ARTICLE
Effects of a Service-Learning Neuroscience Course on Mood and Intergroup Anxiety

Loretta M. Flanagan-Cato, Rista C. Plate, Christina Steele, and Adrianna C. Jenkins
Department of Psychology and Undergraduate Neuroscience Program, University of Pennsylvania, Philadelphia, PA, 19104.
https://doi: 10.59390/HXTQ3326

"Everyday Neuroscience" is an academically based community service (ABCS) course in which college students teach basic neuroscience lab activities to high school students in an under-funded school district, working in small groups on hands-on science activities for 10 weekly sessions. The present study examined the possible psychological and social effects of this experience on the college students, in comparison with peers not enrolled in such a course, by observing and surveying the high school and college students across the 10-week course period. First, the teaching-learning sessions in the course successfully promoted science-focused discussion between the high school and college students for 45 to 60 minutes each week. Second, college students in "Everyday Neuroscience" reported higher positive affect and less intergroup anxiety at the end of the semester compared with the control group of college students who were not in the course. Finally, surveys of the high school students revealed that they found the sessions to be positive social experiences. These findings reveal that a neuroscience-based community engagement course can be both a positive experience for the community partner and a benefit for college students by promoting psychological and social wellness.

Key words: contact hypothesis; high school; outreach; positive and negative affect scale (PANAS); service learning

A crucial component of the mission of many universities is to have a positive impact on their local communities (Benson et al., 2007). One means through which universities collaborate with community partners is service-learning courses, in which college students receive course credit while engaging with the needs of the community. Such courses have the twin benefits of addressing community goals while also providing college students with unique educational experiences that tackle real-world challenges, promoting self-efficacy and well-being (Bringle and Hatcher, 2000; Gonsalves et al., 2019; Bowman et al., 2010).

"Everyday Neuroscience" is an academically based community service course in which neuroscience majors develop and teach basic neuroscience lab activities to high school students in an under-resourced school (Flanagan-Cato, 2019). The Philadelphia School District has the highest national child poverty rate, at 30 percent, and Pennsylvania ranks 45th in state-provided school revenue (National Center for Education Statistics, 2022). To address gaps in science education, this course provides an opportunity for the high school students to experience personalized, hands-on science lessons. Given that a lack of preparation can prevent students from persisting in science, technology, engineering and mathematics (STEM) education (Cota-Robles and Gordan, 1999; Gándara and Maxwell-Jolly, 1999), it is hoped that strengthening the preparation of these students will allow more of them to follow paths into STEM careers. They may also gain health and science literacy skills critical in modern society (Alberts, 2022). In this way, the course aims to improve dispartities in access to the STEM workforce and in health literacy for the high school students.

For the college students, the course improves their skills in science communication, innovation, and critical thinking (Flanagan-Cato, 2019). Science communication requires experience, as one learns to avoid jargon and maintain a familiarity with common knowledge versus expertise. Skills in innovative problem-solving and critical thinking are essential in careers that involve shifting challenges and evolving technologies. Thus, these skills equip college students to be more effective in their future careers in science or medicine. It is worth noting that a combination of improved science literacy for the public and science communication among the college educated may alleviate problems of distrust in science that have hampered scientific endeavors, such as clinical trials, vaccine acceptance, and addressing climate change (Brownell et al., 2013; Holzer et al., 2014).

The present report investigates the potential additional advantages this course may offer the college students. In recent years, college students have been experiencing increased rates of depression and anxiety (Lipson et al., 2022), with more than 60 percent of students meeting criteria for one or more mental health problems. Community-engaged coursework may safeguard undergraduates in this regard, given that such courses have been shown to have related positive effects, including on well-being (Brewer et al., 2018) and feelings of social efficacy (Sax et al., 1999). Therefore, it was reasonable to examine whether "Everyday Neuroscience" might also have salubrious effects on mood.

The setting in which "Everyday Neuroscience" takes

place enabled us to investigate not only the degree to which science service learning might affect students' overall mood across the semester, but also the degree to which they feel at ease interacting with people who differ from themselves on key demographic variables. The past few years have witnessed many disturbing instances of racial, ethnic, and political hostilities. These events have re-energized many universities' efforts towards improving social exchange across the diverse ethnic and socioeconomic groups in our society (Harkavy et al., 2020). Such cross-group contact may initially evoke intergroup anxiety, defined as the arousal induced by intergroup interactions because of expected of discrimination and/or uncertainties regarding behavioral norms (Stephan and Stephan, 1985). Positive social outcomes may emerge with extended cross-group contact, thereby diminishing intergroup anxiety (Wright et al., 1997). Given that "Everyday Neuroscience" comprises consistent, informal interactions between groups that differ in their racial and socioeconomic backgrounds and educational experiences, the present report also investigated the impact of the course on the undergraduates' intergroup anxiety. In addition to describing these results, the present report includes a description of how the format of the course has evolved since the original report

MATERIALS AND METHODS

The Course

"Everyday Neuroscience" is an academically based community service (ABCS) course at a large, Ivy League university in an urban environment in the mid-Atlantic United States. The course was designed to invest in students a discipline-relevant, mutually impactful community engagement experience. As reported previously (Flanagan-Cato, 2019), the college students design and teach weekly hands-on neuroscience activities for 10 consecutive weeks to high school students. The first weeks of the semester were dedicated to providing context about the academic level and prior poorly resourced education of the high school students we would be teaching. In addition, teaching strategies were discussed, with an emphasis on flexibility to individualize lessons, frequent comprehension checks, reinforcing effort, and "meeting students where they are." Because students worked in small groups, classroom management was not an concern. The first five activities strengthen the high school students' foundation in cell biology, macromolecules, diffusion and osmosis, DNA structure and genetics. The final five activities introduce neuroscience topics, specifically, reflexes, taste, vision, attention, and memory. In addition to these community-facing activities, the college students engage with readings and guest lecturers that highlight the intersection of neuroscience and the community work, including topics of cognitive development, learning, motivation, and the neurobiological impacts of poverty.

The present report is based on three semesters: Fall 2021, Spring 2022, and Fall 2022. Teaching-learning teams were created to include three college students and two to four high school students, and membership in these groups remained consistent across the semester. Weekly attendance was documented. On average, there were 2.8 college students and 2.6 high school students in each group. Thus, the teacher-student ratio was close to 1:1.

The structure of the interactions was recorded by a research assistant during the Spring 2022 semester, noting at 10-minute intervals the main activity of each group, whether it was socializing, mentoring or engaging with the lesson. All groups spent 45 to 60 minutes of the allotted 90 minutes focused on the teaching-learning activity. The average time spent socializing or mentoring averaged 10 minutes or less per lesson. These observations indicate that the teaching 4essionns created productive learning conditions.

Participants

The "ABCS group" was comprised of the undergraduate students enrolled in "Everyday Neuroscience". More than half the students were neuroscience majors; other typical majors were biology, psychology, or health and society. The enrollment per semester ranged from 24 to 33 students.

The "control group" was comprised of students taking Introduction to Experimental Psychology, which is not required of neuroscience majors, although many neuroscience majors take it. As an introductory-level course, this class is taken by a broad spectrum of majors, ranging from humanities to social and natural sciences, in addition to students who have not yet declared a major. The enrollment per semester is approximately 300. The course gives credit towards the final grade for students participating in any of a menu of research activities, and these surveys were one of the options. Completing the surveys involved no specific training or preparation. Approximately 20% of the students in the control group had participated in a service-learning course previously.

Each semester involved a new set of students in both the ABCS and control groups, and across the three semesters, a total of 77 students in the ABCS courses and 78 students in the control group completed both the pre- and post-surveys at the beginning and end of the semester,

	Control N=78	**ABCS N=77**
Year in college (%)		
Senior	29	75
Junior	36	25
Sophomore	35	0
Female (%)	81	86
Ethnic group (%)		
White, non-Hispanic	51.9	61.4
Asian or Pacific Isl.	31.2	23.4
Black or African Am.	9.1	5.7
Hispanic	10.4	12.9
Other	1.3	2.9
Socioeconomic (%)		
Highly aided	10.4	8.6
First-gen. college	26.0	12.9

Table 1. Demographic features of the college students who completed the surveys across three semesters.

respectively. The demographic features of these two subgroups are shown in Table 1.

The high school students consisted of 10th graders (a new group of students each semester, for a total of n=69) from a small public high school located in the same city. The school does not offer academic tracking. According to the school's decision, the students were selected for participation in this course based on teachers' recommendations, which were based on attendance and academic motivation. In this way, the course included approximately 60% of the 10th graders each year. A few of these students had individualized education plans (IEPs) based on learning differences. Some of these students had family members with college experience, and some of these students had worked with college students in other educational programs.

The high school student population primarily identified as Black or African American (95%), and 99% were eligible for free or reduced lunch. Although there was some racial and economic overlap, the high school students were demographically dissimilar to most of the college students on dimensions of age, education level, race, and economic status. The teaching-learning groups were created randomly from the first meeting to insure consistent social contact throughout the semester. Uniformly, the college and high school students did not know each other previously.

Survey Instruments

The college students were asked to complete two questionnaires administered via Qualtrics. The surveys included a consent agreement in accordance with the University of Pennsylvania Institutional Review Board. Five percent of their final grade was based on completing the consent forms. Completing the survey itself was otherwise voluntary and not incentivized. Thus, students had the option to opt out of these surveys with no penalty. The survey was sent by the research team, not the instructor, and the introduction to the survey emphasized the need for honest responses for the sake of research validity. The students were given 24 hours to complete the surveys to ensure that responses were in a similar time frame for everyone.

The first survey was administered early in the semester, before contact with the high school students, and the second at the end of the semester, after the last day of interaction. The survey submissions were anonymous and coded to allow the pre- and post-surveys to be paired.

In addition to the demographic information described above, the surveys included the Positive and Negative Affect Schedule short form (PANAS-SF; Thompson, 2007) and a subset of the Intergroup Anxiety Scale (Stephan and Stephan, 1985). The PANAS-SF asks how strongly various emotions are felt, including 10 positive (enthusiastic, interested, determined, excited, inspired, alert, active, strong, proud, attentive) and 10 negative (hostile, irritable, guilty, ashamed, nervous, jittery, distressed, upset, afraid, scared) items on a five-point scale (Very Little to Not at All = 1; to Extremely = 5). The scores for all positive items were combined, and likewise for all negative items, with possible scores for each ranging from 10 to 50. Based on the Intergroup Anxiety Scale, students were asked to respond to the following prompt: Imagine you are the only Penn student interacting with local urban high school students, compared to occasions when you are interacting only with other Penn students, to what extent would you feel, on a sliding scale 0-100, confident, happy, relaxed ("Ease" items), self-conscious, awkward, defensive ("Anxiety" items). An average was created for the "Ease" items, and a separate average was created for the "Anxiety" Items. A final score of "intergroup security" was created by subtracting the "Anxiety" from "Ease" value. In this way, a higher score reflects more intergroup security.

Data Analysis

The experimental design was to examine the independent variable of social contact with the high school students on the dependent variables of positive and negative affect and intergroup security for the college students. This was tested by measuring before and after contact sessions (pre-test and post-test) and controlling for course-unrelated changes across time by comparing students enrolled in the course with a comparison group of students not enrolled in the course. Preliminary analysis found no effect of semester on survey results, and therefore both control (n=78) and ABCS (n=77) groups included students from all three semesters. For each student, a pre- and post-semester score was computed for the PANAS-SF and intergroup security. A two-way ANOVA was conducted to assess the possible differences in pre- and post-semester responses and a possible difference based on ABCS participation. Post-hoc Student's t-tests were used when appropriate. The statistics program R was used for descriptive and inferential statistics. Results are presented as the mean $\pm$ standard error of the mean. All hypothesis tests used α=0.05 as the criterion level of significance.

RESULTS

It is important to note that the high school students indicated that they felt socially comfortable and respected during their interactions with the college students, based on survey responses from the end of the semesters (Table 2). Indeed, in the final survey, one high school student offered this comment: "I've had a very good time here with the [college] students and they taught me so much about different topics and helped me every step of the way." This feedback from the high school students suggests that the teaching-learning sessions were a socially positive experience for them.

The PANAS-SF was used to examine possible mood differences between the ABCS students and the control group, combining students in both groups across the three semesters. A two-way ANOVA was conducted to assess the possible factors of time (beginning versus end of the semester) and group (control versus ABCS). There was no main effect of time; however, there was a significant main effect of group ($F=32.01$, $p<0.001$). Specifically, the ABCS group began and ended the semester with significantly higher positive mood scores than the control group (both $p<0.001$), as shown in Figure 1. In post-hoc analysis, the college students' pre- and post-semester composite scores for positive affect showed that the control group experienced a significant reduction in positive mood across the semester

Belongingness	
I feel part of the college community	79.0
The college feels part of my community	80.4
Feeling Thermometer (cold = 0=50; warm = 50-100)	
I feel towards the college students	77.5
The college students feel towards me	77.8
The college students feel towards Robeson students	80.9
Inclusion	
I feel included when working with the college students	79.6
I feel like an outsider to the college students	29.0
Bias/Assumptions	
The college students listened and respected what I had to say	86.2
I felt accepted by the college students	85.4
I feel like I connected with the college students	80.9
I felt like I could be myself around the college students	77.3
I think the college students explain things at the right level	83.8
I think the college students respect my intelligence	83.9
I think the college students were interested and respected my interests and opinions	82.8
I think the college students did not make negative assumptions about me	85.7

Table 2. High school students' responses to survey questions at the end of two semesters (n=30). All questions could be answered with a sliding scale, a range of 0 to 100, with the indicator starting point at 50. Unless otherwise indicated, 0=Disagree and 100 = Agree.

(32.6 ± 0.9 vs. 30.4 ±0.9, p< 0.001). In contrast, the ABCS group displayed no reduction in positive mood across the semester (36.5 ± 0.8 vs. 36.3 ±0.8). Thus, there was significant interaction between time and group (p<0.05).

Regarding the negative composite score, a two-way ANOVA was conducted to assess the possible factors of time (beginning versus end of the semester) and group (control versus ABCS); there was no main effect of time. Neither the control group nor the ABCS group experienced a significant difference in scores when comparing their pre- and post-semester surveys (21.4 ± 0.8 vs. 21.1 ± 0.9, and 19.0 ± 0.8 vs. 18.7 ± 0.9, respectively), as shown in Figure 2. There was, however, a significant main effect of group (F=6.55, p<0.02). Specifically, the ABCS group began and ended the semester with a significantly lower negative mood scores than the control group (both p<0.001). Accordingly, no significant interaction was found between time and group.

The Intergroup Anxiety Scale was adapted to examine possible differences between the ABCS group and the control group regarding intergroup security. A two-way ANOVA was conducted to assess the possible factors of time (beginning versus end of the semester) and group (control versus ABCS); there was no significant main effect of time. A main effect of group was, however, significant (F=4.87, p<0.05). Specifically, the ABCS group began and ended the semester with significantly higher scores of intergroup security than the control group (both p<0.001), as shown in Figure 3. The control group did not experience a

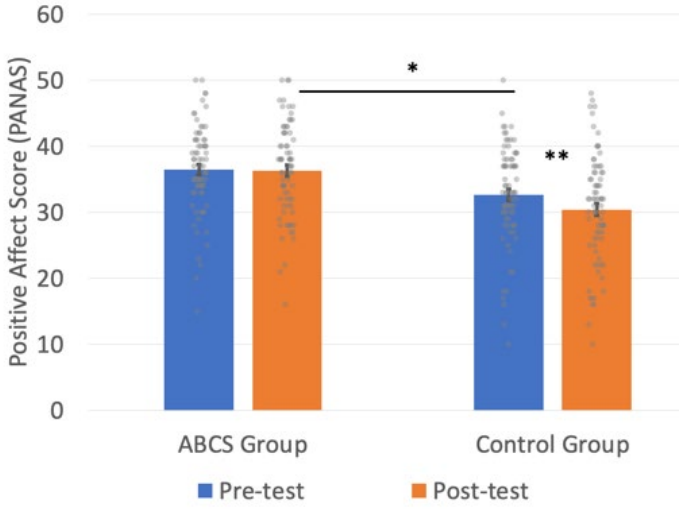

Figure 1. Positive affect comparing beginning of the semester (pre-test) versus end of semester (post-test), combined data for three semesters. Whereas students in the control group showed a reduction in positive affect across the semester, students in the ABCS group showed no change, as reflected in a significant Time x Group interaction. Error bars indicate the standard error of the mean. **.01 significance level, *.05 significance level.

significant change when comparing their pre- and post-semester surveys (17.3 ± 3.5 vs. 15.9 ± 3.5). In contrast, the ABCS group displayed a significant improvement in intergroup security when comparing their pre- and post-semester scores (38.8 ± 3.0 vs. 52.3 ± 3.2, p<0.001).

DISCUSSION

As a community-engaged course, "Everyday Neuroscience" has been shown to benefit aspects of college students' well-being, with students reporting an increased sense that they have something to contribute to society and increased confidence to share their ideas (Flanagan-Cato, 2018). The present report adds details regarding these teaching-learning sessions, determining that the high school students experience positive social interactions. Regarding the outcomes for the college students, the present study revealed that, compared with a control group of college students, participants in the course experienced less of a decreased positive mood and a greater reduction in intergroup anxiety. Each of these findings will be discussed in turn.

As mentioned above, community engagement courses should be mutually beneficial, providing value to the community partners as well as the college students. The evidence presented here suggests that the teaching-learning groups spent most of the lesson focused on the science learning of the high school students. The preparation that the college students received, regarding personalizing the lessons and pacing the activities to match the individual high school students' interests and educational background, may have helped keep the teaching-learning groups on task.

Another noteworthy aspect of this study was the survey data from the high school students signifying the social

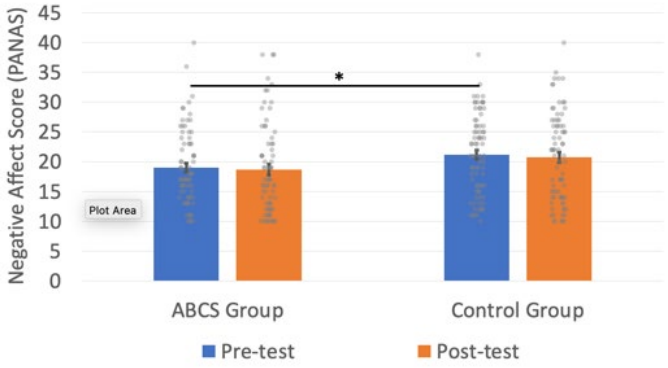

Figure 2. Negative affect between the beginning and end of the semester (pre- versus post-test). Neither group showed a significant change in negative affect across the semester of study. Error bars indicate the standard error of the mean.

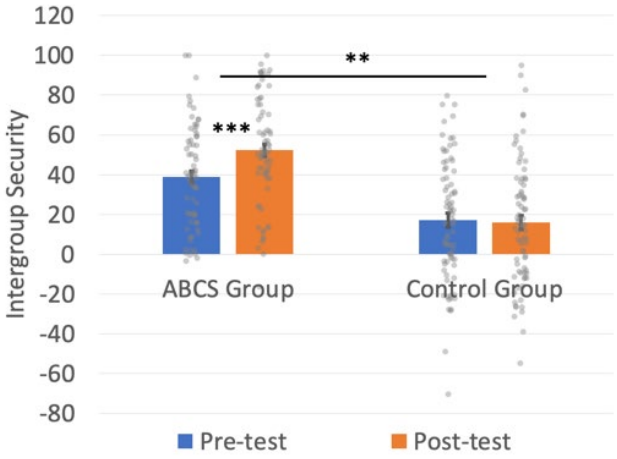

Figure 3. Intergroup security in the beginning and end of the semester (pre- versus post-test) Whereas students in the control group showed no change across the semester, students in the ABCS group showed a marked increase in intergroup security, as reflected in a significant Time x Group interaction. Error bars indicate the standard error of the mean. ***.001 significance level, **.01 significance level.

comfort level they felt with the college students. In questions worded to assess inclusion, belongness or threats of bias, responses consistently indicated that the high school students were not harboring feelings of alienation or bias towards them. These responses are important, given that a sense of belonging contributes to students' decisions to persist in STEM education (Rainey et al., 2018), and they are consistent with evidence that personal relationships are critical for a sense of belonging (Johnson, 2012). The multi-week contact may have contributed to these favorable views, given that extended contact has been shown to reduce bias (Cameron et al., 2006; Liebkind and McAlister, 1999). Regarding the college students, as they pursue careers in clinical or translational research, they may draw on their experience working with community partners to enhance the quality and relevance of their future research (Brownell et al., 2013; Skinner et al., 2018).

As mentioned above, there has been a concerning rise in undergraduate mental health issues (Lipson et al., 2022). Mental health is a key factor in academic success, and supporting students' mental health is economically compelling for colleges (Eisenberg et al., 2009). Although the present report did not directly measure mental health, scores for the positive PANAS items have a large negative correlation with Beck's Depression Index (Thompson, 2007). Likewise, negative PANAS scores have a large positive correlation with Beck's Depression Index and anxiety. Given that the ABCS students began the semester with higher positive mood scores, and lower negative mood scores, than the control group, those with better moods may self-select to enroll in a community engagement course. Nevertheless, the results suggest that the ABCS course may prevent a decline in positive mood during the semester. A common theme in students' final reflections was that the course gave students a sense of purpose. For example, one student wrote, "This class has helped me apply my neuroscience knowledge in a real-world setting, which was super exciting for me– I always felt that neuroscience was fun and interesting, but I never got the chance to use it much outside of class. Also, this class is structured so that we get to learn more about making real impacts in our communities." Another theme in the reflections was that the social interactions were a unique feature of the course. As one student wrote, "Another thing that is so special about this class is that every week you are working in the same groups every time so you really get to build a special relationship with the students and the other [college] students. This has created a special bond and nothing like any other class I have taken." Previous work has shown that positive affect is correlated with both meaning in life and sociability in college (Costa and McCrae, 1980; Emmons and Diener, 1986; Lyubomirsky et al., 2005; Zika and Chamberlain, 1992). Further studies will be needed to determine the possible contributions of a sense of purpose and the social interactions experienced in the course to support a positive mood.

Modern life, including our educational system, increasingly involves working within diverse groups; however, intergroup anxiety may challenge one's emotional and behavioral regulation, draining executive function, reducing cognitive abilities (Trawalter and Richeson, 2006, and interfering with effective communication (Stephan and Stephan, 1985; Stephan et al., 1999). Although students who enrolled in "Everyday Neuroscience" began the semester with more intergroup security than their peers, participation in the course further increased intergroup security. A common theme in the students' reflections was that they developed a personal familiarity with the high school students. As an example, one student wrote, "I remember back to the first day we met the students. They all seemed very quiet as we tried to engage them with icebreaker questions. However, getting to meet with us each week made them more comfortable. Eventually, we reached the point where we could not stop laughing together as we threw marshmallows around during the reflexes lab. Each lab became not only an opportunity to teach a new subject, but also to relax and enjoy each other's company." Future studies will be needed to determine the importance of regular contact over time in reducing intergroup anxiety in

this context.

Several limitations of this study should be noted. As mentioned, students self-selected to enroll in "Everyday Neuroscience," and the course may attract students with more positive moods and less intergroup anxiety at baseline. Such students may be predisposed to retain a positive mood across the semester and experience improved intergroup security after interacting with an unfamiliar group. It is currently unknown whether students with lower moods and more intergroup anxiety would also have these benefits. Another limitation arises from the use of surveys, in which participants may feel compelled to conform with some perceived expectation. Furthermore, these survey responses capture a narrow time frame, which may not represent the more general mood or intergroup feelings of the participants. In the future, adding a waitlist control group and experiential sampling would help address these concerns.

The current findings raise several important questions for future study. For example, it is unknown how long the improvement in intergroup security may last. Second, although the college students anecdotally report that participation in the course reinforces their neuroscience knowledge, this has not been rigorously studied. A long-lasting reduction in intergroup anxiety, as well as an academic benefit for knowledge and concept retention would be important to document. Likewise, it would be valuable to examine the possible long-term benefits for the high school students regarding social well-being, academic achievement, and a possible persistence in STEM studies.

In summary, "Everyday Neuroscience" creates a venue for science teaching and learning, supporting a positive social connection with the local high school students and a sustained positive mood and increased intergroup security for the participating college students.

REFERENCES

Alberts B (2022) Why science education is more important than most scientists think. FEBS Lett, 596: 149-159. doi: 10.1002/1873-3468.14272

Allport GW, Clark K, Pettigrew T (1954) The nature of prejudice. Cambridge, MA: Addison-Wesley.

Benson L, Harkavy IR, Puckett JL (2007) Dewey's dream: Universities and democracies in an age of education reform: Civil society, public schools, and democratic citizenship. Philadelphia, PA: Temple University Press.

Bowman N, Brandenberger J, Lapsley D, Hill P, and Quaranto J (2010) Serving in college, flourishing in adulthood: Does community engagement during the college years predict adult well-being? Applied Psychology: Health and Well-Being 2(1):14-34. doi: 10.1111/j.1758-0854.2009.01020.x

Brewer SE, Nicotera N, Veeh C, Laser-Maira JA (2018) Predictors of positive development in first-year college students. Journal of American College Health 66:720-730. doi: 10.1080/07448481.2018.1440567

Bringle RG, Hatcher JA (2000) Institutionalization of service learning in higher education. J Higher Education 71:273-290. doi: 10.1080/00221546.2000.11780823

Brownell SE, Price JV, Steinman L (2013) Science Communication to the General Public: Why We Need to Teach Undergraduate and Graduate Students this Skill as Part of Their Formal Scientific Training. J Undergrad Neurosci Educ. 12:E6-E10.

Cameron L, Rutland A, Brown R, Douch R (2006) Changing children's intergroup attitudes toward refugees: Testing different models of extended contact. Child Dev 77: 1208-1219. doi: 10.1111/j.1467-8624.2006.00929.x

Costa PT, McCrae RR (1980) Influence of extraversion and neuroticism on subjective well-being: happy and unhappy people. J Personality Social Psych 38:668-678. doi: 10.1037/0022-3514.38.4.668

Cota-Robles EH, Gordan EW (1999) Reaching the top: A report of the national task force on minority high achievement. New York, NY: The College Board.

Eisenberg D, Golberstein E, Hunt JB (2009) Mental health and academic success in college. BE J Econ Analysis Policy 9. doi: 10.2202/1935-1682.2191

Emmons RA, Diener E (1986) A goal-affect analysis of everyday situational choices. Journal of Research in Personality 20:309-26. doi: 10.1016/0092-6566(86)90137-6

Flanagan-Cato LM (2019) Everyday Neuroscience: A community engagement course. J Undergraduate Neuroscience Education 18:A44-A50.

Gándara P, Maxwell-Jolly J (1999) Priming the Pump: Strategies for Increasing the Achievement of Underrepresented Minority Undergraduates. New York, NY: College Entrance Examination Board.

Gonsalves J, Metchik EY, Lynch C, Belezos CN, Richards P (2019) Optimizing Service-Learning for Self-Efficacy and Learner Empowerment. Michigan J Community Service Learning 25:19-41. doi:10.3998/mjcsloa.3239521.0025.202

Harkavy I, Puckett JL, Hodges RA (2020) University-Assisted Community Schools as Democratic, Anti-Racist, Justice- and Equity-Seeking Institutions: A Growing Movement for Democracy and Social Change. Universities and Community Schools 10: 2-4.

Holzer JK, Ellis L, Merritt MW (2014) Why we need community engagement in medical research. J Invest Medicine, 62: 851-855. doi:10.1097/JIM.0000000000000097

Johnson DR (2012). Campus racial climate perceptions and overall sense of belonging among racially diverse women in STEM majors. J College Student Devel 53:336–346. doi: 10.1353/csd.2012.0028

Lipson SK, Zhou S, Abelson S, Heinze J, Jirsa M, Morigney J, Patterson A, Singh M, Eisenberg D (2022) Trends in college student mental health and help-seeking by race/ethnicity: Findings from the national healthy minds study, 2013–2021. J Affective Disord 306:138-147. doi:10.1016/j.jad.2022.03.038

Liebkind K, McAlister AL (1999) Extended contact through peer modelling to promote tolerance in Finland. Eur J Soc Psych 29:765-780. doi: 10.1002/(SICI)1099-0992(199908/09)29:5/6<765::AID-EJSP958>3.0.CO;2-J

Lyubomirsky S, King L, Diener E (2005) The benefits of frequent positive affect: Does happiness lead to success? Psych Bull 131:803-855. doi: 10.1037/0033-2909.131.6.803

National Center for Education Statistics (2022) Public School Revenue Sources. Washington, DC: Institute for Education Sciences, US Department of Education. Available at: https://nces.ed.gov/programs/coe/indicator/cma.

Rainey K, Danc, M, Mickelson R, Stearns E, Moller S (2018) Race and gender differences in how sense of belonging influences decisions to major in STEM. Intl J STEM Ed 5:10. doi: 10.1186/s40594-018-0115-6

Sax LJ, Astin AW, Avalos J (1999) Long-Term Effects of Volunteerism During the Undergraduate Years. Rev Higher Ed 22:187-202. Available at: http://digitalcommons.unomaha.edu/slcehighered/88.

Skinner JS, Williams NA, Richmon, A, Brown J, Strelnick AH, Calhoun K, De Loney EH, Allen S, Pirie A, H. Wilkins, CH (2018) Community experiences and perceptions of clinical and

translational research and researchers. Prog Community Health Partnersh. 12:263-271. doi: 10.1353/cpr.2018.0050

Stephan WG, Stephan CW (1985) Intergroup anxiety. J Social Issues 41:157-175. Available at: https://doi 10.1177/1088868314530518

Stephan WG, Stephan CW, Gudykunst WB (1999) Anxiety in intergroup relations: A comparison of anxiety/uncertainty management theory and integrated threat theory. Int J Intercultural Relations 23:613-628. doi: 10.1016/S0147-1767(99)00012-7

Thompson ER (2007) Development and validation of an internationally reliable short-form of the positive and negative affect schedule (PANAS). J Cross-cultural Psych 38:227-242. doi: 10.1177/0022022106297301

Trawalter S, Richeson JA (2006) Regulatory focus and executive function after interracial interactions. J Exp Social Psych 42:406-412. doi: 10.1016/j.jesp.2005.05.008

Wright SC, Aron A, McLaughlin-Volpe T, Ropp SA (1997) The extended contact effect: Knowledge of cross-group friendships and prejudice. J Pers Social Psych, 73:73-90. doi:10.1037/0022-3514.73.1.73

Zika S, Chamberlain K (1992) On the relation between meaning in life and psychological well-being. Brit J Psychol 83: 133-145. doi: 10.1111/j.2044-8295.1992.tb02429.x

Received January 20, 2023; revised April 4, 2023; accepted April 17, 2023.

This project was supported by the Klein Family Social Justice Grant. The course was made possible thanks to the high school partners, including Principal Richard Gordon, Science Coordinator Louis Lozzi, and teacher Brian Horn. The logistical support of Penn's Netter Center for Community Partnerships was critical, and I especially thank Dr. Ira Harkavy, Dr. Richard Carter, and Cory Bowman. The authors thank Sarah Hatch, Theodor Lenz, Yunshi Luo, and Violet Yu for their excellent research assistance.

Address correspondence to: Loretta M. Flanagan-Cato, 433 South University Avenue, Department of Psychology, University of Pennsylvania Philadelphia, PA 19104. Email: flanagan@psych.upenn.edu