

**A. COVER PAGE**

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<b>Program Director/ Principal Investigator</b> Rachael Jones	<b>Administrative Official Information</b> Robert De Jesus
<b>Change of Contact PD/PI:</b> N/A	
<b>Human Subjects:</b> N/A	<b>Vertebrate Animals:</b> N/A
<b>hESC:</b>	<b>Inventions/Patents:</b> None

**B. ACCOMPLISHMENTS****B.1. What are the major goals of the project? (8000 characters)**

The major goals of the SCERC are to: 1) educate students to become professionals in Industrial Hygiene (IH), occupational and environmental health nursing (OEHN), and occupational medicine (OM), 2) to provide continuing education for professionals and non-professionals in the field, 3) to proliferate occupational safety and health activities through outreach to other educational institutions, 4) to conduct and facilitate research and research training addressing occupational health and safety issues, 5) to be an occupational safety and health resource to organizations, 6) to instill an appreciation for the interdisciplinary nature of occupational health in trainees and professionals in the field, 7) to respond to the changing nature of occupational health and safety problems. The SCERC is comprised of three academic programs (industrial hygiene, occupational and environmental health nursing, and occupational medicine), two research training programs (Targeted Research Training and Pilot Project Research Training), a Continuing Education Program, an Outreach Program and the Planning and Evaluation Core. In the application, the strategic plan identified the following activities for the performance period:

*a. The SCERC will:*

1. Continue to provide high quality professional training at the Masters level and research training at both the Masters and Doctoral levels.
2. Increase emphasis on research training for all academic programs.
3. Expand doctoral research training in allied academic programs such as epidemiology, occupational health psychology, and public health and support NORA-related dissertation research for students in these programs.
4. Utilize both old and new technologies to provide an interdisciplinary experience for trainees.
5. Explore ways to help revitalize occupational safety training in the region.
6. Continue to reach out to recruit and support a diverse student population.
7. Continue to provide service to the diverse population and business community in Region IX.
8. Evaluate its programs and impact on a regular basis utilizing a formal process

*b. Individual Core Academic Programs will:*

1. Continue to evolve to reflect the changing fields of occupational health and safety.
2. Develop and implement recruiting plans to ensure a good supply of well-qualified applicants from diverse backgrounds.
3. Expand doctoral level training to add more depth to the existing programs and in order to meet increasing demand for new faculty due to accelerating retirement rates of existing OH faculty.

*c. Research Training Core Programs will:*

1. Increase NORA-related research activity in core and allied training programs
2. Increase research productivity in terms of peer-reviewed publications and new research grants
3. Foster r2p projects directly benefitting vulnerable low wage immigrant worker populations

*d. Continuing Education and Outreach Programs will:*

1. Continue to offer courses that occupational safety and health professionals rely on to maintain their credentials and keep up to date in their profession.
2. Respond to needs assessments by changing existing or creating new courses as best practices and technologies change and emerge.
3. Continue to seek grants to expand the knowledge and skills of occupational health and safety to supervisors, health and safety committees, labor, and workers.
4. Expand course offerings regionally beyond the Los Angeles area including Orange County, Arizona, Nevada, and Hawaii.
5. Expand online course offerings including asynchronous CE online courses and podcasts

**B.2. What did you accomplish under these goals?**

Briefly, during the performance period, the SCERC:

- provided financial support as tuition and fees and /or stipend to 98 individual pursuing graduate or post-graduate training (44 OEHN, 8 TRT, 36 IH, 10 OM);
- awarded 22 pilot project research grants that spanned 14 domains of the NORA;
- delivered continuing education to 6,329 learners (52,752 contact hours) in a variety of OSH disciplines;
- faculty and trainees were actively engaged in research activities, including extensive publication in the peer-reviewed literature;
- reached out to OSH professionals, workers and community groups through social media, educational infographics, development and delivery of free webinars related to COVID-19, mental health and regulatory updates; and
- organized and co-sponsored local and regional conferences and events, among other activities.

### ***Planning and Evaluation Core***

Significant progress has been made on most SCERC aims. The SCERC continued to provide high quality professional training at the Masters and Doctoral levels and to graduate occupational safety and health professionals and researchers to address the needs of the workforce in Region IX, and beyond. During the past project period, there were 11 trainees in the OMR program. One hundred percent of the OMR graduates for more than the past 15 years have taken and passed the board examination and become board certified in occupational medicine. The IH program had 36 NIOSH supported trainees, 1.67 times the number as in the 2012-2016 project period and 50% of the 2021 graduating cohort were from underrepresented minorities (URM). The OEHN program had 44 trainees who received NIOSH support, with 70% of the 2021 MSN graduating cohort URM. Progress on diversity of trainees reflects effective recruitment and retention strategies. The PPRT funded 23 projects (total funding for projects was \$229,168). Applicants to the Pilot Project Research Training increased over the period to a high of 14 in the last funding cycle of the project. TRT and Pilot Project Training research covered 14 different NORA priority areas. SCERC trainees received numerous awards, all were invited to give presentations at local and/or national venues, and they published 65 peer reviewed papers with other manuscripts in preparation or under review. CE averaged ~1,000 participants annually with >12,000 contact hours. SCERC faculty and external advisory boards explored revitalizing the occupational safety training in the region. In response, the IH program made EHS 259B Workplace Safety a required course to satisfy the need for more safety courses. This will complement the existing required course EHS259A Safety and Ergonomics.

Evaluation of programs and impact were conducted by obtaining systematic feedback from advisory boards/groups (External Advisory Boards and Practice Expert Groups), trainee evaluations of courses/activities (example, the faculty and student evaluations of the interdisciplinary training course EHS 230 A,B,C, interdisciplinary clinical case conferences, CE courses and Outreach activities and presentations); and review of indicators to assess productivity and impact with program Logic Models. Data was used for effective continuous program quality improvement, and strategic planning for the next five years.

Expansion of doctoral research training into multiple allied academic programs was not realized. Going forward, we have proposed an academic training program in Occupational Epidemiology with faculty on both UCI and UCLA campuses, as both have added new faculty with strong research programs in occupational epidemiology (Dr. Jian Li at UCLA and Dr. David Richardson at UCI). The TRT program will then refocus emphases on interdisciplinary training that builds on the success of the SCERC initiative in work organization at UCI and the strong toxicology research at UCI; and UCLA expertise related to secondary prevention of chronic disease, particularly cardiovascular disease; and both campuses will provide targeted research training in occupational health disparities research. All of these are areas with urgent needs in Region IX and beyond.

Two new faculty members have joined the SCERC core faculty. Candace Tsai, ScD, CIH, MS, was appointed as Associate Professor in EHS, and Deputy Director of the IH program, and started in November 1, 2020. Her research focus is on nanoparticles, nanotechnology and emerging technologies. Jian Li, MD, PhD came to UCLA in 2019 as a full professor with a split appointment between the Department of EHS Fielding School of Public Health and School of Nursing. He is the Program Director of the UCLA TRT program. He has a strong track record in interdisciplinary occupational health research, research management, and research methods ranging from population-based epidemiological studies to company-based interventional research. His research addresses psychosocial, organizational, and physical factors in the workplace, chronic disease of the cardiovascular and psychosomatic systems, among vulnerable working populations particularly.

The SCERC Executive Committee developed a new initiative, “*Leadership and Professional Development*” led by Dr. Poursan Faghri, that began to be piloted in Fall 2021. This initiative was based upon trainee feedback on the 2016 needs assessment (pre-COVID-19) plus 2020 needs assessment data, and focus groups held separately with Doctoral and Masters trainees in 2021. Trainees indicated on each of these assessments that they wanted more training and experiences in leadership and communication skills with employers and diverse worker populations. The goal of the leadership and professional development initiative is outreach to a diverse group of workplaces and employers to secure internships and clinical rotations that promote competency in trainee communication and leadership within diverse workplaces with diverse worker populations. The initiative has both intra- and interdisciplinary activities. The aims of the new program are, 1) Identify gaps, forecast future workforce trends and needs, and recommend/advise program directors as a way to keep SCERC training responsive to the rapid changes in work, workforces and OSH; 2) promote occupational health professional development of trainees by identifying and securing innovative fellowship, mentored opportunities inclusive of diverse employers, diverse worker populations, and workers in standard and nonstandard work arrangements; 3) enhance collaboration and partnerships with state and local health departments, employers, labor organizations, and others to develop internship programs and facilitate future employment of trainees. Dr. Faghri, who will lead the program, joined the SCERC during the past project period as an Adjunct Professor. She is well suited to lead the program with 25 years of academic and professional leadership experiences in OSH and exposure hazards evaluation at the workplace.

During COVID-19, UCI and UCLA moved to a distance learning format. The EHS230A-C course series had been taught in-person at UCLA with video streaming to UCI. However, as faculty adapted to maximize teaching effectiveness in a zoom format, it became evident that the distance learning increased participation by the SCERC External Advisory Board, as well as SCERC faculty not teaching the course, but attended because they enjoyed the interdisciplinary interactions with trainees. Using feedback from trainees, faculty, and External Advisory Board members, we decided to retain the zoom format going forward.

### ***Occupational and Environmental Health Nursing***

Progress on achieving the goals and objectives of the OEHN Program is evidenced by support for 44 OEHN trainees who received tuition and fee support from NIOSH (37 MSN; 7 PhD). The OEHN Program had a steady stream of admissions throughout the five years, plus every trainee who entered the program graduated (n=32) or is “*in progress*” toward graduation with good academic standing (n=12). Approximately 80% of graduates reported employment in OSH or currently pursuing employment in OSH. Many graduates were offered employment by their clinical rotation sites immediately after graduation. This attests to the strength of our applicants, strengths of the program in preparing trainees for roles in OSH, and the great need for OEHNs with graduate education to meet the OSH needs of the workforce locally and in Region IX. There are only two Commission on Collegiate Nursing Education (CCNE) accredited graduate level occupational health nursing programs in Region IX.

The OEHN program is located in one of the most densely populated and highly diverse areas of the nation, where ~30% of the population are foreign born, and nearly half of the population speak a language other than English at home.<sup>3</sup> The SCERC OEHN program has a reputation as a reliable source of top caliber OEHN graduates to address the needs of this diverse workforce. During the past project period, underrepresented minorities (URM) in the Masters' program increased to over 70% of the 2021 graduating class, and 52% were multilingual. All PhD graduates have assumed university positions as faculty in Schools of Nursing.

### ***Occupational Medicine***

Dr. Alya Khan has taken over leadership of the Occupational Medicine (OM) program. Dr. Khan has double board certifications in Internal Medicine and Occupational Medicine, and has been clinical faculty and preceptor to the residents since May 2014 and Residency Director since 2018. There was overlap between Dr. Boomus and Dr. Khan to ensure a smooth transition. Importantly, Dr. Dean Baker, prior program director, remained in the program as active faculty until 2019. Dr. Khan has introduced didactics in the residency program around career preparation for residents in order to provide practical structure to residents' post-graduation plans. Most notably, Dr. Khan has created a formalized mentoring program for the residents utilizing OEM professionals, mostly from the Resident Advisory Committee. With Dr. Khan's experience precepting residents, formal training by UC Irvine GME, faculty mentors, and teaching experience and training, she has developed skills that foster resident success and well-being. Faculty mentors have been provided training in implicit bias, GME training (required for new faculty) and opportunity to participate in UCI LIGHT program for enhancing teaching and leadership skills. Dr. Khan has also been an active member of the ACOEM Presidential Taskforce on the Future of Occupational and Environmental Medicine, particularly in looking for additional funding for all OEM residency training programs. Dr. Khan co-authored a position statement for ACOEM on the "Future of Occupational and Environmental Medicine" published in the *Journal of Occupational and Environmental Medicine*.

Dr. Khan has worked to ensure OM residents are fully integrated into SCERC activities. The transition of some SCERC events to virtual platforms has allowed increased faculty and trainee participation. In EHS230B, trainees had the opportunity to work on a book study in which they formed small groups to read and discuss a non-fiction editorial book on topics relevant to OEM. Feedback from trainees was very positive and allowed them further opportunity for interaction and working together on a common project. Over the last 2 years, Dr. Khan, has invited the UC Irvine TRT trainees to monthly journal clubs with the UCI residents which has also brought another dimension of further interaction among trainees. UCLA trainees were also invited to attend the last COEH symposium held in 2020 along with the UCI residents and will also be encouraged to attend the next COEH symposium in 2022.

Dr. Khan has been working on recruitment and retention of a diverse workforce within the Occupational Medicine Residency. In addition to the above areas, Dr. Khan has also actively worked on increasing the diversity in the pipeline by doing outreach activities such as attending the American College of Occupational and Environmental Medicine Residency Fair in 2019 and 2021 which boasts medical students from all across the nation and internationally. Dr. Khan presented a talk for the PRIME-LC students on Case Studies in Occupational and Environmental Medicine. Dr. Khan also participated in the UCI GME Diversity Open House for 3rd year medical students in 2019 and 2021. Dr. Khan has been presenting to UC Irvine Internal Medicine first year residents so they can learn about OEM and encourages them to do a rotation in the OMR program. Most recently, Dr. Khan was nominated to become a mentor for the Residents and Fellows Scholars Academy which focuses on providing mentorship to residents and fellows who are from underrepresented backgrounds and have an interest in a career in academia.

The OMR program is accredited for 6 residents and had 4 residents for the 2021-2022 academic year. There were previously 3 residents in each academic year for the past 3 years. The primary reason for this gap is due

to lack of funding which is a national challenge. In order to address this challenge, Dr. Khan has been working on this from a local and national front. Dr. Khan has successfully instituted a rotation site for the residents at the Long Beach Veterans Administration just this year. This VA has a close relationship with UCI and many residents/fellows from other programs have training opportunities at this local VA. This rotation will not only provide additional clinical and administrative experiences, but also additional funding. Dr. Khan has also been an active member of the ACOEM Presidential Taskforce on the Future of Occupational and Environmental Medicine, particularly in looking for additional funding for all OEM residency training programs. Dr. Khan has been recruited to be a member of the ACOEM Presidential Taskforce “OEM Workforce” which will continue the efforts for increased residency recruitment and funding.

Another point is the application and interview methods have changed to increase recruitment of high-quality residents. Historically, applications were on paper and submitted individually to the UC Irvine OMR program. Dr. Khan decided to enroll in the electronic residency application system (ERAS) which is commonly used by most ACGME residency and fellowship programs for applications. This not only streamlined application and document requests, but increased awareness among applicants of the program at UC Irvine since we became visible on an internationally recognized database. The number of applications tripled from the teens to close to 50. Since the COVID-19 pandemic, interviews have been held exclusively virtually. The virtual format allowed us to interview multiple in one day and thus, interview a great number and diversity of qualified candidates.

The program has maintained full ACGME accreditation for 6 residents with no current citations. One hundred percent of the graduates for more than the past 15 years have taken and passed the board examination and become board certified in occupational medicine. The program’s overall objectives, structure, and curriculum have been maintained with enhancements because of continued growth in the faculty, outstanding clinical and academic training facilities, restructured MS degree program, enhanced opportunities for interdisciplinary interaction, and comprehensive methods for planning and evaluation.

### ***Pilot Project Research Training***

During 2017-2022 (5 award cycles), the PPRT received 42 complete applications, with the largest number, 14 applications, received in the last year from 8 universities in Southern and Northern California and Arizona. The funded projects covered 14 NORA priority areas. The growth of the program is due to increased outreach efforts to raise awareness of the program. These efforts include targeted announcements to different departments within UCLA and other academic institutions (including Social Welfare, Community Health Sciences, Engineering, and Health Policy and Management), follow-up emails to our contacts in region IX, and advertising the PPRT program on our website, social media platforms and personally to our colleagues and students during interdisciplinary events including the Welcome Orientation held in September and Annual Meeting held in February. Pilot projects were supported at ERCs, TPGs, and other occupational health centers and allied programs in Region IX

Since 2019 PPRT trainees, including junior faculty and new investigators, are required to have a mentoring plan in place. Junior faculty are required to identify an ‘expert research mentor’ in their application and meet with them once a quarter at minimum. At least one peer-reviewed publication and one presentation at a national conference or professional meeting is an explicit requirement of the grant. Junior investigators are expected and encouraged to apply for one external grant related to their PPRT project and, ideally, stemming from their pilot data. R2p projects are prioritized and ‘expected stimulation of interdisciplinary research and translation into practice’ is included as a component of the evaluation.

### ***Targeted Research Training***

During the project period, the TRT program provided support for doctoral-level research training at UCLA in occupational epidemiology, industrial hygiene program, and OEHN with limited support for the SCERC-wide training in work organization. A total of 8 trainees were supported, and 3 students participated in TRT activities without financial support. The program also conducted outreach and program evaluation activities. The UCI TRT faculty collaborated with the UCI COEH, UCI Occupational Medicine faculty and Outreach program to develop a 2-day continuing education symposium targeted to occupational physicians, nurses and industrial hygienists on wildfire health risks held at UCI in February 2020. The UCI Work Organization program organized two workshops on promotion of Healthy Work in 2017 and 2018.

*Occupational Epidemiology Research Training.* The new Collaborative Research Training Program in Occupational Epidemiology was approved by NIOSH in 2012 and fully established during the current period. In 2013, Dr. Krause developed and co-taught with Dr. Ritz a new occupational epidemiology course cross-listed in EHS and EPI Departments (EPI M261 /EHS M260) since 2013. Enrollment increased each year and last fall included 19 mostly PhD epidemiology students. Several students were inspired by this course to dedicate their research to NORA priority areas in occupational health and 3 out of 4 trainees were recruited into the program through this venue. Dr. Krause served on all trainees' dissertation committees, and together with other epidemiology faculty provided hands-on mentoring for proposal writing, data collection, data management, analyses, and the preparation of scientific presentations and peer-reviewed publications. Since 2016, two epidemiology PhD students joined the program, dedicated their dissertation research to NORA priority topics, and participated in and enriched the interdisciplinary SCERC teaching activities.

*Work Organization Research Training.* During the current project period, the TRT program provided limited support to Drs. Choi, Baker, and Schnall to implement the SCERC work organization research training initiative. This training initiative was very productive in providing SCERC research training, conducting research projects that provide practical research training; providing a research training environment for visiting faculty and students on work organization; and facilitating outreach in the region. During the project period, Dr. Baker and Dr. Choi taught lectures on work organization and the health effects of work-related psychosocial stress in the core courses of each of the SCERC academic programs. In addition, Dr. Choi and Dr. Schnall regularly taught two elective courses at UCLA and at UCI: EHS M270: Work and Health; and The Work Environment and Cardiovascular Disease in Clinical Practice. The SCERC work organization research training program conducted research projects that provided an opportunity for SCERC trainees (UCI OM residents, graduate students and undergraduate students) to participate in field research. Dr. Choi and the work organization research group conducted a research project among professional taxi drivers to examine the impact of psychosocial stressors on cardiovascular outcomes.

### ***Outreach***

Outreach activities were conducted by the individual academic and research training programs, and by personnel of the Outreach Program. Examples include:

- Cal/OSHA – UniteHERE collaboration culminates in New Cal/OSHA standard “Musculoskeletal Injury Prevention Program” effective July 1, 2018. As an invited official speaker and ongoing informal consultant for the Cal/OSHA Standards Board, Dr. Niklas Krause continued to provide scientific evidence from his long-standing research on work-related musculoskeletal pain and injury among hotel housekeepers and assisted with the critical evaluation of public comments made by other stakeholders. His research findings published both in lay reports and peer-reviewed journals were instrumental for the creation of the California Code of Regulations, Title 8, Section 3345, Hotel Housekeeping Musculoskeletal Injury Prevention standard that became effective July 1, 2018. This is the first ergonomic standard adopted in the United States specifically designed to address injuries experienced by housekeepers in the hotel industry.

- OM Director Dr. Kahn serves as Board of Directors for the Western Occupational and Environmental Medicine Association (WOEMA) and moderates a podcast series for the Western Occupational and Environmental Medicine Association (WOEMA) on COVID 19.
- The Outreach program collaborated with the UCI Center for Occupational and Environmental Health to deliver a symposium in February 2020 titled *Hot Topics, in Wildfire: Present and Future Health Risks*.
- In 2018, Dr. Robbins of the OEHN Program presented at the University of California, Office of the President, Carbon Neutral Initiative, UCLA Campus Lead for integration of climate change and sustainability content into curricula of the UCLA Health Professional Schools
- Dr. Thomas of the OEHN Program and Advisory Board Member Annette Haag co-teach the annual Occupational Health and Safety Principles and Nursing Certification Course for Continuing Education twice a year Dr. Thomas will take over the course in the future.
- The Outreach Program co-sponsored the UC Office of the President's two-day Risk Summit, attended annually by more than 600 UC health and safety professionals and designed to prepare individuals for upcoming challenges from legislative or regulatory developments and emerging areas of risk. The Risk Summit was offered in-person in Palm Springs, CA in 2017, Anaheim, CA in 2019 and via Zoom in 2020 and 2021.
- In 2017, the Outreach Program hosted the 1st Mental Health in the Workplace Symposium (MHS). This event was followed up with the 2018 Mental Health Symposium that discussed issues related to medical marijuana and the medical and legal aspects of substance use and abuse in the workplace. Both activities included an interdisciplinary group of OSH and health professionals.
- In April 2020, the Outreach Program created a free COVID-19 webinar series titled, *COVID-19 Updates: Employer's Corner*. Initially a weekly event, these 1-hr sessions discussed current issues related to prevention and management of COVID-19 in the workplace.

### ***Continuing Education***

From July 1, 2017 through December 31, 2021, the CE Program offered more than 400 courses and activities including 270 CE courses (in-person and webinars), 5 symposia, and 55 sessions of interdisciplinary activities. In addition, we offered 83 courses with partners. Over the four years, the program served a total of more than 6,800 trainees. Selected CE course offerings included: Certified Hazardous Materials Manager Exam Review; Certified Safety Professional Exam Review; Fundamentals of Workplace Safety; Incident Investigation; Indoor Air Quality; Introduction to Industrial Hygiene; Occupational Health Nursing Review; Orientation to Sustainable Environmental Assessment; Risk Management; Sampling and Instruments; Bloodborne Pathogens; and Personal Protective Equipment, among others.

The program struggled during the beginning of the 2020 pandemic shut down. Courses were cancelled due to uncertainty and lack of resources. Staff worked with course directors to train them on platforms that would be used to teach future courses. Some instructors were comfortable with the new teaching format, and some were not. Courses like Train-the-Trainer were taken off the schedule since the course focused on not only lecture but role-play. Over the course of the pandemic, however, instructors and learners have effectively adapted to the online CE course offerings.

### **B.3. Competitive Revisions/Administrative Supplements**

N/A

### **B.4. What opportunities for training and professional development did the project provide?**



The SCERC academic programs provided financial support during graduate and post-graduate training to 98 individuals studying industry hygiene (MPH/MS/PhD), occupational and environmental health nursing (MSN/PhD), and occupational medicine (MS/Residency). The SCERC research training programs provided financial support to 8 graduate and post-graduate trainees through the Targeted Research Training Program, and awarded 22 pilot project research grants to graduate students, post-doctoral scholars and junior faculty. The SCERC delivered continuing education to 6,329 learners (52,752 contact hours) in a variety of OSH disciplines and allied fields. During the performance period, SCERC trainees, staff and faculty engaged in their own continuing education and professional development activities, including attending scientific conferences to stay current with OSH topics and disseminate research findings, completing training in the responsible conduct of research and protection of human subjects, and participating in continuing education activities with the SCERC and other organizations.

#### **B.5. How did you disseminate the results to communities of interest?**

The primary mechanisms of dissemination were through publication in the peer-review literature and presentations at scientific conferences. Other mechanisms included: social media, interviews with the press, and service to professional societies and community-based organizations.

#### **B.6 - What do you plan to do during the next reporting period to accomplish the goals? (8000 characters)**

For the next reporting period, our goals are to 1) educate OSH professionals and researchers who, through their professional and scholarly practice, make positive change work and workplaces for workers, 2) research important challenges in OSH, and 3) disseminate new knowledge that can impact OSH practice. These goals will be achieved by continuing to support talented trainees through the SCERC high-quality academic programs and research training programs; supporting research that addresses current, important challenges in OSH; and using outreach and continuing education activities to disseminate new knowledge related to OSH to OSH and allied professionals and impacted workers and communities. The SCERC has onboarded a new Center Director in August 2022, Dr. Rachael Jones, who will lead efforts during the next reporting period, building upon prior success and identifying innovative opportunities to advance our goals. In particular, Dr. Jones is reorganizing the operations of Planning and Evaluation Core and re-imagining the Continuing Education and Outreach programs to more efficiently and effectively achieve the SCERC goals.

## **C. PRODUCTS**

### **C.1. Publications, conference papers, and presentations**

#### **TRAINEE PUBLICATIONS AND DISSERTATIONS**

1. **Adewumi-Gunn TA**, Ponce E, Flint N, Robbins W. A Preliminary Community-Based Occupational Health Survey of Black Hair Salon Workers in South Los Angeles. *J Immigr Minor Health*. 2018; 20(1):164-170. doi: 10.1007/s10903-016-0521-0. PMID: 27804012.
2. **Adewumi-Gunn TA** (2019) Salon Safety: Community-Engaged Approaches to Workplace Safety Interventions. University of California, Los Angeles ProQuest Dissertations Publishing. 13860479. [Dissertation]
3. **Aquino, N.** (2019) Association between work and dietary behaviors: An exploratory descriptive study. University of California, Los Angeles, eScholarship, University of California. [Dissertation]
4. **Ayoub SC**, Ahmad M. Presbyopia: Clinical Update. *Insight*. 2017; 42(2):29-36. PMID: 30074720.
5. **Ayoub S**, Tsui E, Mohammed T, Tseng J. Readability Assessment of Online Uveitis Patient Education Materials. *Ocul Immunol Inflamm*. 2019; 27(3):399-403. doi: 10.1080/09273948.2017.1413396. PMID: 29286863.

6. **Banaee S, S Que Hee S.** Permeation of limonene through disposable nitrile gloves using a dextrous robot hand. *J Occup Health.* 2017; 59(2):131-138. doi: 10.1539/joh.16-0179-OA. PMID: 28111415; PMCID: PMC5478526.
7. **Banaee S, Hee SSQ.** Glove permeation of chemicals: The state of the art of current practice, Part 1: Basics and the permeation standards. *J Occup Environ Hyg.* 2019; 16(12):827-839. doi: 10.1080/15459624.2019.1678754. PMID: 31684851; PMCID: PMC8005623.
8. **Banaee S, Hee SSQ.** Permeation of ethoxy- and butoxy-ethanols through a disposable nitrile glove. *Ind Health.* 2020; 58(3):276-281. doi: 10.2486/indhealth.2019-0146. PMID: 31685784; PMCID: PMC7286716.
9. **Banaee S, Que Hee SS.** Glove permeation of chemicals: The state of the art of current practice-Part 2. Research emphases on high boiling point compounds and simulating the donned glove environment. *J Occup Environ Hyg.* 2020; 17(4):135-164. doi: 10.1080/15459624.2020.1721509. PMID: 32209007; PMCID: PMC7960877.
10. **Bhuyan RR, Vadehra K, Kang N (2020)** Vaping Induced Pathological Changes in the Lung Comparing with Imaging Finding-A Case Report Study. *J Clin Stud Med Case Rep* 7: 092. Doi: 10.24966/CSMC-8801/100092.
11. **Brogmus GE (2021)** Workplace Intervention to Reduce Back Pain through the Control of Early Morning Flexion. University of California, Los Angeles, ProQuest Dissertations Publishing. 28867311. [Dissertation]
12. **Curtis DF (2018)** The Association of Chronic Stress Secondary to Occupational Racism and Shift Work with Obesity. University of California, Los Angeles, ProQuest Dissertations Publishing.10821921. [Dissertation]
13. Das, B. Pal, B. **Bhuyan, R.** Li, H. Sarma, A. Gogoi, G. Gouw, A. Felsher, D. MYC regulates the HIF-2alpha stemness pathway via Nanog and Sox2 to maintain self-renewal in cancer stem cells versus non-stem cancer cells. *Cancer Rs* 2019; 79(16):4015-4025. Doi: 10.1158/0008/5472.CAN-18-2847. PMID: 31266722 PMCID: PMC6701948.
14. Dobson M, **Choi B,** Schnall PL. Work organization, health, and obesity in urban transit operators: A qualitative study. *Am J Ind Med.* 2017; 60(11):991-1002. Doi: 10.1002/ajim.22760 PMID: 28833399.
15. Fackenthal JD, Yoshimatsu T, Zhang B, de Garibay GR, Colombo M, De Vecchi G, **Ayoub SC,** Lal K, Olopade OI, Vega A, Santamariña M, Blanco A, Wappenschmidt B, Becker A, Houdayer C, Walker LC, López-Perolio I, Thomassen M, Parsons M, Whiley P, Blok MJ, Brandão RD, Tserpelis D, Baralle D, Montalban G, Gutiérrez-Enríquez S, Díez O, Lazaro C; kConFaB Investigators, Spurdle AB, Radice P, de la Hoya M. Naturally occurring BRCA2 alternative mRNA splicing events in clinically relevant samples. *J Med Genet.* 2016; 53(8):548-58. DOI: 10.1136/jmedgenet-205-103570. PMID: 27060066.
16. **Feaster M, Krause N.** Job strain associated with increases in ambulatory blood and pulse pressure during and after work hours among female hotel room cleaners. *Am J Ind Med.* 2018; 61(6):492-503. Doi: 10.1002/ajim.22837. PMID: 29569256.
17. **Feaster M, Arah OA, Krause N.** Effort-reward imbalance and ambulatory blood pressure among female Las Vegas hotel room cleaners. *Am J Ind Med.* 2019;6 2(6):523-534. doi: 10.1002/ajim.22980. PMID: 31044447.
18. **Garcia-Rojas IJ,** Omidakhsh N, Arah OA, **Krause N.** Blood Pressure Changes After a Health Promotion Program Among Mexican Workers. *Front Public Health.* 2021; 9:683655. doi: 10.3389/fpubh.2021.683655. PMID: 34249846; PMCID: PMC8261043.
19. **Gelber, AF (2021)** Expression of Breast Milk in the Workplace: An Analysis Among Registered Nurses, Nurse Managers, and Hospital Representatives in Acute Care Hospitals. ProQuest Dissertations Publishing. [Dissertation]
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## C.2. Website(s) or other Internet site(s) – include URL(s)

Southern California Education and Research Center: <https://erc.ucla.edu>

UCLA SCERC YouTube Channel: <https://www.youtube.com/channel/UC8tco7SZU0qPyH1d2vVeoig>

LinkedIn: <https://www.linkedin.com/in/southern-california-niosh-erc-56706a83/>

## C.3. Technologies or techniques

Nothing to Report

## C.4. Inventions, patent applications, and/or licenses

Nothing to Report

## C.5. Other products and resource sharing

Nothing to Report

## D. PARTICIPANTS

**D.1. What individuals have worked on the project?** Please include calendar, academic, and summer months.

Commons ID	S/ K	Name	Degrees( s)	Role	Cal	Ac a	Su m	Foreig n	Countr y	S S
ULRIKELUDERER	Y	Ulrike Luderer	MD, PhD	Program Director	0.36					
ROBBINS2	Y	Wendie Robbins	PhD	Interim PI / Program Director	3.37					
JIAN_LI	Y	Jian Li	PhD	Program Director			0.74			
ALYAKHAN		Alya Khan	MD	Program Director	1.26					

NEGAROMID	Y	Negar Omid	PhD	Academic Administrator	12.00					
AADZHEMYAN	Y	Ani Adzhemyan	MA	Program Director	11.36					
QUEHEE2	Y	Shane Que Hee	PhD	Program Director			0.11			
YIZHU2	N	Yifang Zhu	PhD	Core Faculty			0.22			
THOMASE22	N	Elizabeth Thomas	PhD	Deputy Director	2.75					
	N	Lindsey Lorenzana	BA	Program Representative	12.00					
PDFAGHRI	N	Pouran Faghri	MD	Academic Administrator			2.41			
	N	Hamid Arabzadeh	PhD	Instructor		0.92				
	N	George Brogmus	PhD	Instructor		1.04				
	N	Yi-Hsuan Chen		Graduate Student Researcher		1.44				
	N	Barbra Lyons		Student Assistant	1.77					
	N	Christine Tran		Student Assistant	0.56					

## D.2 Personnel updates

### a. Level of Effort:

- There were no changes in effort relative to planned levels

### b. New Senior/Key Personnel:

- Wendie Robbins, PhD served as Interim Center Director from July 1, 2021 until August 30, 2022

### b. Changes in Other Support:

- Nothing to report

### d. New Other Significant Contributors:

- Pouran Faghri, MD joined the Center in 2021 to support activities in Continuing Education and Outreach

## E. IMPACT

### **E.1 - What is the impact on the development of human resources, if applicable?**

Through participation in academic training and research training activities, trainees and other students in the SCERC programs have developed new competencies as occupational safety and health professionals and researchers. During the performance period, the academic programs provided support to 90 trainees (10 in Occupational Medicine, 36 in Industrial Hygiene, and 44 in Occupational and Environmental Health Nursing). In addition, 8 trainees were supported by the Targeted Research Training Program and 22 grants were awarded through the Pilot Project Research Training Program. The Continuing Education program engaged about 1,000 learners annually, on average, with an excess of 12,000 contact hours per year.

### **E.2 - What is the impact the Public Health Relevance and Impact? The investigator should address how the findings of the project relate beyond the immediate study to improved practices, prevention or intervention techniques, legislation, policy, or use of technology in public health.**

Former SCERC trainees are pursuing further education in OSH or working as OSH professionals or researchers. This has increased the number of well-qualified professionals and researchers working to improve worker health, safety and well-being.

Former SCERC Director Dr. Niklas Kraus' research and consultation to the Cal/OSHA standards board contributed to the evidence-base that supported the new Cal/OSHA standard "Musculoskeletal Injury Prevention Program" effective July 1, 2018 (California Code of Regulations, Title 8, Section 3345, Hotel Housekeeping Musculoskeletal Injury Prevention Standard). This is the first ergonomic standard adopted in the United States specifically designed to address injuries experienced by housekeepers in the hotel industry.

## F. CHANGES

### **F.1 – Changes in approach and reasons for change, including changes that have a significant impact on expenditures**

There were no changes in approach that significantly impacted expenditures. There was a large amount of unspent funds at the end of the performance period owing to vacant trainee positions in some programs and salary savings from faculty. Going forward, Dr. Jones will be monitoring expenditures closely to ensure that funds are spent as planned, and any unspent funds are reallocated appropriately in a timely fashion.

### **F.2 - Actual or anticipated challenges or delays and actions or plans to resolve them**

COVID-19 posed a challenge with the transition to working from home and online education, but this challenge has been overcome with time. The sudden retirement of Dr. Nikolas Kraus, Center Director, was a challenge that was addressed by Dr. Wendie Robbins taking on the Interim role. This challenge has been addressed with the hiring of Dr. Rachael Jones, who was appointed Center Director in August 2022.

### **F.3 - Significant changes to human subjects, vertebrate animals, biohazards, and/or select agents**

Nothing to report.

## **G. Special Reporting Requirements**

### **G.1 Special Notice of Award Terms and Funding Opportunities Announcement Reporting Requirements**

Not applicable.

### **G.2 Responsible Conduct of Research**

Trainees participated in training in the responsible conduct of research and protection of human subjects. The specific activities include: university-required trainings in human subjects protection (CITI courses) ethics, sexual harassment, diversity and cybersecurity; and a 4-hour continuing education webinar about ethics delivered as part of EHS230A. In addition, each academic program includes courses with topics related to research ethics, research design, research misconduct and the use of human and animal subjects in research (e.g., EHSC200 courses).

### **G.3 Mentor's Research Report or Sponsor Comments**

Nothing to Report

### **G.4 Human Subjects**

G.4.a Does the project involve human subjects?

The SCERC does not involve human subjects, though some of the awarded Pilot Project Research Training grants involve human subjects. For each of these grants, principal investigators are required to obtain human subjects approvals from their home institution, and comply with all reporting requirements from that institution.

G.4.b Inclusion Enrollment Data

Not applicable.

G.4.c ClinicalTrials.gov

Not applicable.

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

No.

### **G.5 Human Subject Education Requirement**

Are there personnel on this project who are newly involved in the design or conduct of human subject's research?

Most recipients of the Pilot Project Research Training Program grants and some of the trainees in the other SCERC programs were involved in the design and conduct of research involving human subjects. Each of these individuals received Institutional Review Board approval prior to initiate this research at their home institution, and this approval requires completion of education about protection of human subjects.

**G.6 Human Embryonic Stem Cells (HESCS)**

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

**G.7 Vertebrate Animals**

Does this project involve vertebrate animals?

No

**G.8 Project/Performance Sites**

University of California, Los Angeles  
University of California, Irvine

**G.9 Foreign Component**

Not applicable.

**G.10 Estimated Unobligated Balance**

G.10.a Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total approved budget?

Yes.

**G.11 Program Income**

Is program income anticipated during the next budget period?

Yes. The Continuing Education program generates program income from course fees. This income is used to pay instructors for developing and delivering courses, and to cover other direct expenses arising from the program activities.

**G.12 F&A Costs**

Is there a change in performance sites that will affect F&A costs?

No.

## I. OUTCOMES

I. Provide a concise summary of the outcomes or findings of the award, written for the general public in clear and comprehensible language, without including any proprietary, confidential information or trade secrets

Note: project outcome information will be made public in NIH RePORTER

During the past performance period, the Southern California Education and Research Center:

- provided financial support as tuition and fees and /or stipend to 98 individual pursuing graduate or post-graduate training in industrial hygiene, occupational and environmental health nursing, occupational medicine and allied occupational health fields;
- awarded 22 pilot project research grants that spanned 14 domains of the National Occupational Research Agenda;
- delivered continuing education to 6,329 learners (52,752 contact hours) working in a variety of occupational health and safety and allied disciplines;
- faculty and trainees were actively engaged in research activities, including extensive publication in the peer-reviewed literature, and in leadership roles within academic and professional organizations;
- reached out to occupational health and safety professionals, workers and community groups through social media, educational infographics, development and delivery of free webinars related to COVID-19, mental health and regulatory updates; and
- organized and co-sponsored local and regional conferences and events, among other activities.

Through these activities, the SCERC has trained next generation of occupational health and safety professionals and researchers, and enhanced the abilities of professionals, workers and communities to improve the health and safety of workers.