Addressing Barriers to Access to CS

NCWIT K-12 Alliance Member Huddle
12:00pm PST/3:00pm EST
Welcome

**Jannie Fernandez**
K-12 Alliance Manager and TECHNOLOchicas Program Manager

**Leslie Aaronson**
Strategic Director of K12 Initiatives

**JeffriAnne Wilder, Ph.D.**
Research Scientist

**Allison Scott, Ph.D.**
Chief Research Officer, Kapor Center

**Corinne Roller**
Director of Advocacy and Public Policy, Girls Who Code
Goals

• Get Connected
• Quarterly Huddles around themes to stay informed
• Learn from each other
• Highlight the work that you are doing
• Share useful tools/opportunities to all members
Expectations

• Take the lead!
• Ask questions
• Promote your work!
• Make Connections with each other
• Missed our last Huddle? Catch up here
Girls of Color in Computing:
Lessons Learned from the SMASH Program and Future Directions

Allison Scott, Ph.D.
8/16/2018
NCWIT K-12 Huddle
SMASH =

- 7 sites across four states: (UC Berkeley, Stanford, UC Davis, UCLA, Morehouse, Wharton, Wayne State)

- 5 week, 3 residential summer program + alumni programming

- 95% underrepresented students of color, 51% female, 72% FRPL-eligible, 73% First-Gen College

- Over 1,000 current students and alumni
**SMASH**

**BARRIERS**
- Lack of access to rigorous CS courses
- Lack of access to diverse peers and role models in CS
- Social/psychological barriers (identification, belonging, stereotypes)

**Culturally Relevant and Responsive Pedagogical Framework**

**INTERVENTIONS**
- Multi-year CS course sequence
- Culturally responsive pedagogy and curriculum
- Exposure to diverse CS role models, peers, and instructors
- Leadership growth opportunities inside and outside of the CS classroom

**SHORT-TERM OUTCOMES**
- Computer science knowledge
- Attitudes toward CS
- Identification with CS
- Belonging in STEM
- Decreased racial stereotypes
- Decreased gender stereotypes
- Access to diverse STEM/CS role models
- Network of STEM/CS peers
- Leadership skills
- CS college and career aspirations

**LONG-TERM OUTCOMES**
- Declare CS major
- Persist in CS
- Graduate with CS degree
- Community impact via changed CS industry demographics

*Figure 1: Conceptual Framework*
The intersection of racism and sexism affects women of color in ways that cannot be fully captured by examining race or gender separately, making the experiences of women of color in the computing and tech ecosystem qualitatively different from white women and men of color.
What we have learned about the unique obstacles facing girls of color in computing…
Girls of color perceive greater barriers to pursuing STEM degrees than boys

**Study Sample**

n=152 male and female high school students who participated in the SMASH program

**Key Findings**

- Girls of color perceived significantly more internal and external barriers to studying STEM in higher education than their male counterparts
- Perception of internal and external barriers were negatively related to STEM aspirations, students with higher perceptions of barriers were less likely to aspire to major in a STEM field.
Repeated exposure to CS coursework increases positive CS attitudes and aspirations among girls of color.

**Study Sample**

n=108 female SMASH scholars who participated in 2 summers of SMASH CS courses (2014 and 2015)

**Key Findings**

- One summer of exposure to the SMASH CS intervention demonstrated a *significant impact* on attitudes towards CS and CS content knowledge.
- **Repeated exposure produced significantly greater growth** in CS knowledge, identification and aspirations than just one summer. Two summers of exposure also significantly reduced gender stereotypes among girls of color.
Despite multi-year CS interventions, girls of color are less likely to pursue CS majors than their male peers.

Study Sample
n=205 male and female SMASH scholars who participated in the SMASH CS courses (2014 and 2015)

Key Findings
• Girls of color were significantly less engaged with CS prior to the program and at the conclusion of the first summer than their male counterparts (but no differences in CS competency or growth in competency)
• Among students who self-selected into the optional AP CS prep course, there were NO gender differences in enrollment or completion.
• Girls of color were significantly less likely to major in computer science in college than their male peers, despite participating in identical programming, detailing unique intersectional barriers for girls of color.
Exploratory strategies for mitigating these barriers…

**Single-Gender CS Classrooms**
- Girls CS classes were piloted at 3 SMASH sites in summer 2018
- Data collected using surveys, observations, and focus groups
- Results coming soon!

**Positive Affirmations/Encouragement**
- Messages were sent to scholars at regular intervals to either: (a) inform scholars about computer science careers or (b) encourage resilience and affirmation in CS.
- Results coming soon!
**Women of Color in Computing: Researcher-Practitioner Collaborative**

*This project aims to increase the number of girls of color pursuing and completing CS degrees, and participating in the tech workforce, entrepreneurship and venture capital. We aim to do this by conducting and disseminating research on:*

- Data trends among women of color in computing education and career pathways
- Barriers to participation in computing among women of color
- Innovative and effective interventions and strategies to increase participation in computing among women of color

**AIM:** To build a body of literature on women of color in computing and develop, test, and scale strategies for improving outcomes for women of color across the tech ecosystem.

[www.wocincomputing.org](http://www.wocincomputing.org)
Priority Research Areas:

- Entry, Persistence, and Advancement in Computing in Higher Education
- Participation of WOC across the Technology Workforce
- Women of Color in Entrepreneurship and Venture Capital

Types of Research Projects:

- Landscape data and trends
- Exploratory studies of interventions
- Efficacy studies of interventions

www.wocincomputing.org
Discussion

• Any experiences with these interventions or other interventions with girls of color?

• What are some other ideas for interventions within this program context?

• Are there other interventions that the field would benefit from exploring through research?
Thank you!!

allison@kaporcenter.org
Increasing Participation at all levels of the Pipeline

Corinne Roller
Director of Advocacy and Public Policy, Girls Who Code
Increasing Participation at all levels of the Pipeline

3rd - 5th Grade Clubs

K-12 Advocacy

Women In Tech Lesson Plans

College Loops and Alumni

Questions? Reach out to Corinne at corinne@girlswhocode.com
RESOURCES: Access

• **How Can You Engage A Diverse Range of Girls in Technology?**

• **Top 10 Ways to Engage Underrepresented Students in Computing**

• **Bringing Young Women into Computing Through the NCWIT Aspirations in Computing Program**

• **How Do Stereotype Threats Affect Retention?**
Your Turn!
Save the Date

Thursday, December 6th
12:00pm PST / 3:00pm EST

Would you like to present?
https://tinyurl.com/NCWITk12
THANK YOU
See you in December!