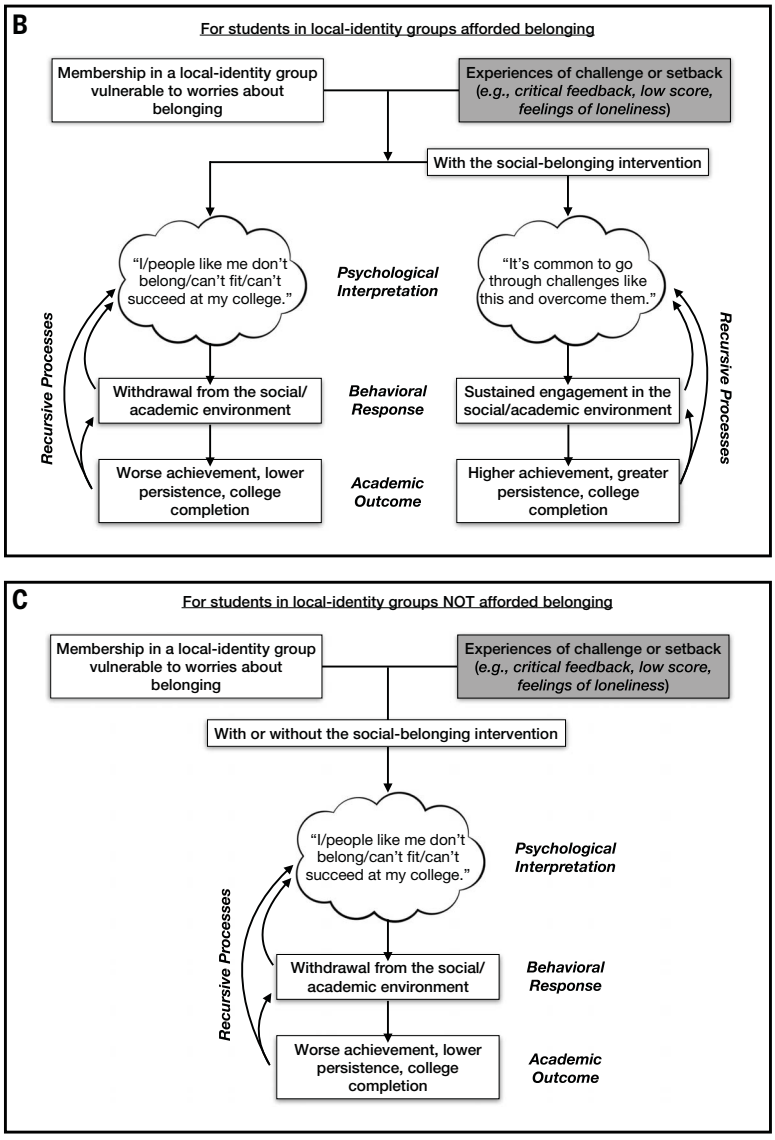

Fig. 1. Key concepts and theory of change. (**A**) Key concepts. (**B**) Theory of change for students in local-identity groups afforded belonging [adapted from figure 1 in (*12*)]. (**C**) Theory of change for students in local-identity groups not afforded belonging. Past research provides primary evidence for the theory of change depicted in (B) (*8*, *10*–*15*, *19*). The present research introduces the concept of local-identity groups and the moderating role of belonging affordances, comparing (B) and (C).

poorly yet realize sufficient levels of belonging in the spring term. If so, the intervention would help groups at risk of poor performance take advantage of supportive environments. Competing hypotheses are also possible. For instance, could the belonging intervention compensate for a hostile climate? This is a legitimate hypothesis. Yet the intervention does not create institutional structures that support belonging; all it does is offer students a positive way to make sense of common challenges to belonging that arise in college. It helps students navigate college to develop their belonging, but college still has to be navigable. From this theoretical perspective, only in contexts that make it possible for a group to overcome belonging worries will students be able to use this idea effectively (see SM).

In a study such as this, what kind of effects would be meaningful? Typical benchmarks for understanding effect sizes in laboratory research are inappropriate in field settings focused on changing educational outcomes such as college achievement (*37*). Instead, it is important to calibrate against other potential reforms. Past research finds percentage-point gains of 0.3 to 3.4 points in the probability of college attendance and college persistence from such investments as improving teacher quality in secondary school and increased financial aid (see SM). Relative to the cost of changing instruction or financing scholarships, the investments needed to implement the social-belonging intervention are minimal, particularly for a brief online form completed before matriculation (it is freely available online: https://www.perts.net/orientation/cb). Indeed, the present implementation is especially brief: In the key writing task, participating students wrote for just 7 min 36 s (median), which is considerably shorter than prior smaller trials (tables S1 to S3). If an experience this brief can produce even a 1 to 2 percentage-point gain in the rate at which students complete their first year of college enrolled full-time, it would be remarkable from both a theoretical and a practical perspective.

Results

A total of 102,792 students were invited to participate. Primary analyses were conducted with the intent-to-treat sample, 26,911 students across 22 postsecondary institutions. A 23rd institution was excluded, as it was not in the United States and used a different design (see Table 1 and tables S4 and S5 for student and institutional sample characteristics; see table S9 for baseline equivalence). The trial also included a third condition, which adapted belonging materials for each campus. That condition is not reported here, given our focus on contextual rather than material heterogeneity. For the CONSORT diagram, see Fig. 2.

Preliminary analyses

Manipulation check

A manipulation check was included to ensure that the intervention achieved its intended initial impact, which it did. The belonging intervention led students to anticipate greater growth in belonging over time compared with the control group $b = 0.289$ [95% confidence interval (CI): 0.261, 0.318], SE = 0.014, $t = 20.13$,

Table 1. Intent-to-treat sample by first-generation status, race-ethnicity, advantage status, and gender. "Advantaged" students are white and Asian continuing-generation students. "Disadvantaged" students are all other race-ethnicity × first-generation status combinations.

Classification	First-generation status	Race-ethnicity		*N*	Percent of total sample
By first-generation status and race-ethnicity	First generation	Of Hispanic/Latinx origin (of any race)		3,934	15%
		Not of Hispanic/Latinx origin	Black/African/African American	1,121	4%
			White/European American	3,001	11%
			Asian/Asian American	640	2%
			Native American/Native Hawaiian/Other Pacific Islander	54	0.2%
			Other	737	3%
			Total first generation	**9,487**	**35%**
	Continuing generation	Of Hispanic/Latinx origin (of any race)		1,487	6%
		Not of Hispanic/Latinx origin	Black/African/African American	1,166	4%
			White/European American	10,832	40%
			Asian/Asian American	1,925	7%
			Native American/Native Hawaiian/Other Pacific Islander	73	0.27%
			Other	1,941	7%
			Total continuing generation	**17,424**	**65%**
By canonical "advantage" status		Advantaged		12,757	47%
		Disadvantaged		14,154	53%
By gender		Male		10,754	40%
		Female		15,743	58.5%
		I prefer another term/transgender		410	1.5%
		Not provided		4	0.01%
		Grand total		**26,911**	**100%**

$P < 0.001$, as expected. Although there was some heterogeneity in this effect across local-identity groups (see SM), it was not explained by the moderators of interest: the treatment effect did not interact with local-identity groups' historic achievement level or belonging affordance, Ps > 0.187. Thus, the primary results here are not attributable to differences in how persuasive the intervention was for a given local-identity group.

Heterogeneity of the treatment effect on first-year full-time completion rates

There was meaningful heterogeneity in treatment effects on the primary outcome, first-year full-time completion rates. The standard deviation of this effect across local-identity groups was 2.4 percentage points, $b = 0.024$ [0.014, 0.042], SE = 0.007, $t = 3.60$, $P < 0.001$, $Q = 215.87$, df = 49, $P < 0.001$. Thus, we proceeded to test our primary multilevel interaction-effect hypothesis.

Independence of moderators

The local-identity group belonging affordance and historic achievement level reflect separate factors [i.e., they were not significantly correlated at the local-identity group level (see SM)]. Thus, the historic circumstance that, we theorize, can lead to vulnerability to worries about belonging was largely independent of the opportunity students had to belong in their college in their cohort.

Primary analyses

Three-way interaction

The preregistered linear mixed-effects model showed that the effect of the belonging intervention on first-year full-time enrollment rates depended on the local-identity group's historic achievement and belonging affordances, three-way interaction, $b = 0.013$ [0.004, 0.023], SE = 0.005, $t = 2.81$, $P = 0.005$ (see model details in the SM).

Bayesian multilevel analyses

To interpret and visualize the three-way interaction and to guide follow-up hypothesis tests, we estimated a flexible Bayesian multilevel model using machine learning tools called Bayesian causal forest (BCF). An advantage of BCF is that we can make decisions about subgroups and functional forms that are not possible in a conventional regression by using an algorithmic decision rule to examine the posterior distribution of treatment effects across nonparametric effects of moderators (*38*). This helps avoid the undue influence of researcher degrees of freedom (see Fig. 2 caption and SM).

Using this hands-off, data-driven approach, we found that, among local-identity groups low in afforded belonging [<−0.5 SD, number of groups (k) = 135, number of students (n) = 4078], there was no discernible treatment effect overall and no moderation by group historic achievement level. By contrast, among local-identity groups medium to high in afforded belonging (k = 239, n = 22,833), signifying sufficient belonging affordances, we found a linear moderation effect by group historic achievement, with larger effects for lower-achieving local-identity groups. The BCF model's results are plotted in Fig. 3.

Two-way interactions and simple effects

Guided by the BCF model's decision rules for subgroups, we conducted follow-up hypothesis tests of our preregistered linear mixed-effects model among groups that were medium to high in afforded belonging versus low in afforded belonging. Within the medium-to-high belonging category (85% of students and 64% of local-identity groups), we found an overall conditional average treatment effect (CATE) of 1.1 percentage points, $b = 0.011$ [0.0005, 0.002], SE = 0.005, $t = 2.06$, $P = 0.040$, that was qualified by a condition × historic achievement interaction, $b = 0.013$ [0.002, 0.024], SE = 0.006, $t = 2.34$, $P = 0.020$.

We decomposed this two-way interaction into subgroup effects (tables S10 and S11). Among students whose local-identity groups had lower historic achievement (k = 61, n = 5212), in which just 49% (SD = 8%) of students had historically maintained full-time enrollment through the first year, we observed the largest CATE, 2.0 percentage points, b = 0.020 [0.003, 0.038], SE = 0.009, t = 2.27, P = 0.023. Among students whose local-identity groups had medium historic achievement (k = 120, n = 12,460; 77% historic full-time rates, SD = 10%), the CATE was 1.3 percentage points, b = 0.013 [0.002, 0.024], SE = 0.006, t = 2.27, P = 0.023. Among students from groups with high historic achievement (k = 58, n = 5161; 96% full-time rates, SD = 2%), the CATE was essentially zero, b = −0.003, P = 0.681. Among students whose local-identity groups were not afforded opportunities for belonging, the simple effects of treatment at low, medium, and high levels of historic achievement were all nonsignificant, Ps > 0.112.

Robustness

Multiple tests confirmed the robustness of the primary results. First, similar results obtained using a static societal disadvantage classifier in lieu of historic achievement, despite some differences in two-way interactions (see SM). Notably, these analyses had a higher standard error for the three-way interaction term (disadvantaged status: SE = 0.010; historic group-level achievement SE = 0.005), consistent with our theory that treating social disadvantage as a static grouping variable masks contextual variability. Second, results were similar when including poststratification weights and when using treatment-on-treated analyses (table S10).

Generalizability

What do these effect sizes imply for the broader population of colleges? While the sample of schools is a convenience one, it was recruited to be diverse along multiple dimensions (e.g., geography, selectivity, size). Indeed, it reasonably generalizes to 749 4-year nonprofit degree-granting colleges and universities in the United States (Tipton b index = 0.887) (see SM for full specification of the generalizability sample). In 2015 and 2016, these 749 institutions welcomed an average of 1,019,790 first-time full-time–degree seeking undergraduates annually. When applying poststratification weights to force the composition of our sample to resemble the population of inference, the positive treatment effect among students in local-identity groups medium to high in belonging affordances (85% of our sample) was similar, 1.4 percentage points (as compared with 1.1 percentage points, reported above, for the unweighted sample; table S10). Thus, the results imply that if the full set of institutions

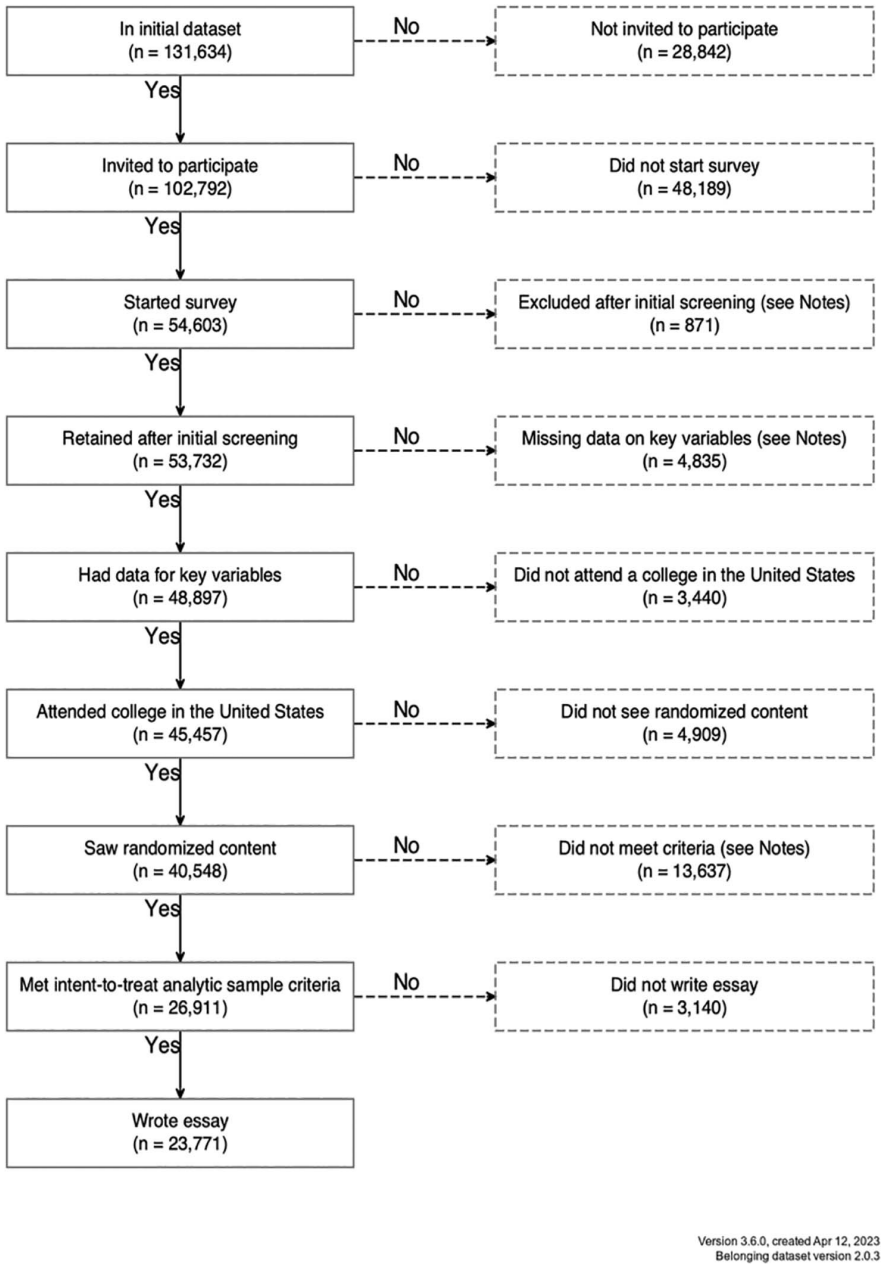

Fig. 2. CONSORT diagram. "In initial dataset" is the number of students who were either in the intervention roster, started the intervention (t1) survey, or had academic data provided by their college. "Invited to participate" is the number of students who were either in the intervention roster or started the intervention (t1) survey. "Started survey" is the number of students who started the intervention (t1) survey. "Retained after initial screening" is the number of first-time students who met all prescreening criteria. (Exclusion details: missing condition: 612; multiple conditions: 185; invitation issue: 74. Exclusions were processed sequentially as listed.) "Had data for key variables" is the number of students who had data for variables used in analytic models. (Exclusion details: missing cohort/college name: 1836; missing all academic outcome data: 167; missing race-ethnicity, first-generation status, or local-identity group variable: 2832. Exclusions were processed sequentially as listed.) "Attended college in the United States" is the number of students who attended a US college (one Canadian university participated in the study but used a different design and so will be reported separately). "Saw randomized content" is the number of students who proceeded through the survey far enough to see randomized content, meeting the intent-to-treat sample criterion. "Met intent-to-treat analytic sample criteria" is the number of students who met the intent-to-treat analytic sample criteria. (Exclusion details: in customized treatment condition, with school-specific content: 13,522; local-identity group did not have at least one participant in each condition: 88; missing year 1 full-time completion variable: 25; missing study moderators: 2. Exclusions were processed sequentially as listed.) "Wrote essay" is the number of students who wrote an essay in either condition of any length (i.e., met the treatment-on-treated sample criterion). Version 3.6.0, created 12 April 2023. Belonging dataset version 2.0.3.

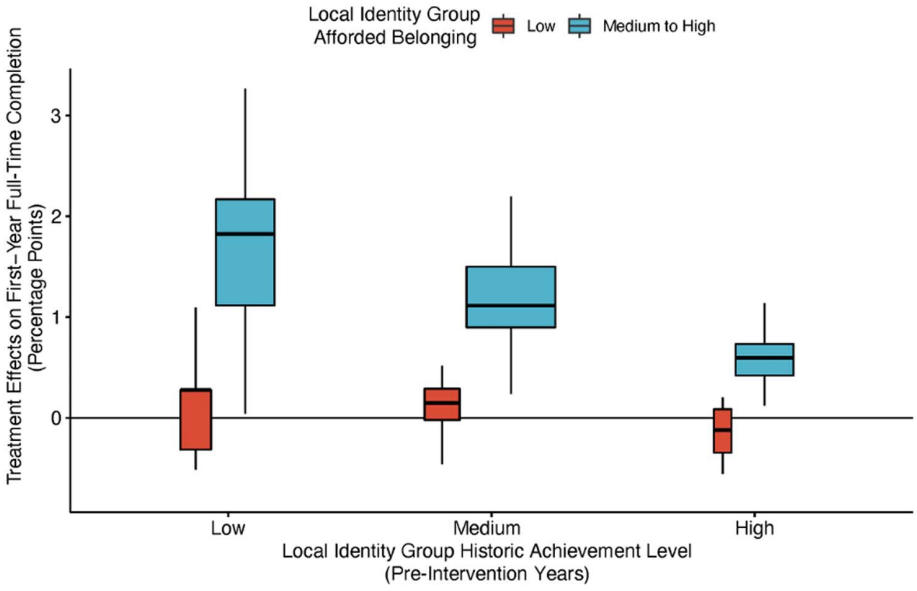

Fig. 3. Conditional average treatment effects (CATEs) on the probability of completing the first year enrolled full-time in the intent-to-treat sample (*N* = 26,911, *k* = 374 at 22 colleges and universities), from the Bayesian causal forest analysis. Each of the 374 local-identity groups had an estimated treatment effect (i.e., random slope, in the multilevel model, with two student-level covariates: gender and standardized test scores). This plot depicts the interquartile ranges (IQR) of the distributions of local-identity groups' average treatment effects, at different levels of the moderators. The dark line is the median (which will be similar, but not identical, to the mean treatment effects listed for the CATEs in the text), and the whiskers are the 95% percentile ranges. The width of each box is proportional to the number of local-identity groups in that category. The figure shows positive treatment effects for students in groups medium-to-high in afforded belonging (*N* = 22,833, *k* = 239), especially groups with lower historic achievement along the outcome measure, first-year full-time completion rate. The thinner, red boxes show null effects: Groups not afforded belonging did not tend to benefit from the treatment. To select the belonging cut-point used in this figure, we fit a random forest model to the posterior distribution of treatment effects and allowed the algorithm to choose the belonging cut-point that best minimized mean-squared error. That value was −0.5 SD for afforded belonging (36th percentile among local-identity groups). The cut-points for the three achievement groups were set at the 25th and 75th percentiles (Low: 0th to 24th historic percentile; Medium: 25th to 74th percentile; High: 75th to 100th percentile). Generalizability sample: 1.02 million new students annually entering 749 US 4-year colleges and universities. For mean completion rates by condition, see table S11.

in the generalizability sample implemented the 10- to 30-min online belonging module with their incoming students they would see an additional 12,136 students (1,019,790 × 0.85 × 0.014) complete the first year enrolled full-time each year. Moreover, these gains would be concentrated in groups with lower historic achievement, reducing inequality. Insofar as institutions take steps to convey the belonging message in more effective ways or support greater belonging affordances, they may see larger gains.

Discussion

The present results confirm the potential of even a brief social-belonging intervention to improve students' progress in college, especially students from groups that have historically achieved at lower rates. Yet this potential is not invariant. It depends on the opportunity students have to belong in their college contexts.

These results are consistent with the emerging theory that positive change requires planting "high-quality seeds" (hopeful answers to threatening questions) in "fertile soil" (contexts in which these answers are true) (*39*). Above a certain threshold, college contexts make belonging possible for diverse student groups—they afford belonging. The belonging intervention helped students realize the benefit of this affordance in terms of improved persistence. Conversely, when affordances for belonging were inadequate, which was the case for 15% of our student sample, the hopeful way of making sense of belonging offered by the intervention did not increase persistence.

For colleges and universities striving to better support students, the findings point to the importance of twin goals: (i) simultaneously conveying that belonging concerns are common in the transition to college for students from all backgrounds and improve with time and (ii) acting to ensure that this message is legitimate and reflected in opportunities to belong in the lived experience of all groups (*8*, *23*, *40*). To convey this message, colleges may complement brief online modules with broader efforts to create a culture on campus that normalizes challenges and worries about belonging and emphasizes opportunities for growth, whether through welcome addresses, residential programming, pedagogy, or other mutually reinforcing institutional communications and conversations. To ensure that this message is legitimate for all students, colleges may increase efforts to ensure an adequate representation of both students and faculty from diverse groups on campus (*41*); support ethnic-themed clubs, events, activities, and coursework that cultivate an understanding of and pride in group identities (*21*, *42*); prioritize pedagogy that emphasizes growth rather than identifying the ostensibly smart people (*29*, *43*); and create residential (*32*) and classroom communities that offer opportunities for positive intra- and intergroup interactions, including by establishing and communicating norms that encourage supportive relationships and discourage bias (*22*). Psychological and structural reforms are not substitutes for one another but can work together to promote positive change.

Belonging concerns are primary for many students as they enter college. Moreover, the history and reality of racism and social-class exclusion in higher education means that everyday challenges such as feeling excluded or having a hard time finding a lab partner can take on a racialized or social class–laden meaning for specific identity groups: "People like me don't belong here." Because such fixed, global attributions can become self-confirming, it is important to forestall them. Yet even as the social-belonging intervention focuses on everyday adversities experienced by students from all backgrounds at one time or another, it does not deny that students can also experience racial bias, stereotyping, and discrimination; nor does it deny the pride that students may feel in their racial-ethnic group. It is both true that students have similar challenges and experiences (e.g., worries about belonging) in the transition to college and true that students in different identity groups experience distinct challenges. Indeed, some adaptations of the belonging intervention for specific populations specifically raise and normalize group differences in experience (*13*, *15*). More broadly, it is important that messaging does not suppress the racialized and social class–informed experience of higher education. Surfacing these experiences can also be powerful (*20*, *21*, *23*, *44*).

Correspondingly, for researchers, these findings point to a new generation of work to

understand belonging affordances: What is needed to make belonging possible, for whom, and where? This may include the structured opportunities students have to interact with and build relationships with each other and with faculty (e.g., in residential life, first-year classes, student groups) as well as the social and academic culture on campus, including the degree to which instructors express their beliefs and engage in practices that affirm students' distinctive identities and strengths (*42*) and promote a growth mindset (*12*, *16*, *29*, *43*), among other factors (*17*, *45*).

As intervention science matures and we move to increasingly large-scale studies, identifying contextual boundary conditions around promising practices will increasingly come to the fore (*7*). For research on intergroup inequality, it is important to study variation in identity-group experiences, for we cannot assume that a given identity group has the same meaning or the same opportunities in different contexts. The local-identity group methodology developed here allows quantitative social scientists to relax the assumption that identity-group experiences are static and, correspondingly, to develop theory about how and why these experiences vary in ways that, for instance, create vulnerabilities to belonging concerns and belonging affordances. In doing so, we can learn what aspects of school contexts we should change to better realize their promise for all students.

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All consulting and speaking appearances have been disclosed to their respective university offices of research support and compliance, and no financial conflicts of interest have been identified under university policies. D.P. is the cofounder and executive director of PERTS, which offers free social-belonging interventions. None of the other authors has an ongoing financial relationship with any private entity that provides social-belonging products or services. **Data and materials availability:** Code and data will be available upon publication to researchers who agree to terms of data use, including institutional review board approvals and analysis in a secure computing environment and prohibitions against any analysis that risks exposing the identity of participating students (i.e., deductive disclosure) or of participating institutions in reports of school-specific results without permission from the partner institution. Please contact belonging@accelerateequity.org. The preregistered analysis plan can be found in the Open Science Framework (OSF) (*46*). The intervention module will not be commercialized and is available at no cost to all postsecondary schools in the US or Canada that wish to use it: https://www.perts.net/orientation/cb. Researchers wanting to access the intervention materials can see sample content in the supplementary materials and may contact G.M.W. or C.Log. and must agree to terms of use, including noncommercialization of the intervention and prohibitions on independent use.

SUPPLEMENTARY MATERIALS

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Supplementary Text
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Where and with whom does a brief social-belonging intervention promote progress in college?

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Editor's summary

The rate of earning university degrees in the United States is very unequal across social class, race, and ethnicity. Interventions that promote academic persistence also work differently for students from different backgrounds and operate differently across contexts. Walton *et al*. conducted a randomized controlled trial to systematically explain and understand these heterogenous effects in a brief online intervention across 22 universities and colleges (see the Perspective by Bowman). The intervention was designed to remedy students' concerns about belonging through a reading-and-writing activity that emphasized how worries about fitting in, struggling in class, and feeling homesick during the college transition are common and improve over time. They found that the intervention improved retention and persistence in school, particularly among historically underrepresented students, when the school context offered students opportunities to belong. The findings have policy implications for academic institutions that strive to better support and retain diverse students. —Ekeoma Uzogara