# CRA-W Career Mentoring Workshops: Measuring Long-term Impact on 2008-2009 Participants

BURCIN TAMER, DIRECTOR
CENTER FOR EVALUATING THE RESEARCH PIPELINE
COMPUTING RESEARCH ASSOCIATION

CERP
Computing Research Association
Evaluation

CRA-W
Computing Research Association
Women

Suggested Citation:
Tamer, N. B. (2018). *CRA-W Career Mentoring Workshops: Measuring Long Term Impact on 2008-2009 Participants.* Washington, DC: Computing Research Association.



Center for Evaluating the Research Pipeline
Computing Research Association
1828 L St NW, Suite 800
Washington, DC 20036
e. cerp@cra.org

# Table of Contents

# About CERP

The Computing Research Association's (CRA) Center for Evaluating the Research Pipeline (CERP) evaluates the effectiveness of intervention programs designed to increase retention of individuals from underrepresented groups in computing, namely men from underrepresented racial/ethnic groups, and women of all racial/ethnic backgrounds. More generally, CERP strives to inform the computing community about patterns of entry, subjective experiences, persistence, and success among individuals involved in academic programs and careers related to computing.

CERP was created by the Committee on the Status of Women in Computing Research (CRA-W)/Coalition to Diversify Computing (CDC) Alliance through a National Science Foundation grant to the Computing Research Association (CNS-1246649). The current research was supported by NSF grant CNS-1246649. Any opinions, findings, conclusions, and recommendations are the authors' and do not necessarily reflect the views of the National Science Foundation.

For more information about CERP, visit http://cra.org/cerp/.

CERP
Computing Research Association
Evaluation

# Acknowledgements

This evaluation was supported by NSF award CNS-1246649. Any opinions, findings, conclusions, and recommendations are the authors' and do not necessarily reflect the views of the National Science Foundation.

CERP would also like to thank the CRA-W board members for providing their expert advice and feedback throughout this study. The evaluation was conducted by the author, and the resulting analysis and interpretation of the findings were not determined by, and do not necessarily reflect the views of these individuals.

# Executive Summary

This report used a comparative evaluation framework to test the long-term impact of the workshops using participants from two workshops held in 2008 and 2009.

Our analysis revealed that:

- Overall, CMW participants have advanced further in their career than the randomly selected comparison group. This finding was statistically significant.
- The trends for the two events also aligned with the overall observation that CMW participants were more advanced in their careers. However, statistical test results showed the differences in the 2008 event were statistically significant while this was not the case for the 2009 event.
- CMW participants were more advanced in their career when the sample was broken down by the job setting (i.e., academia vs industry/government labs), Statistical tests showed that participants in each current job setting were statistically significantly different for the 2008 workshop while this was not the case for the 2009 event.

A plausible explanation for the lack of statistical significance in the differences we observe for the 2009 could be that the participants of this event were more junior than those in the 2008 workshop.

This analysis is not definitive in terms of identifying CMW participation as the cause of the participants' greater advancement in their careers. However, the inclusion of a random comparison group strengthens the possibility that CMW participation may have played a role in these women's career trajectory positively.

# Introduction

The CRA-W's Career Mentoring Workshops (CMW; also formally known as CAPP[1] prior to 2009) are workshops intended to provide mentoring and networking opportunities for the early-career and mid-career women computing professionals in academia, labs, and industry with the goal of encouraging women's advancement in their careers. The CRA Center for Evaluating the Research Pipeline (CERP) was recruited by CRA-W to conduct evaluation of the CMW program. Between years 2015-2017, CERP has measured the short-term impact of the CMW using a variety of methods, including feedback data collection and pretest-posttest assessment. Their findings have indicated CMW is making a short-term impact on participants' career goals, confidence to succeed in their careers, and professional network[2]. In this report, we present findings from CERP's analysis of the long-term impact of CMW on the participants' career trajectories.

# Evaluation Procedure

Given that a major goal of CMW is to encourage women's advancement in their computing career, we examined how far along CMW participants from 2008 and 2009 workshops were 7-8 years after participating in these workshops. To accomplish this, CERP collected data on the current job titles of CMW participants as well as a random sample of women who completed their PhDs around the same time frame as the CMW participants to use as a comparison group. If CMW accomplished its goal, participant women should be further along in their careers than the comparison group.

# Data

For this long-term impact evaluation, we used publicly available online data on the participants and the comparison group. This section details the data collection steps.

The full list of participants for the two workshops was obtained from CRA-W registration records. There was a total of 47 participants in 2008 and 43 in 2009. Of the 47 participants in 2008, 21 were in the research track, 11 were in the education track, and 15 were in the labs track. Of the 43 participants in 2009, 28 were in the research track and 15 were in the labs track.

---

[1] Cohort of Associate Professors – Research, Cohort of Associate Professors – Education, Cohort of Advanced Professionals – Labs.

[2] Wright, H.M. 2016. *CRA-W 2016 Career Mentoring Workshops: Early R/L and Mid E/R/L: January 2017 Evaluation Report*. Computing Research Association. Washington, DC.

First, we needed to identify the years in which the CMW participants received their doctorate degrees. Using the list of participants, we identified these years through web searches. For CMW 2008, there were two time intervals, 1995-1996 and 2000-2002. CMW 2009 participants had received their doctorate degrees during 2007-2011. Two separate intervals were used for the 2008 workshop participants since there were no participants who received their doctorate degrees between 1996-2000. This was done to maximize the representativeness of the comparison group.

Based on the doctorate year information for the participants, we selected the appropriate comparison group. A list of all dissertations that have "Computer Science" in their subject terms were gathered using ProQuest Thesis and Dissertation Database[3]. The specific search criteria used to obtain the list of dissertations were: ULO("united states") AND SU.EXACT("Computer Science"); Doctoral dissertations only; From [year min] to [year max].

We then extracted the name of the authors (i.e. PhD recipients) from the exported list of dissertations. Since CMW specifically targets women professionals, we needed to determine the authors' gender using the R package "gender[4]". This package searches for the first names of dissertation authors in the U.S. Social Security Administration (SSA) baby name database. The output of this search shows the proportion of times a name has been given to a girl and the proportion of times a name has been given to a boy. We then assigned each name a "predicted gender" based on whether the name was given to a girl or a boy more frequently. Because some names were missing from the database, this assignment was done for each of the names of every author (e.g., first name, middle name, etc.).

Random samples of 150 and 120 women were selected as comparison group candidates for the 2008 and 2009 workshops, respectively. These names were cross-referenced with a list of all known CMW participants and any previous CMW participants (including those who were participated in the 2008 and 2009 workshops) were dropped from the comparison group.

Once the complete list of participant and comparison group names were identified, we ran automated web searches and collected the top ten search results were collected for each name. After removing indicators whether an individual was in the participant or the comparison group, CERP used the output extracted from the web searches to manually identify the current job status for each individual (participant and comparison). For each individual, we identified their job title, work setting (academia, industry, etc), institution/company, department/division, and PhD awarded date.

Finally, all resulting job titles were ranked in terms of their level of advancement. CERP solicited assistance from several experts in the computing field to determine these rankings. Each expert

---

[3] https://www.proquest.com/products-services/pqdtglobal.html
[4] https://cran.r-project.org/web/packages/gender/index.html

was provided with a list of unique job titles that resulted from the web searches without any identification of whether the titles belonged to the participant or the comparison group. The rankings from each expert were cross-checked for consistency and titles that received differing rankings were reevaluated until a final decision was reached. Ranking of the titles was done within the different job settings as the titles were not easily comparable across the different settings. Once the within setting categorization was completed the titles were coded into three high level ranks: entry, mid, senior. Table 1 shows all titles and their final categorization.

**Table 1. Job title categories by job setting**

| Title Ranking | Detailed Ranking | Title Names |
|---|---|---|
| Academia | | |
| Entry | Postdoc | Postdoctoral Associate |
| Entry | Adjunct 1 | Adjunct Assistant Professor |
| Entry | Adjunct 2 | Adjunct Associate Professor |
| Entry | Professor 1 | Assistant Professor |
| Mid | Professor 2 | Associate Professor |
| Mid | Professor 2.5 | Associate Professor and Graduate Coordinator |
| Senior | Professor 3 | Reader, Professor |
| Senior | Professor 4 | Dean of Graduate Studies for Arts, Sciences, and Engineering, Professor, Professor and Associate Dean |
| Senior | Professor 5 | Emeriti Faculty, Professor Emerita |
| Academia Teaching | | |
| Entry | Teaching 1 | Instructor, Lectures |
| Mid | Teaching 2 | Associate Professor Teaching Stream (Senior Lecturer) |
| Industry | | |
| Entry | Industry 1 | Independent Computer Software Professional, IT Professional, Mathematics Tutor |
| Entry | Industry 2 | Computer Scientist, Consultant, Data Scientist, Experimenter, Hardware Development Engineer, Risk Manager, Software Developer, Software Engineer, Website Production Manager, System Engineer |
| Entry | Industry 2.5 | Software Developer II |
| Mid | Industry 3 | Retired (Senior Scientist), Senior Architect, Senior Director, Senior Engineer, Senior Manager, Senior Software Development Engineer, Senior Software Engineer, Staff Software Engineer, Senior UX Designer |

*Continued on the next page*

Table 2. Job title categories by job setting *(continued)*

| | | |
|---|---|---|
| Mid | Industry 4 | Principal Program Manager, Lead, Lead Information Systems Engineer, Lead Services Analytics, Software Engineering Manager, Technical Project Manager, Risk Manager |
| Senior | Industry 5 | Associate Director and Chief Architect, Director, Director of Data Engineering |
| Senior | Industry 5.5 | Vice President |
| Senior | Industry 6 | Chief Medical Officer, CTO, CEO, Co-Founder, Founder, President |
| Industry Research/Labs | | |
| Entry | Industry 2 | Research Analyst, Research Associate, Researcher |
| Mid | Industry 3 | Research Scientist, Research Staff Member, Member of Technical Staff, Technical Staff |
| Mid | Industry 4 | Senior Research Scientist, Senior Researcher, Senior Scientist |
| Senior | Industry 5 | Principal Data Scientist, Principal Member of Technical Staff, Principal Research Scientist, Principal Scientist, Scientist and Group Lead |

# Analysis and Results

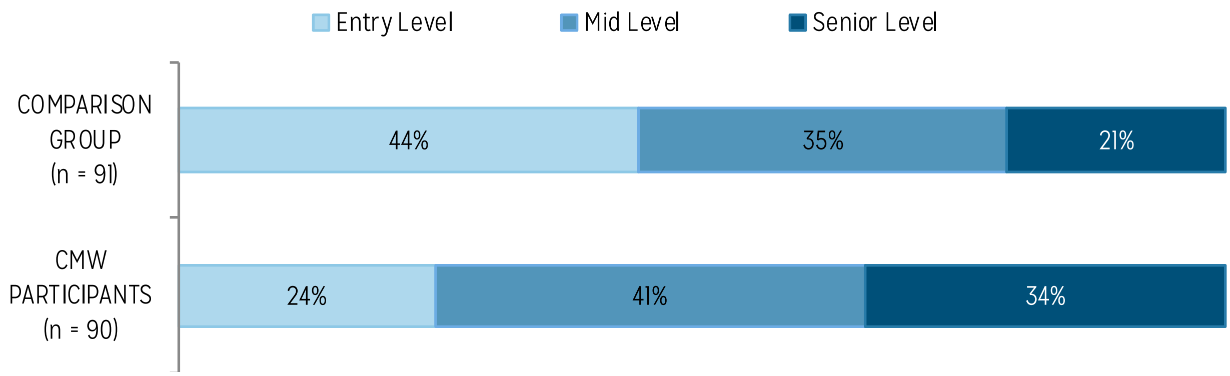
We compared the job title rankings of the CMW participants and the comparison group in a number of different ways. First, we compared the CMW participants to the comparison group for the overall sample. Then, we broke down this comparison by the two workshops, 2008 and 2009. Finally, we looked at job rank comparisons of each workshop by the current job setting of the individuals.

## Results for the overall sample

Using the 3-level categorization of job ranking (entry, mid, senior) detailed above in Table 1, we first compared workshop participants to the comparison group across academia and industry to get an overall picture of job ranks regardless of their setting. In doing so, we were able to leverage a larger sample size to increase the power of our statistical analysis.

To test for a systematic difference in job rankings between workshop participants and the comparison group, we ran a 2 (Groups) x 3 (Job Title Rank) Chi-squared test and found a statistically significant difference in rankings across the two groups, $\chi^2(2, N = 181) = 8.46$, $p < 0.05$). Specifically, CMW participants were less likely than non-participants to be in an entry level position, $p < .05$, and they were more also likely to be in a senior level position than non-participants, $p < .05$. See Figure 1 for a visual representation of these results.

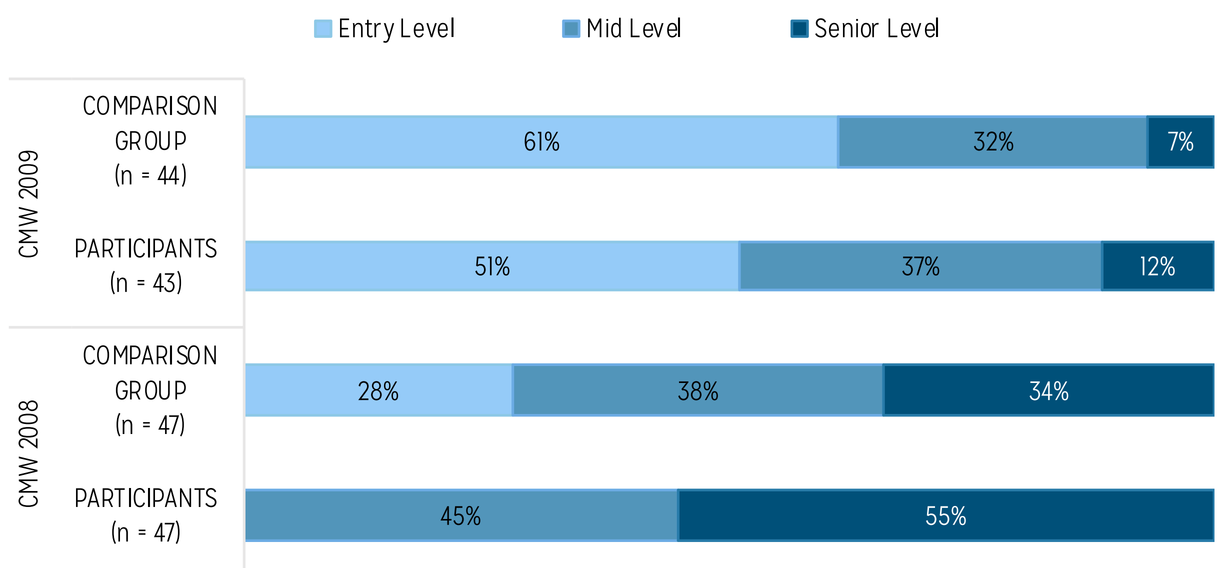
Figure 1. Job Ranks for Participants vs. Comparison Group




## Results for the 2008 and 2009 workshop separately

When we broke down the results by the two workshops, we saw a similar distribution of job ranks between the participants and the comparison groups. The CMW participants tended to be further along in their careers than the comparison group. 2 (Groups) x 3 (Job Title Rank) Chi-squared test for the CMW 2008 workshop indicated a statistically significant difference in rankings across the two groups, $\chi^2(2, N = 94) = 15.3, p < 0.05$). However, the Chi-squared test for the CMW 2009 workshop did not indicate a statistically significant difference, $\chi^2(2, N = 87) = 1.13, p = 0.57$). The  Figure 2 displays these results for the 2008 and 2009 workshops.

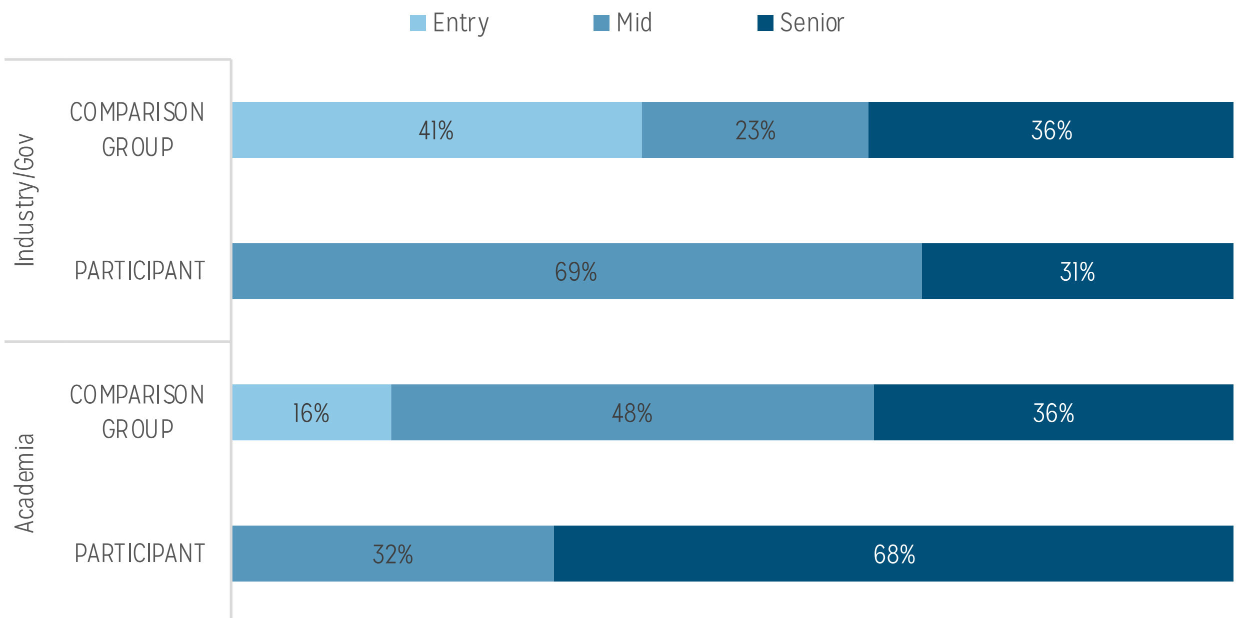
Figure 2. Job Ranks for Participants vs. Comparison Group by Workshops



## Results for the 2008 and 2009 workshop by current job setting

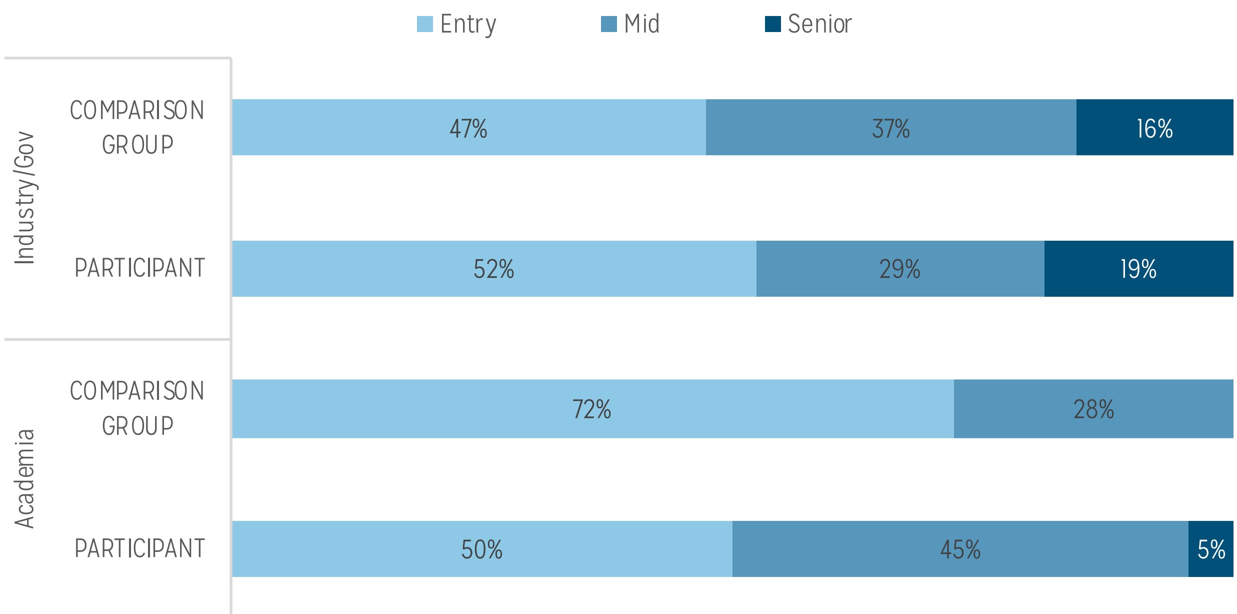
Next, we look at the comparison between the participants and the comparison groups of each workshop by current job setting. Similar to the previous results, there were more CMW participants who were in mid and senior roles in both job settings in the 2008 workshop. In both academia and industry/government labs, Chi-squared tests showed a statistically significant difference: in the academic positions, $\chi^2(2, N = 56) = 8.44, p < 0.05$) and in the industry/government labs, $\chi^2(2, N = 38) = 11.28, p < 0.05$).

**Figure 3. CMW 2008 Job Ranks for Participants vs. Comparison Group by Job Setting**




The distribution of job rankings for the CMW 2009 showed a slightly different outcome. While the academic job titles of the CMW participants align with the overall patterns of workshop participants having more senior job titles, the job title rankings of the participants currently employed in industry/government labs jobs is similar to that of the comparison group. Chi-squared tests for both academia and industry/government showed no statistically significant difference: in the academic positions, $\chi^2(2, N = 47) = 3.04, p = 0.22$) and in the industry/government labs, $\chi^2(2, N = 40) = 0.32, p = 0.85$).

Figure 4. CMW 2009 Job Ranks for Participants vs. Comparison Group by Job Setting




# Summary and Conclusion

CERP conducted this evaluation as a supplement to the immediate impact/feedback evaluations that we completed for the CMW events held between 2015 and 2017. CMWs aim to provide the mentoring faculty and industry professionals in computing research may need to continue advancing in their career. As a workshop targeted specifically towards women in the field, CMWs have the potential to contribute to broadening participation efforts in computing. This would be accomplished by helping women stay in the field and advance in their career paths, addressing both retention issues and lack of representation at the higher levels. It is important to examine the long-term trajectories of CMW participants for two major reasons. First, the actual advancements in career may not be observed in the short-term evaluations. Second, it is valuable to assess whether CMWs may be having a sustained impact on the participants.

This report used a comparative evaluation framework to test the long-term impact of the workshops using participants from two workshops held in 2008 and 2009.

Our analysis revealed that, overall, CMW participants have advanced further in their career than the randomly selected comparison group. While the trends were aligned with this overall observation, the statistical test results showed the differences in the 2008 event were statistically significant while this was not the case for the 2009 event. Even when broken down by the job setting (i.e., academia vs industry/government labs), the results were the same.

A plausible explanation for the lack of statistical significance in the differences we observe for the 2009 could be that the participants of this event were more junior than those in the 2008 workshop. While the 2009 workshop participants received their Ph.D. degrees between 2007-2011 while 2008 participants received their degrees in 1995-1996 and 2000-2002.

This analysis certainly is not definitive in terms of identifying CMW participation as the cause of the participants' greater advancement in their careers. There may have been other explanatory factors that took place during the 7-8 years between the workshops and the data collection. However, the inclusion of a random comparison group strengthens the possibility that CMW participation may have played a role in these women's career trajectory positively. This can be argued given that, presumably, other experiences that may have potentially impacted the participants' careers would be at play for the comparison group. Additionally, there may have been a selection bias in that perhaps the CMW participants were paying closer attention to their career advancement than women who chose not to participate in this mentorship program.

1828 L STREET NW, SUITE 800, WASHINGTON, DC 20036
WWW.CRA.ORG/CERP | CERP@CRA.ORG