# Promoting Health Research among Underrepresented Students through the HUI SRC

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#### **Abstract**

The Hawai'i Pacific University Undergraduate Infrastructure Student Research Center (HUI SRC) is focused on increasing participation of historically underrepresented populations, such as Native Hawaiians, other Pacific Islanders (NHPI), and Filipinos, in tomorrow's biomedical and health research workforce. This is achieved by promoting engagement and competency in entrepreneurial biomedical and health research among undergraduate students. The HUI SRC was modeled after the Morgan State University ASCEND SRC funded by the National Institute of General Medical Sciences. The HUI SRC is rooted in the Hawaiian cultural values of ho'oku'i, hui pū'ana, and lōkahi, referring to the physical gathering space of the Student Research Center and the joining of people together around a unifying theme, in this case the pursuit of science. It is committed to intentionally engaging Indigenous knowledge and ways of doing in decolonizing research. This article describes the project and presents evaluation findings of the first year of implementation of the HUI SRC. The center was effective in increasing undergraduate students' science identity. academic self-concept, social self-concept, social support, peer support, and self-efficacy. These HUI SRC findings highlight the potential impact of undergraduate SRCs in expanding the pipeline of biomedical and health researchers from underrepresented populations, particularly among NHPI and Filipinos.

# **Keywords**

student research center, health, undergraduate, Native Hawaiian, Pacific Islander, Filipino

# **Acronyms**

ASCEND = A Student-Centered, Entrepreneurship Development Program BUILD = Building Infrastructure Leading to Diversity Initiative

HUI SRC = Hawai'i Pacific University Undergraduate Infrastructure Student Research Center

HPU = Hawai'i Pacific University

MSU = Morgan State University

NHPI = Native Hawaiian and Pacific Islander

NIH = National Institutes of Health

REDCap = Research Electronic Data Capture

SRC = Student Research Center

Global preeminence in science and technology is contingent on having a highly educated, competent, and diversely represented cadre of well-trained scientists committed to promoting healthy individuals, families, and communities. <sup>1,2</sup> To promote health parity in marginalized communities, a diverse, inclusive, and equitable representation of scientists is imperative. <sup>3-5</sup> In the United States (US), only 10% of the faculty research positions are occupied by African Americans, Hispanics, Native Americans, or Native Hawaiian and Pacific Islanders (NHPIs) collectively,

although they constitute over 30% of the US population. This major leak in the educational pipeline is especially concerning in underrepresented communities, such as NHPI and Filipino communities, where educational pathways to careers in the scientific workforce are filled with challenges and barriers. In response to these challenges, many training programs have successfully exposed diverse undergraduate students to research opportunities in the biomedical and health sciences, facilitating entrance into scientific careers. Although data specific to NHPI and Filipinos are not available, the workforce gap among underrepresented communities still persists.

# **Diversifying the Scientific Workforce**

While the US increased the number of PhD degree holders over the past few decades, 43% of the PhD graduates are males from well-represented backgrounds (defined at Whites, Asians, and non-US residents). While these graduates hold 82% of all full professorships, they only make up 35% of all undergraduate biomedical degree recipients.8 One of the main strategies for diversifying the biomedical workforce is to ensure that undergraduate students from different cultural backgrounds are recruited to participate in biomedical and health science research early in their education and are positioned for graduate school and careers in the scientific workforce. However, undergraduate student persistence, retention, and graduation can be jeopardized by a constellation of factors, including personal, socio-cultural, and environmental influences. 11,12 The need for relevant, evidence-based approaches for optimizing recruitment, education, and training outcomes, particularly of students from underrepresented communities, continues to persist. 1,2,6,8

In 2014, the National Institutes of Health (NIH) supported 10 sites, including Morgan State University (MSU), as part of the Building Infrastructure Leading to Diversity (BUILD) initiative, which is 1 of the core components of the Diversity Program Consortium. The purpose of the BUILD initiative is to develop and test novel programs that support underrepresented undergraduate students in their pursuit of biomedical degrees and careers. As part of this initiative, MSU's A Student-Centered, Entrepreneurship Development (ASCEND) program increased the diversity of undergraduate student researchers and contributed to their sense of science identity, readiness to lead research, and matriculation in research-oriented graduate programs.<sup>13</sup> A novel component of ASCEND is the Student

Research Center (SRC), a student-led organization designed to be a hub for attracting, retaining, training, and engaging underrepresented undergraduate students in biomedical and health science research.

As part of its diversity initiatives, Hawai'i Pacific University (HPU) engaged in the translation and implementation of MSU's ASCEND SRC to promote science identity, academic self-concept, social self-concept, social support, peer support, self-efficacy, and leadership among NHPI, Filipinos, and other underrepresented students at HPU. The overall goal of the HPU Undergraduate Infrastructure Student Research Center (HUI SRC) is to attract, engage, and retain underrepresented undergraduate students in biomedical and health science research, thus preparing them to enter and complete graduate school and secure a career in the scientific workforce. The activities and outcomes of the HUI SRC are outlined in **Table 1**. The purpose of this article is to describe the HUI SRC and to report formative evaluation findings based on its first year of implementation.

### **Methods**

#### **Participants and Data Collection**

Starting in Spring semester 2020, advertisements for HUI SRC members commenced using mechanisms such as classroom-based information sessions, distribution of electronic and paper flyers, postcards to HPU faculty and students, a HUI SRC website, social media campaigns (eg, Facebook, Instagram, Twitter, Snapchat), and presentations at different student-oriented and freshman orientation events. These methods were intended to create awareness of the benefits of HUI SRC among students, faculty, and administrators at HPU. All students enrolled at HPU

were eligible to participate in student-level evaluations and interviews regardless of their age, gender, race, citizenship status, classification, major, and other demographic and background characteristics. As a whole, all students received campus-wide surveys to determine the efficacy and impact of the HUI SRC training and mentoring approaches on the HPU student body.

The project protocol was approved by the HPU Institutional Review Board as an Exempt study (Protocol #560420035). Data were collected and managed using a secure web-based survey and database Research Electronic Data Capture (REDCap; Vanderbilt University, Nashville, TN) hosted at the lead author's institution. At the beginning of the Spring 2020 semester, students were able to sign up for the HUI SRC by completing an online interest form that included demographic information. Students providing consent were directed to complete an online baseline survey (~20-minutes). At the end of the semester (May 2021), a weblink for the post-survey was sent to the students who completed the baseline survey. Each student participant was offered a \$5.00 electronic gift card per survey.

### Research Design

The program employed a retrospective pre-test and a pre- and post-test study design. A comparison group was not employed in this project, and participants served as their own controls. Specifically, HUI SRC students were asked to evaluate their levels of agreement on items related to 7 outcome areas—science identity, academic self-concept, personal and social self-concept, peer support for research and science, social support, science self-efficacy, and leadership—at baseline (see **Table 2**). Then, in May 2021, they were asked to rate themselves again and also to retrospectively rate their pre-involvement status in the

Table 1. Activities of the Hawai'i Pacific University Undergraduate Infrastructure Student Research Center (HUI SRC) to Promote Health Research among Underrepresented Strudents, School Year 2020-2021						
Activities	Frequency	Desired Outcomes				
Extracurricular	Extracurricular					
Social events; health-related activities (eg, blood drives)	Bi-monthly	Enhanced peer and social support				
Research Training						
Presentations from grant-funded researchers (Inspiration Series)	Every other month	Developing entrepreneurial thinking skills, increased science communication, enhanced science self-efficacy				
Mentorship from research-active faculty from HPU and the University of Hawai'i	Ongoing					
Entrepreneurial-Style Research						
Student-initiated, competitive pilot awards (Health Research Concepts Competition)	Tri-annually	Developing research knowledge and skills, increased leadership and teamwork competency, enhanced science identity				
Dissemination						
Funding for student-led presentations and publications	Annually	Developing communication skills, enhanced scientific writing and analytic competency, pursuit of graduate health research training				
Professional development workshops (eg, resume building, writing graduate school applications)	Annually					

7 outcome areas. Compared with traditional pre- and post-test designs, retrospective pre-tests have proven to be more effective and accurate to capture change as a result of an intervention. <sup>14</sup> It was hypothesized that students would have an inflated sense of accomplishment or ability prior to the intervention, and the more they learned through the HUI SRC, the more likely they were to accurately gauge their growth in learning.

#### Measures

The following demographic variables were collected: age, sex, race, ethnicity, major, grade, school year, educational goal, and level of research interest (scored from 0 to 100). Measures for the questionnaire were adapted from Morgan State University's ASCEND and/or the College Freshman Survey and College Senior Survey developed by University of California at Los Angeles.<sup>15</sup>

# Science Identity

The science identity construct used a 5-point Likert scale to describe how a student seeks to be a scientist. It was measured by 6 items (see **Table 2**). The Cronbach's Alpha coefficient of this scale was good to excellent (0.86 for pre-test items and 0.92 for post-test items). <sup>16</sup> These items were averaged to evaluate overall science identity.

# Academic Self-concept

For this construct, students were asked to rate themselves on certain traits to measure how well they felt they could learn compared with the average person their age on a 5-point Likert scale (1 = lowest 10%, 2 = below average, 3 = average, 4 = above average, and 5 = highest 10%) (see **Table 2**). The reliability of this project's outcomes was acceptable at post-test (Cronbach's alpha = 0.62 at baseline, 0.73 at post-test). These items were averaged to evaluate overall academic self-concept.

# Social Self-concept

For this construct, students were asked to rate themselves on certain traits to measure how they perceived themselves in relation to others compared with the average person their age on a 5-point Likert scale similar to that for the academic self-concept (see **Table 2**). In this project, its reliability was good (Cronbach's alpha = 0.81 at baseline, 0.88 at post-test). <sup>16</sup> These items were averaged to evaluate overall social self-concept.

#### Peer Support

The peer-support section was comprised of seven, 5-point Likert items (1 = 0-1, 2 = 2-4, 3 = 5-7, 4 = 8-10, 5 = >10) asking about the number of friends or peers available to support one's research and/or scholarship (see **Table 2**). In this project, its reliability was good to excellent (Cronbach's alpha = 0.82 at baseline, 0.91 at post-test). <sup>16</sup> These items were averaged to evaluate the overall size of one's peer support network.

# Social Support

The social support measure was composed of eighteen, 5-point Likert items (see **Table 2**). In this project, its reliability was good to excellent (Cronbach's alpha = 0.86 at baseline, 0.96 at post-test). <sup>16</sup> These items measured a person's perception of social support from family, peers, and the educational community.

# Self-efficacy

This domain includes ten, 5-point Likert items examining students' research self-efficacy by asking how confident they felt about performing various research-related tasks (see **Table 2**). Responses were recorded on a 5-point Likert scale from 1 = not at all, 2 = somewhat, 3 = moderately, 4 = very, and 5 = absolutely. The Cronbach's Alpha coefficient of this scale was excellent (0.91 for pre-test items and 0.96 for post-test items). <sup>16</sup> The items were averaged to evaluate overall self-efficacy.

# Leadership

The leadership construct consisted of four, 5-point Likert items (see **Table 2**). In this project, its reliability was good (Cronbach's alpha = 0.83 at baseline, 0.88 at post-test). <sup>16</sup> These items were averaged to evaluate overall leadership.

# **Statistical Analysis**

Frequencies and percentages for categorical variables and means and standard deviations for continuous variables were reported to describe baseline demographics. Bivariate analyses were conducted to compare students who completed the post survey and students who did not complete the post survey, using 2 sample t-tests or Fisher's exact tests. Then, paired t-tests were performed to compare between baseline and posttest and between retrospective pretest and posttest. All analyses were implemented in SAS 9.4 (SAS Institute, Cary, NC) and P < .05 was considered statistically significant.

Table 2. Measures Used for Pre- and Post-Surveys of Hawai'i Pacific University Undergraduate Infrastructure Student Research Center (HUI SRC) Participants, School Year 2020-2021

Measure	Items	Scores
Science identity	To what extent are the following statements true of you?  (1) I am interested in scientific research  (2) My research interests include health and biomedical studies  (3) I have a strong sense of belonging to the community of biomedical scientists  (4) I derive personal satisfaction from contributing to a team that is doing important research  (5) I think of myself as a biomedical student  (6) I feel like I belong in the field of science	1=strongly disagree 2=disagree somewhat 3= neutral 4=agree somewhat 5=strongly agree
Academic self-concept	Rate yourself on each of the following traits as compared with the average person your age to provide the most accurate estimate of how you see yourself.  (1) Academic ability (2) Drive to achieve (3) Mathematical ability (4) Intellectual self-confidence	1=lowest 10% 2=below average 3=average 4=above average 5=highest 10%
Social self-concept	Rate yourself on each of the following traits as compared with the average person your age to provide the most accurate estimate of how you see yourself.  (1) Leadership ability (2) Public speaking ability (3) Social self-confidence	1=lowest 10% 2=below average 3=average 4=above average 5=highest 10%
Peer support	Indicate the number of friends (peers or near-peers) for each items.  (1) Who can help them if they have a question about their research (2) Who are ready to work with them on their research (3) Who helps with their research (4) Who encourage them to do research (5) Who encouraged them to apply to graduate school (6) Who encourages them to engage in research (7) Who have the same goal of getting into graduate school and becoming researchers	1=0-1 2=2-4 3=5-7 4=8-10 5=>10
Social support	To what extent are the following statements true?  (1) My family thinks it is important that I do research (2) My family thinks it is important that I continue my education as a graduate student (3) I belong to an elite group of student researchers (4) I am determined to pursue a career in health research (5) I am determined to pursue graduate training (6) HPU appreciates my talent in research (7) HPU faculty motivate and support me to pursue a research career (8) I can count on a support network that encourages me to continue my research when I feel frustrated (9) I have great self-esteem about research (10) I have many friends who can answer my research questions (11) I have great access to a support group who can answer may questions about graduate school applications (12) I feel included in the HPU student community (13) I care about what happens at HPU (14) I belong to HPU student community (15) I have a forum to provide my opinion about what happens at HPU (16) I have fair access to educational and research opportunities (17) HPU students care about my opinion (18) I enjoy being a HPU student.	1=strongly disagree 2=disagree 3=no opinion 4=agree 5=strongly agree
Self-efficacy	Indicate your level of confidence in your ability to: (1) using technical science skills (use of tools, instruments, and/or techniques) (2) generating a research question (3) determining how to collect appropriate data (4) explaining the results of a study (5) using scientific literature to guide research (6) integrating results from multiple studies (7) asking relevant questions (8) identifying what is known and not known about a problem (9) understanding scientific concepts (10) seeing connections between different areas of science and mathematics	1=not at all 2=somewhat 3=moderately 4=very 5=absolutely
Leadership	To what extent are the following statements true of you?  (1) I am an effective leader  (2) I have effectively led a group to a common purpose  (3) I have held an official leadership position in an organization  (4) I have provided leadership to an organization, whether or not I held an official position	1=strongly disagree 2=disagree 3=no opinion 4=agree 5=strongly agree

HPU = Hawai'i Pacific University

#### **Results**

From a total of 77 students who completed the interest form, 51 of them completed the baseline survey. Of the students who completed the baseline survey, 31 of them completed the post-test survey. No significant difference was identified in the demographics between students who finished the post-survey and those who did not, except for college major and ethnicity (Table 3). Compared to non-completers, post-survey completers had a higher percentage of psychology majors (25% of completers versus 3% of non-completers, P = .03) and Hispanics (40%) versus 13%, P = .04). Of the 51 who completed the baseline survey, the average age of the student participants were 21.4 years (SD = 3.0). Most of them were female (80%) and had an educational goal of finding jobs related to their majors after graduation. The 5 majors most represented by project participants were biology (24%), marine biology (22%), biochemistry (20%), nursing (16%), and psychology (12%). Participants

reported 12 different majors across the university (see **Table 3** for full list). Thirty-nine percent were in their junior year and had a GPA of 3.7-4.0. Of those who completed the post-test, 23% identified as Filipino, 13% as NHPI, 45% as White, 13% as other Asian, and 13% as other.

**Table 4** shows the comparison between baseline and post-test and between retrospective pre-test and post-test in the outcome measures. Overall, students overestimated their abilities in all measures upon baseline, with baseline scores higher than retrospective pre-test scores in science identity, academic self-concept, personal and social self-concept, peer support for research and science, social support, science self-efficacy, and leadership. When asked to re-assess these scores retrospectively, student participants rated themselves lower on baseline and higher on post-test. Comparing retrospective pretest scores with posttest scores, and there were significant improvement in all of the outcome measures (P < .01) except leadership (P = .70).

Variable	Total (N=51) No. (%) <sup>b</sup>	Post-			
		Completed (N=31) No. (%)	Not completed (N=20) No. (%)	<i>P</i> -value <sup>a</sup>	
Age (Mean ± SD)	21.4 ± 3.0	21.6 ± 3.4	20.9 ± 2.1	.44	
Research Interest (Mean ± SD)	81.9 ± 25.2	82.1 ± 24.3	81.5 ± 27.3	.94	
Sex					
Male	10 (20%)	6 (19%)	4 (20%)	>.99	
Female	41 (80%)	25 (81%)	16 (80%)	2.55	
Ethnicity					
Hispanic	12 (24%)	4 (13%)	8 (40%)	.042	
Non-Hispanic	39 (77%)	27 (87%)	12 (60%)	.042	
Race					
NHPI	5 (10%)	4 (13%)	1 (5%)		
Filipino	9 (18%)	7 (23%)	2 (10%)		
Other Asian	7 (14%)	4 (13%)	3 (15%)	.2	
White	22 (43%%)	14 (45.2%%)	8 (40.0%)		
Other	8 (16%)	2 (6%)	6 (30%)		
Status					
Freshman	7 (14%)	3 (10%)	4 (20%)	.39	
Sophomore	9 (14%)	6 (19%)	3 (15%)		
Junior	20 (39%)	14 (45%)	6 (30%)		
Senior	10 (20%)	4 (13%)	6 (30%)		
Other	5 (10%)	4 (13%)	1 (5%)		

Table 3. Hawai'i Pacific University Undergraduate Infrastructure Student Research Center (HUI SRC) Participant Characteristics, School Year 2020-2021 (Con't)

Variable	Total (N=51) No. (%) <sup>b</sup>	Post-				
		Completed (N=31) No. (%)	Not completed (N=20) No. (%)	<i>P</i> -value <sup>a</sup>		
Majora		·				
Biochemistry	10 (20%)	4 (13%)	6 (30%)	.163		
Biology	12 (24%)	9 (29%)	3 (15%)	.32		
Marine Biology	11 (22%)	7 (23%)	4 (20%)	>.99		
Biomedical Engineering	2 (4 %)	1 (3%)	1 (5%)	>.99		
Chemistry	2 (4%)	0 (0%)	2 (10%)	.149		
Communication Studies and Practices	2 (4%)	2 (7%)	0 (0%)	.51		
Environmental Science	1 (2%)	1 (3%)	0 (0%)	>.99		
International Studies	1 (2%)	1 (3%)	0 (0%)	>.99		
Nursing	8 (16%)	7 (23%)	1 (5%)	.127		
Psychology	6 (12%)	1 (3%)	5 (25%)	.029		
Public Health	2 (4%)	2 (7%)	0 (0%)	.51		
Social Work	4 (8%)	1 (3%)	3 (15%)	.29		
GPA						
<3.2	14 (27%)	6 (19%)	8 (40%)	.141		
3.3-3.6	14 (28%)	11 (36%)	3 (15%)			
3.7-4.0	23 (45%)	14 (45%)	9 (45%)			
Educational Goal <sup>c</sup>						
Job related to my major	37 (73%)	23 (74%)	14 (70%)	.74		
Job not related to my major	2 (4%)	2 (7%)	0 (0%)	.51		
Graduate school in science	26 (51%)	16 (52%)	10 (50%)	.91		
Graduate school outside the Sciences	6 (12%)	2 (7%)	4 (20%)	.195		
Medical degree	16 (31%)	12 (39%)	4 (20%)	.22		
Pharmacy	2 (4%)	1 (3%)	1 (5%)	>.99		
Dentistry or Veterinary degree	9 (18%)	7 (23%)	2 (10%)	.45		
Other	5 (10%)	1 (3%)	4 (20%)	.071		

Table 4. Comparison of Outcome Measures for Student Participation in the Hawai'i Pacific University Undergraduate Infrastructure Student Research Center (HUI SRC), School Year 2020-2021

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Outcome <sup>a</sup>	Baseline (N=51)	Retrospective Pretest (N=31)	Posttest (N=31)	<i>P</i> -value: Baseline vs Posttest <sup>b</sup>	P-value: Retrospective Pretest vs Posttest <sup>b</sup>
Science identity	4.2 ± 0.7	3.8 ± 1.0	$4.2 \pm 0.9$	.75	.001
Academic self-concept	$3.8 \pm 0.6$	$3.7 \pm 0.7$	$3.8 \pm 0.7$	.62	.005
Social self-concept	$3.9 \pm 0.8$	$3.7 \pm 0.9$	$3.8 \pm 0.8$	.49	.005
Social support	$3.9 \pm 0.5$	$3.7 \pm 0.6$	4.0 ± 0.7	.37	.003
Peer support	2.2 ± 0.7	1.9 ± 0.9	2.4 ± 0.9	.16	<.001
Self-efficacy	$3.7 \pm 0.7$	$3.5 \pm 0.8$	$3.8 \pm 0.8$	.45	<.001
Leadership	4.3 ± 0.6	$4.0 \pm 0.8$	4.1 ± 0.8	.31	.7

<sup>&</sup>lt;sup>a</sup> All measures were averaged over multiple Likert type scale questions scored 1-5 (see Table 2).

NHPI = Native Hawaiian or Pacific Islander, GPA = grade point average

a P-value was calculated based on Chi-square test, Fisher's exact test, or two sample t test.

<sup>&</sup>lt;sup>b</sup> The sum of percentages may not be 100% due to rounding.

<sup>&</sup>lt;sup>c</sup> Multiple answers allowed.

<sup>&</sup>lt;sup>b</sup> Paired-sample t-tests were used to calculate the *P*-value.

#### **Discussion**

Rooted in the commitment to social justice and founded on an entrepreneurial research training model established by MSU's ASCEND SRC, the goal of the HUI SRC is to develop a diverse cadre of biomedical and health researchers from underrepresented communities. This was achieved through opportunities to develop undergraduate students' science identity, confidence in leading research, and interest in graduate school and the scientific workforce. Perceptions of leadership were not significantly improved, which may have reflected either high confidence in students' leadership ability from the beginning or a misunderstanding of the meaning of the concept. Furthermore, peer support in science was relatively low, which may have been an artifact of COVID-19 restrictions. Future research needs to examine the role of peers and peer support in engagement and persistence in health and biomedical research.

Compared with other ethnic groups, there were relatively few NHPI and Filipino students that participated in the HUI SRC. Although NHPI and Filipino students were not underrepresented compared to their proportion in the HPU student body, it is important to note that these students are minoritized at the university and have historically struggled with socio-economic barriers to accessing higher education and a lack of a sense of belonging in a system built for a dominant culture.8-9 As evidenced by the high numbers of biology, marine biology, and biochemistry majors in the HUI SRC, the findings from this project may have been biased toward biomedical majors. This bias was perhaps due to preconceived notions around exclusivity of biomedical research to only health sciences and biomedical majors. The COVID-19 pandemic also impacted the recruitment, engagement, and survey participation for the HUI SRC, potentially for NHPI and other represented students, resulting in a small sample size.

# **Limitations**

The reliance on a participant's ability to recall information in a period of time could be a limitation of the retrospective pretest design. Additional investigation is needed to understand how use of the retrospective pre-test may be appropriate for formative evaluations of institutional interventions that engage undergraduate students in research, as opposed to traditional pre/post-test designs.

# Implications for Future Research, Policy, and Education

The initial results of this project have positioned HUI SRC to make valuable contributions to a diverse, inclusive biomedical and health research workforce with implications for future research, policy, and education. Bernard, et al point out the fact that science and medicine workforces continue to lack diversity. 
<sup>17</sup> However, the NIH BUILD<sup>18</sup> and UNITE<sup>19</sup> initiatives are com-

mitted to further funding workforce diversity and measuring success. The HUI SRC embodies and contributes to advancing justice, equity, diversity, and inclusion at HPU.

In terms of implications for bridging higher education to the biomedical and health care workforce, efforts that engage students earlier and more effectively in real-world health research opportunities should result in retention, better-trained students, and better-informed citizens with abilities to critically think and generate solutions to address societal problems, particularly related to health and well-being of NHPI, Filipinos, and other underrepresented communities. <sup>13</sup> The HUI SRC provides the structure to bridge education to workforce through knowledge expansion, mentorship, and entrepreneurial research activities. Such structures can help in overcoming the challenges of, and leverage the opportunities incumbent with, the environment of a small private liberal arts university.

#### **Conclusions**

These findings provided formative evidence that the HUI SRC was effective in increasing students' confidence and perceived competence in conducting entrepreneurial biomedical and health research at a minority serving undergraduate institution. As a result of the formative evaluation of the SRC, more training, mentorship, and support for HUI SRC students will be provided in leadership within multidisciplinary research teams, and more targeted recruitment, engagement, and support of NHPI and Filipino students as HUI SRC members and primary researchers will be implemented. The ongoing implementation and assessment of this program at HPU will provide key data to evaluate the portability and potential broader implementation of this model in expanding access for underrepresented groups in biomedical research careers, particularly Native Hawaiians, other Pacific Islanders, and Filipinos.

# **Conflict of Interest**

None of the authors identify a conflict of interest.

# **Disclosure**

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# References

- National Academies of Sciences, Engineering, and Medicine. The next generation of biomedical and behavioral sciences researchers: Breaking through. National Academies Press; 2018.
- National Academies of Sciences, Engineering, and Medicine. Minority serving institutions: America's underutilized resource for strengthening the STEM workforce. National Academies Press: 2019.
- Hart MB, Moore MJ, Laverty M. Improving Indigenous health through education. Med J Aust. 2017;207:11-12.
- Moy E, Mau MK, Raetzman S, et al. Ethnic differences in potentially preventable hospitalizations among Asian Americans, Native Hawaiians, and other Pacific Islanders. Ethn Disease. 2013;23(1):6-11.
- Zimmerman E, Woolf SH. Understanding the relationship between education and health. NAM Perspect. 2014.
- Valantine HA, Collins FS. National Institutes of Health addresses the science of diversity. Proc Natl Acad Sci. 2015;112(40):12240-12242.
- Mokuau N, Garlock-Tuialii J, Lee P. Has social work met its commitment to Native Hawaiians and other Pacific Islanders? A review of the periodical literature. Soc Work. 2008;53(2):115-121.
- Valantine HA, Lund PK, Gammie AE. From the NIH: A systems approach to increasing the diversity of the biomedical research workforce. CBE Life Sci Educ. 2016;15(3):fe4.
- Valantine H, Wilson R. NIH scientific workforce diversity actions and progress: 2014-2019. Oral presentation at: 118th Annual ACD Meeting; June 13th, 2019; Bethesda, MD.
- McGee Jr R, Saran S, Krulwich TA. Diversity in the biomedical research workforce: developing talent. Mt Sinai J Med. 2012;79(3):397-411.

- Hernandez JC, Lopez MA. Leaking pipeline: Issues impacting Latino/a college student retention. J Coll Stud Ret. 2004;6(1):37-60.
- Teranishi R, Rose A, Gutierrez A, et al. Native Hawaiians and Pacific Islanders in Higher Education. Accessed on July 26, 2023. https://apiascholars.org/wp-content/uploads/2020/01/ Native-Hawaiians-and-Pacific-Islanders-in-Higher-Education.pdf.
- Kamangar F, Silver G, Hohmann C, et al. An entrepreneurial training model to enhance undergraduate training in biomedical research. BMC Proc. 2017;11(suppl 12):18.
- O'Leary J, Israel G. Capturing change: Comparing pretest-posttest and retrospective evaluation methods. Gainsville, FL: University of Florida IFAS Extension; 2013. Report No. WC135.
- Higher Education Research Institute. College Senior Survey. Accessed on July 26, 2023. https:// heri.ucla.edu/college-senior-survey/
- Taber KS. The use of Cronbach's alpha when developing and reporting research instruments in science education. Res Sci Educ. 2018;48(6):1273-1296.
- Bernard MA, Johnson AC, Hopkins-Laboy T, Tabak LA. The US National Institutes of Health approach to inclusive excellence. Nat Med. 2021;27(11):1861-1864.
- National Institute of General Medical Sciences. Building Infrastructure Leading to Diversity (BUILD) Initiative. Accessed on August 8, 2023. https://www.nigms.nih.gov/training/dpc/pages/build.aspx
- National Institutes of Health. Ending Structural Racism: UNITE. Accessed on August 8, 2023. https://www.nih.gov/ending-structural-racism/unite