

## ARTICLE

# Engaging Undergraduate Students in Forensic Anthropology Research During Times of Restricted Lab Access: The Efficacy and Importance of Student-Led Surveys

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### Abstract

*The impacts of the COVID-19 pandemic on experiential learning have been felt by students interested in forensic anthropology casework and lab training. Without access to labs and with cancellations of courses related to hands-on learning like human osteology and forensic anthropology, students may not receive critical training necessary in their fields of interest. In this paper, we explore one potential option for engaged forensic anthropology research: the creation of skeletal research surveys that students can design and disseminate to law enforcement to better understand the nature of forensic casework in their own states. Students reported a high satisfaction rate with these survey projects and were able to build networks that helped them refine their post-graduation education and career goals. By formulating questions, creating surveys, submitting to the review board, and synthesizing data, students were able to explore forensic topics without entering a traditional lab setting during times of university lockdowns. The data from this research can be used by forensic anthropology students and professors in the future to better assist law enforcement with the identification of skeletal remains. The surveys described in this paper are easily replicated by other professors seeking to provide students with low-cost, remote forensic research opportunities.*

**Keywords:** forensic anthropology; survey methods; human osteology; biological anthropology

### Introduction

Forensic anthropology, defined here as the application of skeletal biology methods to human forensic identification, is an increasingly popular subject in university anthropology departments. Undergraduate students, motivated by interests in true crime media and social justice, may come to college expecting to pursue forensic science majors. While forensic anthropology courses are often taught in departments that are

focused on traditional four/five-field anthropological approaches, students can meaningfully engage in forensic anthropology and forensic sciences research even when forensics is not a main feature of departmental offerings. Many smaller institutions may not have large forensic anthropology laboratory facilities, or directors of existing forensic anthropology labs may not be willing or able to include undergraduate students in highly sensitive forensic casework.

In this paper, we describe a project undertaken by two undergraduate students at flagship state schools in two predominantly rural states (New Hampshire and Idaho). Rural students are more likely to attend rural universities close to home, and they are also more likely to be first-generation students from lower income households (Friesen and Purc-Stevenson 2017). These intersecting factors contribute to experiential and instructional barriers for rural students pursuing forensic anthropology and forensic sciences degrees at both undergraduate and graduate levels.

At both Idaho State University (ISU) and the University of New Hampshire (UNH), the students who designed these studies were funded by the McNair Scholars Program (introduced below). Students were paired with mentors who committed to creating a forensic anthropology research opportunity for them despite neither student having human osteology experience. Here, we provide an example of how combining equalizing educational initiatives like the McNair Scholars Program with direct and simple problem-oriented research questions (e.g., "What does law enforcement do when they encounter human bone?") can aid students in completing publishable forensic research before they graduate. As the McNair program focuses on supporting students who are historically disadvantaged at the college level (e.g., low income, racial or ethnic minority, disabled, or first-generation), a project like this can leverage existing university resources and professors' current research interests to help students diversify and explore their interests in forensic anthropology before applying to graduate schools.

While this project initially started to provide forensic anthropology research experiences to talented students during times of restricted lab access due to the COVID-19 pandemic, we found that the collaboration between two public universities with similar forensic anthropology casework resulted in a replicable research project that could be undertaken by other mentors/advisees. The combination of the need to develop a remote forensic project while meeting the expectations of the prestigious McNair program was initially a tall order. The faculty mentors involved in this project are frequent research collaborators and had expressed through informal conversations with each other that they were troubled by the haphazard approach to identifying human vs. non-human skeletal remains in their respective states. As both professors worked with law enforcement to help identify human remains in forensic cases, they wondered about the process by which fragmented, commingled, and isolated bones were getting identified as non-human (and thus being disposed of) in their states. While some members of law enforcement knew to contact forensic anthropologists when they encountered bone,

many rural departments did not know that there were resources within their own state at public institutions. Drs. Blatt and Michael approached their McNair Scholars about designing a research project exploring the law enforcement response to finding skeletonized remains. We present the results of those surveys below as we believe that this project can be easily replicated by mentors/advisees at other universities.

## History and Impact of the McNair Scholars Program

We provide some context for the McNair program in this paper to underscore the importance of the program in supporting first-generation students like ours in scientific research projects. The McNair program began in 1986 to honor Ronald E. McNair, a physicist and one of the astronauts who died in the Space Shuttle Challenger explosion. The Ronald E. McNair Postbaccalaureate Achievement Program is part of the federal TRIO programs funded by the U.S. Department of Education. TRIO programs are governed by the Higher Education Act of 1965, which awards competitive funds to institutions serving disadvantaged and underrepresented undergraduates. Eligible students include those from groups historically underrepresented in graduate education, those from low-income backgrounds, and first-generation college students.

Chosen scholars are mentored by university faculty and enter a rigorous program of scholarly activities and courses in preparation for entering graduate school. Students are supported through program-funded GRE preparation, assistance with graduate program applications, and engaged mentorship with faculty in higher education. The program also offers cost-free counseling services designed to improve students' financial and economic literacy and funding for students to attend cultural events and academic conferences across the nation. Undergraduate research experience is a mandatory component of the program overall, designed with scaffolded assignments to assist in developing a research question, designing a research project, and disseminating results under the mentorship of faculty. Costs of attending a conference to present project results are also funded by the program. While in the program, students receive a living stipend to support them while they focus on completing their projects during the summer months and a budget to purchase small materials or equipment needed for their projects. A small incentive stipend is provided to mentors. Such funding allows students to focus 40 hours a week during summer on their projects and obligates faculty commitment to the project during that time.

At small, rural institutions such as ISU and UNH, the TRIO McNair program is one of few available funding sources for undergraduate research outside of external grants awarded to faculty members themselves. Similarly, while not reported in the literature specifically, both senior authors of this paper have experienced situations in which the financial incentives of the TRIO program were both the most attractive lure to students applying to undertake undergraduate research and the only means by which many, if not

all, our students were able to partake in research without depending on external summer jobs or loans.

Studies have long demonstrated that the pursuit of college degrees increases lifetime earning potential (Autor 2014), though the type of degree and skillset may vary (Kim et al. 2015). The percentage of students enrolling in advanced degree programs increases with their family income (Baum and Steele 2017), leaving first-generation students at a disadvantage. Only 29% of rural Americans are enrolled in universities compared to 42% of the general population (Baum and Steele 2017), indicating that, in many ways, rural communities are a minority group in higher education. Students from rural communities often express difficulty navigating college and are twice as likely to feel powerless in a university environment, underestimate their abilities, come from backgrounds skeptical of the education system, have issues with transportation, lack technology and internet access, lack food stability, and have unchecked mental and physical health issues (Carpinelli et al. 2007; Garrin and Harding 2017; Morton et al. 2018; Palumbo 2018; Schultz 2003). Additionally, with the impact of COVID-19 and the shift to remote delivery of education and mentorship, programs like TRIO McNair become even more meaningful (Mueller et al. 2021).

In a meta-analysis of TRIO McNair Scholars' successes, Renbarger and Beaujean (2020) found that these students were more likely to complete undergraduate degree programs and six times more likely to enroll in graduate programs. As many researchers have reported (Bancroft et al. 2016; Gittens 2014; Graham 2011; Posselt and Black 2012), one reason for these successes may be the socializing components of the program, which build confidence, connectedness, and competence in the field and academia. Ishiyama and Hopkins (2003) reported that 93.6% of McNair students obtained their bachelor's degree. Moreover, 55.3% entered graduate school within five years of graduation, while only 19.57% of similar students not supported by a McNair program did. Other studies have shown that McNair students are better prepared for the rigors of graduate education (Gittens 2014; Willison and Gibson 2011). Fox et al. (2017) surveyed McNair students at Sam Houston University and found that all the respondents expected to progress beyond a bachelor's degree and that master's and PhD enrollment rates were 77% and 26% respectively, while master's and PhD completion rates were 64% and 65%, respectively.

The McNair program also provides high-impact experiential learning and research development skills to participants. Experiential learning in this sense is adapted from Kolb (1984, 41) as "the process whereby knowledge is created through the transformation of experience." Kayes (2002), in outlining criticisms of experiential learning theory (ELT), noted that the best learning systems engender a diversity of learning modes. The learning process of ELT integrates the four interdependent processes of action, cognition, reflection, and experience. This holistic learning cycle is naturally conducive to anthropological topics (Bossaller et al. 2015; McClellen and Hyle

2012). Geertz (2008) alternatively refers to this as “blurred genres,” in which multidisciplinary approaches (both methodologically and in learning practice) are used to find more cohesive and humanistic results. This process of learning, within a program like TRIO McNair which provides institutional structure, allows students to explicate their personal and disciplinary knowledge, embeds their experience in the context of their discipline and academia, and therefore builds confidence through collaborative experience and social belonging. In this sense, the research projects associated with the TRIO McNair program provide a student experience *for* learning, in that they practice skills, and experience *of* learning, in that they reflect on their learning process in ways they may carry forward to graduate programs.

In practical terms, researchers have demonstrated that experiential learning as an undergraduate has long-term impacts. These include improving time to graduation and increasing the likelihood of attending graduate school and/or finding employment after graduation. Additionally, in their assessment of programs like McNair, students indicate they feel more prepared for advanced study and employment (Bradberry and De Maio 2019; Kong 2021; Sjöstedt 2015). Kong (2021) proposed that experiential learning models build a stronger connection between what is being learned and personal learning experience that enhances learning motivation overall and the ability to regulate one’s motivation as part of the learning process in the future.

## Materials and Methods

The two McNair Scholars at ISU and UNH (authors TS and JE) did not know each other, but they did work with mentors (authors AM and SB) who guided the projects so they would be directly comparable. Students reported directly to their respective mentors. Neither student had any human osteology experience, yet both were deeply interested in doing forensic anthropology research projects. Each student had taken one forensic anthropology course, and both were interested in criminal justice careers. Because the students were funded during the COVID-19 pandemic, having in-person research experiences in a lab was not possible due to university restrictions. Instead, the faculty mentors worked with the students to design IRB-approved surveys for law enforcement in New Hampshire (TS is based at UNH) and Idaho (JE is based at ISU).

Students worked with their mentors to generate a list of questions that explored law enforcement agencies’ familiarity with identifying skeletal remains, estimated numbers of skeletal cases, and assessed knowledge of forensic anthropology methods. Through the McNair program, students were informed about the Institutional Review Board (IRB) process and received support to submit their proposals. After receiving IRB approval, each student generated a list of all law enforcement agencies in their states and endeavored to find contact information (phone number and email) for each office. Because both Idaho and New Hampshire are rural states with a number of small or part-time departments, some agencies had non-functional websites or no listed contact

information. All efforts were made to locate information for every town's police department, all sheriff's offices, and state police.

Throughout the stages of the research process, students and mentors discussed how to communicate with law enforcement effectively and professionally, as well as how to develop a succinct, but thorough, survey. Both students were tasked with learning their preferred survey system (e.g., Qualtrics or Google Forms) and generated drafts of questions. Working together, the students and mentors refined the questions and created the appropriate responses (e.g., check boxes, range of answers, open-ended questions). While the overall intention of the surveys was shared, some differences between the final survey questions were noted because each McNair Scholar was encouraged to come up with their own phrasing and emphases in the surveys. Both students collected the frequencies of each response and interpreted the open-ended responses; they then used these data to develop future suggestions for practicing forensic anthropology in their respective states. Table 1 reflects a sample of survey questions. Note that "Y/N/Unsure" answer types in Google Forms may also be phrased as "Definitely yes/probably yes/might or might not/probably not/definitely not" in Qualtrics.

#### *New Hampshire Protocol*

TS created an anonymous survey in Qualtrics and generated a link to send with an email invitation to take the survey. A follow-up email was sent two weeks after the initial message. Of 107 agencies contacted, 52 responded positively (approximately 49% response rate) to the 10-question survey. Each response from an agency was counted as "representative" of that agency's practices.

#### *Idaho Protocol*

JE created an anonymous survey using Google Forms. The survey link was emailed to 115 departments in 44 counties. Of those email requests, 13 responded positively (approximately 11% response rate) to complete the 12-question survey. Each response from an agency was counted as "representative" of that agency's practices.

**Table 1. A sample of survey questions used in these projects**

	Question	Answer Type
1.	To the best of your knowledge, estimate the number of cases your department has had in the past five years that involve bone (human or animal).	Numerical choice or range

2.	Is anyone in your office trained to identify human vs. non-human bone?	Yes, No, Unsure
3.	If anyone in your office is trained to identify human vs. non-human bone, what was the nature of that training (e.g., workshop, textbook use, consultation with a professional, etc.)?	Open-ended
4.	Have you ever personally encountered a case involving bone (human or animal) in your career?	Yes or No
5.	Do you believe you are able to decipher between human and animal bone?	Yes, No, Unsure
6.	When you have a case involving skeletal remains, who do you call for a human/non-human determination of bone identification?	Open-ended
7.	If you have ever contacted an expert about skeletal remains, could you please check all the boxes that apply:	Selection
8.	When you arrive at a crime scene with skeletal remains, what is your general search and recovery process? Do you collect all bones on the surface, dig below the ground, etc.?	Open-ended
9.	When you have skeletal remains in your possession, where and how do you store them?	Open-ended
10.	How do you keep records of skeletal remains? Do you make an effort to link isolated bones together (e.g., if one bone is found two years before another, do you try to determine if the bones are from the same individual)?	Open-ended
11.	If the remains are identified as Native American, who do you send the remains to for repatriation?	Selection
12.	Before this survey, were you familiar with the amount of information that anthropologists can generate from analyzing bone? Check all that apply:	Selection
13.	Do you think a standardized, statewide protocol for steps to take when bone is encountered (e.g., identification guide, expert contact information, etc.) would be useful in your state?	Yes, No, Unsure

The experience of both students was documented using unstructured interviews, conducted by their faculty mentors, to assess the impact of their projects and the McNair program experience. Specifically, students were asked about how they believed this project had prepared them for the rigors of graduate school. Since the project results demonstrated the extent of knowledge that law enforcement had of forensic anthropology practices, students were also asked to reflect on how these data influenced their view of the practical applicability of their forensic education in the ever-changing "real world." While the students may have been more apt to provide honest feedback if the interviews were conducted by persons other than their faculty mentors, we believe that the close working relationship between students and their mentors over the course of several semesters allowed for sincere responses.

## Results

We propose that these exploratory surveys are excellent "compromise" projects for students without practical osteology experience but with significant interest in learning about forensic casework in their own states. These projects resulted in four demonstrable outcomes: 1) students became familiar with law enforcement practices in preparation for their future careers; 2) law enforcement agencies became aware of the existence of forensic anthropologists in their state and/or aware of types of cases forensic anthropologists could assist with; 3) new contacts were established between rural departments that respond to skeletal remains cases; and 4) students learned how to create effective surveys, interpret data, and synthesize results within the context of their states.

Since each survey generated specific information about the forensic anthropology needs for each state, students were also able to explore the impact that forensic anthropology *could* make if law enforcement personnel were aware of, or had access to, expert analysis. Ultimately, these data and the analysis process led the students and mentors to engage in thoughtful conversations about ethics, resource access, and state-specific needs that affect rural agencies in the U.S.

### *New Hampshire Data*

Nearly 79% of respondents had encountered human or animal bone in their careers, while almost 62% of respondents indicated that their offices had between 1-16+ cases involving skeletonized remains in the past five years. These results clearly indicate that basic skeletal identification skills and/or the ability to contact a skeletal analyst is necessary for law enforcement agencies. Concerningly, 75% of respondents noted that their offices "definitely did not" have a person trained to identify human vs. non-human bone and fewer than 2% of respondents believed they could definitely distinguish between animal and human bone. In her final analysis, TS noted that these results

indicated that more forensic anthropology outreach to agencies is crucial in New Hampshire.

Fortunately, participants did indicate willingness to consult outside experts on skeletal cases, though anthropologists were not frequently included as subject matter experts. Instead, respondents reported contacting Fish and Game units, a medical examiner's office, state crime labs, and the state police Major Crimes division. While nearly all participants (92.3%) had previously recognized that anthropologists could determine if bone was human or animal in origin, only 10% of participants had contacted anthropologists about a case. TS noted that the existence of frequent skeletal cases with a lack of trained personnel was a key takeaway from this survey and an excellent opportunity for creating a pathway between anthropology students and law enforcement for resolving those cases.

#### *Idaho Data*

Nearly 80% of respondents had "occasionally" encountered human or non-human skeletal remains during their career, but 17.4% had never worked on a case involving human skeletal remains. Of the respondents, 69.2% reported that they were "familiar" with the services of forensic anthropologists and 30.8% reported that they were "somewhat" familiar. The majority of respondents (76.9%) also reported that they work collaboratively with museums, universities, or other organizations in order to identify human remains, but nearly a quarter responded that they did not. Of those who did not seek external consultation, the primary reason was that they left consultation decisions to coroner authority. 30% of the departments consulted specifically with a university, 38% consulted only with their coroner, and the remaining departments did not have a specific protocol. Additionally, 84.6% of agencies had specific procedures for recovery of skeletal remains at a crime scene, though these procedures were not specified.

After remains were recovered, more than half of the agencies reported storing the remains in their evidence room. Only one agency responded that DNA was routinely collected, but none of the agencies had specific protocols for storing, documenting, or linking isolated remains to others. Only 10% of respondents reported having training in forensic anthropology or recovery (this was exclusive to those having advanced university degrees in biological anthropology), but all others reported interest in such training.

Finally, respondents were asked if they were familiar with NAGPRA or knew who to contact in cases in which the remains of Native Americans were recovered. Almost half of respondents were familiar with the need to repatriate Indigenous remains but not with the specifics of the associated laws or who to contact. The other half of respondents reported that they would call the closest tribe to their agency or the coroner to ask for assistance. There was no indication of how agencies would distinguish Indigenous versus forensic remains or their level of experience with such cases.

## Discussion

Students reported a high satisfaction rate with the project. The original research design and data collection experience, along with McNair program support and close relationships with faculty, were instrumental in each student achieving their expressed goals. JE graduated with a bachelor's degree in Anthropology and entered the graduate GIS program at Idaho State University to work toward his goal of practicing forensic archaeology. TS, a current Psychology and Justice Studies dual major, has been awarded an internship with the non-profit Justice Research and Statistics Association in Washington, D.C.

Regarding her experience with the McNair program and this project, TS stated that, "I had previously never done research or worked on a project of this scale. What I liked about this research is that it was local, and I felt like I was helping New Hampshire Law Enforcement find better resources to use for cases involving skeletal remains." JE furthered this sentiment by saying, "Being a student in a program like TRIO McNair gave me a reason to learn how to further my research skills. . . . The ability to get hands-on experience and see how it will twist, turn, or end is fascinating from a research perspective, especially at an undergraduate level where you may or may not see that. I learned to guide myself with help/guidance from faculty members on how to further my educational interests."

Designing research surveys allowed students to gain experience with the IRB application process and the nuances of human subjects research and ethics. For students interested in pursuing forensic anthropology at the graduate level, these survey projects may be their only exposure to IRB procedures, as research involving deceased human subjects is not bound to IRB approval in most cases. IRB experience and training from the Collaborative Institutional Training Initiative (CITI), a web-based program, are widely applicable to other careers adjacent to anthropology and can help students market their anthropology backgrounds.

Importantly, students also presented their original research at several undergraduate conferences. Whether applying for graduate school or entering the workforce, practice presenting data and summarizing results for the lay public is a necessary skill for students to obtain. Both students are interested in remaining in a criminal justice field where they will need to prepare for jobs that unite scientific data and cultural interpretations.

Finally, an important by-product of these student-led surveys was the creation of new networks and contacts with law enforcement departments who are now more aware of the skills and ability of forensic anthropologists and their students. The students also made important personal connections with local and regional agencies before graduation. In general terms, these testimonials reflect the overall advantages expressed by scholars assessing the benefits of ETL, but certainly more quantitative data can be

used to assess the post-graduate benefits of the experiential learning components of TRIO McNair and its application to e-learning.

## Conclusions

We invite other forensic anthropology professors who have undergraduate students interested in forensic research to utilize the simple but effective questions from our surveys. In a present and post-pandemic academic setting, forensic anthropology professors may find themselves struggling to generate meaningful low-cost research projects for students interested in forensics. This directed survey approach resulted in increased visibility at the state level for our research labs (leading to more casework and, hopefully, more expedient identifications). These projects also allowed students to deeply consider how effective communication of scientific information to law enforcement is a critical piece of the identification process in the United States. While our students may have initially desired to work directly with human remains in a forensic laboratory, they reported high satisfaction with their remote research projects.

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## References

- Autor, David H. 2014. "Skills, education, and the rise of earnings inequality among the 'other 99 percent.'" *Science* 344 (6186): 843–851.  
<https://doi.org/10.1126/science.1251868>.
- Bancroft, Senetta F., Susan Kushner Benson, and Eugenia Johnson-Whitt. 2016. "McNair Scholars' Science, Technology, Engineering, and Mathematics (STEM) Graduate Experience: A Pilot Study." *Mid-Western Educational Researcher* 28 (1): 3–27.
- Baum, Sandy, and Patricia Steele. 2017. *Who goes to graduate school and who succeeds?* Washington, DC: Access Group and Urban Institute.  
[https://www.urban.org/sites/default/files/publication/86981/who\\_goes\\_to\\_graduate\\_school\\_and\\_who\\_succeeds\\_1.pdf](https://www.urban.org/sites/default/files/publication/86981/who_goes_to_graduate_school_and_who_succeeds_1.pdf).
- Bossaller, Jenny S., Jillian Frasher, Sarah Norris, Claire Presley Marks, and Barry Trott. 2015. "Learning about social justice through experiential learning abroad." *Reference and User Services Quarterly* 54 (3): 6–11.  
<https://www.jstor.org/stable/refusersrq.54.3.6>.
- Bradberry, Leigh A., and Jennifer De Maio. 2019. "Learning by doing: The long-term impact of experiential learning programs on student success." *Journal of Political*

- Science Education 15 (1): 94 –111. <https://doi.org/10.1080/15512169.2018.1485571>.
- Carpinelli, John D., Angelo J. Perna, and Linda S. Hirsch. 2017. "The Impact of an Undergraduate Research Program on Students' Attitudes toward and Pursuit of Graduate Studies – A Follow-up Study." In 2017 ASEE Annual Conference & Exposition. <https://doi.org/10.18260/1-2--28975>.
- Fox, L. C., T. Hamrick, and K. Tayebi. 2017. "Transforming lives: Mentoring first generation, minority college students." *The Chronicle of Mentoring and Coaching* 2 (10): 120–126.
- Friesen, Laura, and Rebecca J. Purc-Stephenson. 2016. "Should I stay or should I go? Perceived barriers to pursuing a university education for persons in rural areas." *Canadian Journal of Higher Education* 46 (1): 138–155. <https://doi.org/10.47678/cjhe.v46i1.185944>.
- Garrin, Ashley, and Thelma Harding. 2017. "Learning by Doing: Supporting Future Underrepresented Graduate Students through Exposure to Research." In *Iowa State Conference on Race and Ethnicity (ISCORE)*. <https://www.iastatedigitalpress.com/iscore/article/id/10285/>.
- Geertz, Clifford. 2008. *Local Knowledge: Further Essays in Interpretive Anthropology*. New York: Basic Books.
- Gittens, Cheryl Bailey. 2014. "The McNair program as a socializing influence on doctoral degree attainment." *Peabody Journal of Education* 89 (3): 368–379. <https://doi.org/10.1080/0161956X.2014.913450>.
- Graham, LaKresha. 2011. "Learning a new world: Reflections on being a first-generation college student and the influence of TRIO programs." *New Directions for Teaching and Learning* 2011 (127): 33–38. <https://doi.org/10.1002/tl.455>.
- Ishiyama, John T., and Valerie M. Hopkins. 2003. "Assessing the impact of a graduate school preparation program on first-generation, low-income college students at a public liberal arts university." *Journal of College Student Retention: Research, Theory & Practice* 4 (4): 393–405. <https://doi.org/10.2190/CB17-UENX-N064-U1HQ>.
- Kayes, D. Christopher. 2002. "Experiential learning and its critics: Preserving the role of experience in management learning and education." *Academy of Management Learning & Education* 1 (2): 137–149. <https://psycnet.apa.org/doi/10.5465/AMLE.2002.8509336>.
- Kim, Chang Hwan, Christopher R. Tamborini, and Arthur Sakamoto. 2015. "Field of study in college and lifetime earnings in the United States." *Sociology of Education* 88 (4): 320–339. <https://doi.org/10.1177/0038040715602132>.
- Kolb, D. A. 1984. *Experiential learning: Experience as the Source of Learning and Development*. Englewood Cliffs, NJ: Prentice-Hall.

- Kong, Yangtao. 2021. "The Role of Experiential Learning on Students' Motivation and Classroom Engagement." *Frontiers in Psychology* 12.  
<https://doi.org/10.3389/fpsyg.2021.771272>.
- McClellan, Rhonda, and Adrienne E. Hyle. 2012. "Experiential learning: Dissolving classroom and research borders." *Journal of Experiential Education* 35 (1): 238–252.  
<https://doi.org/10.1177/105382591203500103>.
- Morton, Terrell R., Nestor A. Ramirez, Judith L. Meece, Cynthia Demetriou, and Abigail T. Panter. 2018. "Perceived Barriers, Anxieties, and Fears in Prospective College Students from Rural High Schools." *The High School Journal* 101 (3): 155–76.  
<https://www.jstor.org/stable/90024241>.
- Mueller, J. Tom, Kathryn McConnell, Paul Berne Burow, Katie Pofahl, Alexis A. Merdjanoff, and Justin Farrell. 2021. "Impacts of the COVID-19 pandemic on rural America." *Proceedings of the National Academy of Sciences* 118 (1).  
<https://doi.org/10.1073/pnas.2019378118>.
- Palumbo, Laura. 2018. "Instruction Is Contextual: An Examination of McNair Program Curricula for STEM Scholars and Recommendations Based on the Framework for Information Literacy in Higher Education." *Science & Technology Libraries* 37 (2): 187–210. <https://doi.org/10.1080/0194262X.2018.1456089>.
- Posselt, Julie Renee, and Kim R. Black. 2012. "Developing the research identities and aspirations of first-generation college students: Evidence from the McNair scholars program." *International Journal for Researcher Development* 3 (1): 26–48.  
<https://doi.org/10.1108/17597511211278634>.
- Renbarger, Rachel, and Alexander Beaujean. 2020. "A meta-analysis of graduate school enrollment from students in the Ronald E. McNair post-baccalaureate program." *Education Sciences* 10 (1): 1–15.  
<https://psycnet.apa.org/doi/10.3390/educsci10010016>.
- Schultz, Patrick Francis. "Upon entering college: First semester experiences of first-generation, Rural students from agricultural families," PhD diss., (Colorado State University, 2003).
- Sjöstedt, Roxanna. 2015. "Assessing A Broad Teaching Approach: The Impact Of Combining Active Learning Methods on Student Performance In Undergraduate Peace And Conflict Studies." *Journal of Political Science Education* 11 (2): 204–220.  
<https://doi.org/10.1080/15512169.2015.1030502>.
- Willison, Scott, and Emily Gibson. 2011. "Graduate school learning curves: McNair scholars' postbaccalaureate transitions." *Equity & excellence in education* 44 (2): 153–168. <https://doi.org/10.1080/10665684.2011.558416>.