

Old Dominion University

ODU Digital Commons

Cybersecurity Undergraduate Research

2023 Spring Cybersecurity Undergraduate
Research Projects

Lack of Black Female Diversity Within the Cybersecurity Workforce

Eric Preston
Old Dominion University

Follow this and additional works at: <https://digitalcommons.odu.edu/covacci-undergraduateresearch>



Part of the [Computer Engineering Commons](#), [Inequality and Stratification Commons](#), [Race and Ethnicity Commons](#), and the [Social Justice Commons](#)

Preston, Eric, "Lack of Black Female Diversity Within the Cybersecurity Workforce" (2023). *Cybersecurity Undergraduate Research*. 5.

<https://digitalcommons.odu.edu/covacci-undergraduateresearch/2023spring/projects/5>

This Paper is brought to you for free and open access by the Undergraduate Student Events at ODU Digital Commons. It has been accepted for inclusion in Cybersecurity Undergraduate Research by an authorized administrator of ODU Digital Commons. For more information, please contact digitalcommons@odu.edu.

The Lack of Black Female Diversity Within the Cybersecurity Workforce

Eric Mung'aū Preston

Old Dominion University

Cybersecurity Program

Mr. Malik A. Gladden

04/14/2023

The Lack of Black Female Diversity Within the Cybersecurity Workforce

Cybersecurity is the methods, strategies, and programs put in place for protecting computers and electronic devices. Its critical importance is due to how technology intertwines with multiple aspects of society, from major forms of infrastructure to the phones we use daily (Anderson, 2022). However, while this ever-growing field has a large workforce, issues stem from its lack of representation. Specifically, of African American women (Brin, 2017; Yamaguchi & Burge, 2019).

The Problem Statement

This study addresses the barriers that prevent Black women from having significant representation in the cybersecurity workforce. The possible consequences of not having African American women in the cybersecurity workforce are a lack of diversity, a lack of diverse ideas and perspectives, reinforced stereotypes, and a widening gender pay gap. Solving this problem requires more research to understand these barriers and to identify possible solutions that can be applied to the real world.

The Background of the Problem

The demographics of the United States of America have become significantly diverse, yet research shows that there is a huge gap in gender and race representation in the cybersecurity workforce. For example, a study done by Zippia (2023) showed that there are 14,796 cybersecurity analysts currently employed in the United States. Of those, only 21.5% are women while 78.5% are men. In addition to that, regarding ethnicity, 72.6% are White, 9.1% Hispanic or Latino, 8.0% Black, and 7.3% Asian. Another study supported this data by indicating how women are underrepresented among Cybersecurity professionals (Withanaarachchi & Vithana, 2022). Because of these statistics, I am interested in finding the barriers that cause these

disparities, particularly for Black/African American women. The findings could help us produce solutions to closing the gap.

Barriers

Many barriers prevent African American women and women from entering and making a substantial step in the cybersecurity workforce. Some of these barriers are tied to cybersecurity while others are more general. Below I'll discuss both kinds.

“Brogrammer Culture”

According to Brin (2017), one of the main reasons that cause a lack of Black females in these fields is a “brogrammer culture” that has made the cybersecurity workforce male-dominated. Brogrammer culture is a culture that creates a stereotypical view of men and women. Men are exemplified for their supposed technical abilities while women are harshly devalued for their supposed lack of skills. This leads to men being perceived as a better fit for the tech industry compared to women and less overall diversity (Thébaud & Charles, 2018).

Lack of Role Models and Representation

The lack of role models and representation of African American women is prevalent in the cybersecurity workforce. African American women are less likely to see people who look like them in cybersecurity roles, which can make it harder for them to envision themselves in the field. Without role models and representation, African American females may be less likely to pursue cybersecurity as a career (Williams-Denton, 2022).

Historical Discrimination and Systemic Barriers

Black women have faced historical discrimination and systemic barriers that have limited their access to education and career opportunities. Some of these historical discriminatory practices and systemic barriers have included a lack of adequate access and exposure to the field

of cybersecurity. These barriers have made it more difficult for them to enter cybersecurity fields requiring specialized training and technical skills (Esin, 2020; William-Denton, 2022).

Stereotypes and Biases

Other barriers include stereotypes and biases that make it harder for Black women to succeed in cybersecurity. For example, Black females may be perceived as less competent or less qualified than their white male counterparts, even when they have the same skills and experience (William-Denton, 2022; Anderson, 2022). This disparity in how Black women are perceived makes it harder for them to enter or stay in the profession.

Lack of Access to Resources and Networks:

In addition to stereotypes and biases, African American women may have limited access to resources and networks that can help them enter and advance in cybersecurity. For example., they may not have access to mentorship opportunities due to most of their peers being White males. Additionally, they may also feel unwelcome at industry events which often lead to connections and exposure to new job opportunities. This lack of exposure prevents them from having access to resources and networks in the field (Anderson, 2022).

Cultural Norms and Expectations

Cultural norms and expectations can also play a role in limiting the representation of Black women in cybersecurity. For example, Black females may face pressure from society, and communities to pursue careers in fields that are seen as more "traditional" or "feminine," such as healthcare or education, rather than fields like cybersecurity which are often seen as more technical and male-dominated (Esin, 2020). These cultural norms and expectations unintentionally steer Black women from cybersecurity careers.

Implications

The barriers that prevent or steer Black women from the cybersecurity workforce are problematic in that they deter them from entering and staying in the profession. The high levels of underrepresentation of African American women in the cybersecurity profession have significant implications. These implications are noted below.

Lack of Diversity in Perspectives and Innovation

The cybersecurity profession is currently dominated by White men (Wright, 2005). This means that most of the ideas presented in the development of products in this field mostly represent White males. This means that the perspectives and experiences of Black/African American women are not as widely represented. This means that the lack of diversity in the workplace often creates blind spots or gaps in decision-making and problem-solving and can negatively impact the security of computer systems and networks (Pifer, 2017). Another missed opportunity in the cybersecurity workforce is the lack of innovation. We know that diversity is important to people due to the creative results that emerge when people from different backgrounds and perspectives work together (Pifer, 2017). Excluding Black women means that the profession misses out on new and creative ideas and perspectives that are related to Black culture.

Limited Career Opportunities

Additionally, the exclusion of Black women in cybersecurity creates limited career opportunities for Black females. The lack of African American women in the cybersecurity workforce means that there are limited opportunities for African American females to be recruited or promoted into leadership positions. This also means that due to lack of representation, other Black females may hesitate to enter the profession since they don't see

themselves represented (Wright, 2005; Gurchiek, 2018). This means that the cycle of lacking Black women in the profession is repeated again and again.

Widening Gender Pay Gap

Cybersecurity and STEM careers often pay high salaries. If the pay in these careers is high, and there are few Black women in the profession, then it means that they miss out on the high salaries, resulting in a widening gender pay gap. Additional implications of the gender pay gap mean that Black women are not able to pass on to their offspring generational wealth. As a result, a lack of generational wealth leads to Black families having difficulties moving up the social economic ladder (Gurchiek, 2018; Wright, 2005).

To sum up, the underrepresentation of African American women in cybersecurity has implications that have far-reaching consequences. Despite these implications and consequences, there are possible solutions that can remove some barriers that perpetuate the underrepresentation of African American females in the cybersecurity workforce.

Solutions

Several solutions can be implemented towards increasing the diversity of Black women in the cybersecurity workforce. Identified below are solutions that can help decrease the underrepresentation of Black/African American women in the cybersecurity workforce.

Recruitment

The first one is increasing representation by actively recruiting and hiring Black women in cybersecurity roles. For example, employers can engage and work with diversity and inclusion experts to help them plan for and implement recruitment strategies that specifically focus on and target Black females. Some ways they can increase equitable recruitment practices are using

strategies such as blind hiring techniques. Blind hiring techniques are when employers hide the names of applicants to prevent implicit bias in the hiring process (Yamaguchi & Burge, 2019).

Mentorship

Another solution is for employers to provide mentorship and networking opportunities to Black women who are already in the cybersecurity industry. This process of networking is supposed to help them connect with other Black females, advance their careers, and help build communities in their workplace. If this were to occur, African American women would have support systems within the workplace (Brin, 2017; Yamaguchi & Burge, 2019).

Inclusive Workplace Culture

Creating inclusive workplace cultures is another solution that can foster a space where workers are respectful of all cultures. This culture can be encouraged by the organization providing ongoing unconscious bias training for managers, and staff. In addition to that, encourages workers to have conversations about diversity. Also, creating support systems that monitor the well-being of Black women in the workplace (Anderson, 2022).

Promoting Awareness and Visibility

Additionally, organizations can promote awareness and visibility of Black women in cybersecurity. For example, running promotion campaigns, and conferences that focus on diversity and inclusion in the cybersecurity workforce can help decrease bias and increase interest in the field (Anderson, 2022).

Leadership Development

Another solution is creating spaces in the workforce where African American women receive leadership development as part of their educational and workforce experience. This process leads to having more African American females in leadership roles in Cybersecurity

which may lead to young Black women being interested in the career as they see themselves represented (Yamaguchi & Burge, 2019).

Providing Training and Education

Along with leadership development, providing training and education to Black women can enhance the skills and knowledge they need to enter the field. For example, educational institutions can create partnerships with K-12 schools to introduce cybersecurity as a possible career for Black girls. These partnerships can be in the form of apprenticeships, internships, and summer programs that can provide hands-on experience (Bhuyan et al., 2020; Toro, 2019).

Increase Scholarship

Increasing scholarship in this area of study is another solution to increasing the diversity of Black/African American women in cybersecurity (Yamaguchi & Burge, 2019). Institutions can offer mentorship to undergraduate students to enhance their research skills, increase knowledge about Black women's experiences in cybersecurity and identify gaps that need attention (Yang et al., 2019; Shumba et al., 2013).

Conclusion

In conclusion, cybersecurity methods, strategies, and programs put in place for protecting computers and electronic devices have become a very important part of the infrastructure of technology as a whole. Additionally, it has become an ever-growing field with a large workforce that is often paid high salaries. However, a problem is that this large workforce has an issue of lacking representation of women and especially African American women. This research paper sought to identify barriers, implications, and solutions towards this problem.

This study found that barriers that maintain the underrepresentation of Black women in cybersecurity included a culture of "brogrammers". This means the White men that dominate the field create a culture where they are seen as the only workers that fit this career while

diminishing the capabilities of women and minorities. Other barriers included a lack of role models and representation, stereotypes, biases, lack of access to resources and networking, and cultural norms and expectations. All of these barriers culminate in large implications for Black women's careers and futures.

The implications found to result from the barriers included a lack of diversity in perspective and innovation, limited career opportunities, and a widening pay gap. Having low diversity in a workforce leads to fewer differentiating perspectives and ideas. Furthermore, lack of diversity can also limit potential career opportunities and leadership positions by African American women having hesitation due to little representation. In addition, limiting career opportunities also restricts Black females from procuring higher salaries and wealth for their children, trapping them on the socioeconomic ladder.

While these barriers are a challenge, this study has found possible solutions that could help resolve the problem of the underrepresentation of Black females in the cybersecurity workforce. The solutions included the recruitment of African American women, providing mentorship, and surrounding them with an inclusive work culture. Additionally, promoting awareness and visibility of Black women in cybersecurity, providing leadership development, education, and training in the K-12 about cybersecurity as a career, and funding scholarships on how numbers of Black women can be increased in the field of cybersecurity. Altogether, if these considerations are implemented there is hope that in another decade there will be higher levels of representation of Black/African American women in the cybersecurity workforce.

References

- Anderson, B. D. (2022). The Minority in The Minority, Black Women in Computer Science Fields: A Phenomenological Study.
<https://digitalcommons.liberty.edu/cgi/viewcontent.cgi?article=4987&context=doctoral>
- Bhuyan, J., Wu, F., Thomas, C., Koong, K., Hur, J. W., & Wang, C. H. (2020). Aerial drone: An effective tool to teach information technology and cybersecurity through project-based learning to minority high school students in the US. *TechTrends*, 64, 899-910.
<https://doi.org/10.1007/s11528-020-00502-7>
- Brin, D. (2017). Women, Minorities Largely Absent from Cybersecurity Jobs. *HRNews*,
<http://proxy.lib.odu.edu/login?url=https://www.proquest.com/trade-journals/women-minorities-largely-absent-cybersecurity/docview/1862758924/se-2>
- Del Toro, E. (2019). Introducing Women to Computer Science in High School to Reduce the Gender Gap in the Cybersecurity Profession (Order No. 13863122). Available from ProQuest Dissertations & Theses Global. (2226155576).
<http://proxy.lib.odu.edu/login?url=https://www.proquest.com/dissertations-theses/introducing-women-computer-science-high-school/docview/2226155576/se-2>
- Esin, J. O. (2020). A CALL FOR CONCERN: The Unbalanced Representation of Minorities and Women in Cybersecurity Profession. *Journal for Women and Minority in Technology*, 2.
https://www.researchgate.net/profile/Joseph-Esin/publication/346574399_Journal_for_Women_and_Minority_in_Technology/links/5fc80439299bf188d4e99859/Journal-for-Women-and-Minority-in-Technology.pdf
- Gurchiek, K. (2018). Report: Minority Professionals in Cybersecurity Underrepresented in Senior Roles, Paid Less. *HRNews*,

<http://proxy.lib.odu.edu/login?url=https://www.proquest.com/trade-journals/report-minority-professionals-cybersecurity/docview/2014724000/se-2>

Patitsas, E., Craig, M., & Easterbrook, S. (2014, June). A historical examination of the social factors affecting female participation in computing. In *Proceedings of the 2014 conference on Innovation & technology in computer science education* (pp. 111-116).
<https://doi.org/10.1145/2591708.2591731>

Pifer, C. L. (2017). *Cybersecurity Workforce Alert: Women's Perspectives on Factors Influencing Female Interest* (Order No. 10744000). Available from ProQuest Dissertation & Theses Global; Publicly Available Content Database. (2038463874).
<http://proxy.lib.odu.edu/login?url=https://www.proquest.com/dissertations-theses/cybersecurity-workforce-alert-womens-perspectives/docview/2038463874/se-2>

Shumba, R., Ferguson-Boucher, K., Sweedyk, E., Taylor, C., Franklin, G., Turner, C., ... & Hall, L. (2013, June). Cybersecurity, women and minorities: findings and recommendations from a preliminary investigation. In *Proceedings of the ITiCSE working group reports conference on Innovation and technology in computer science education-working group reports* (pp. 1-14). <https://doi.org/10.1145/2543882.2543883>

Thébaud, S., & Charles, M. (2018). Segregation, stereotypes, and STEM. *Social Sciences*, 7(7), 111. <https://doi.org/10.3390/socsci7070111>

Williams-Denton, O. (2022). *A Comparative Interpretive Phenomenological Analysis of the Sociotechnical Factors Contributing to Underrepresentation of Black Women in Information Technology Leadership* (Order No. 29061939). Available from ProQuest Dissertations & Theses Global. (2659620247).
<http://proxy.lib.odu.edu/login?url=https://www.proquest.com/dissertations-theses/comparative-interpretive-phenomenological/docview/2659620247/se-2>

Wright, M. M. (2005). Finding a place in cyberspace: black women, technology, and identity.

Frontiers: A Journal of Women's Studies, 26(1), 48+.

https://link.gale.com/apps/doc/A133608432/LitRC?u=viva_odu&sid=bookmark-LitRC&xid=356e311b

Yamaguchi, R., & Burge, J. D. (2019). Intersectionality in the narratives of black women in computing through the education and workforce pipeline. Journal for Multicultural

Education, 13(3), 215-235. <https://www.emerald.com/insight/content/doi/10.1108/JME-07-2018-0042/full/html#sec015>

Yang, D., Xu, D., Yeh, J. H., & Fan, Y. (2019). Undergraduate research experience in cybersecurity for underrepresented students and students with limited research opportunities. Journal of STEM Education, 19(5).

<https://www.learntechlib.org/p/207536/>

Zippia. (2022, September 9). Cyber Security Analyst Demographics and Statistics [2023]:

Number of cyber security analysts in the US. Cyber Security Analyst Demographics and Statistics [2023]: Number Of Cyber Security Analysts In The US. Retrieved January 8, 2023, from <https://www.zippia.com/cyber-security-analyst-jobs/demographics/>