

Women in Cybersecurity: Spanning the Career Life Cycle

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Executive Summary

The goal of this survey was to help women entering and advancing in the field of cybersecurity. According to the US Bureau of Labor Statistics, US companies will add 546,200 new jobs in computer and information technology between 2018 and 2028, a rate higher than the average for all occupations. Of those jobs, the bureau predicts a 32% growth rate for information security analysts.¹ Currently, women are emerging as cybersecurity experts, with a much larger influx of women expected to enter the field.

For our survey, we targeted successful women working in varied roles in the cybersecurity community, and we queried them about everything from breaking into the field and gaining career momentum to choosing a specialty and finding ways to remain relevant. In this report, we provide lessons learned and advice on how a woman in cybersecurity or a woman wanting to enter this field can lay a foundation to ensure success. This paper not only speaks to women, but aims to offer insights to men in cybersecurity as well.

The ways that women found success in cybersecurity differ, but each experience provides a lesson learned and, in the end, most women commented on similar experiences. The respondents did not hold back in their straightforward answers, which really helps pave the path for success for those following in our footsteps. The survey shows that:

- **41% of respondents credited being in the right place at the right time for their rise into senior or leadership positions.** That means you need to put yourself out there and be visible to decision makers.
- **16% of respondents were hired immediately after finishing their undergraduate degree.** Investigate which degrees fit your interests and pursue them.
- **On-the-job experience and certification far outweighed graduate degrees in terms of training.** There is little that can prepare you for the job like doing the job alongside someone.
- **Mentorship is gender-neutral.** Women have been groomed in cybersecurity by both men and women—and we need to pay this forward to all who want to enter our field.

¹ www.bls.gov/ooh/computer-and-information-technology/home.htm

Women in Cybersecurity Respondent Base

The 488 respondents to this survey include women from eight regions worldwide who hold a variety of leadership positions in the cybersecurity industry. Of these positions, 20% of the respondents are security administrators/analysts. What is interesting is that 17% identify their position as “other,” which means they don’t identify with the standard categories provided. This is common in our field! Where do we fit in, what is our primary role, how do we define ourselves? The simple question, “What is your primary role?” can have more than one answer and often does for our respondents. Figure 1 highlights the positions held, industries represented, workplace regions and time in the cybersecurity field.

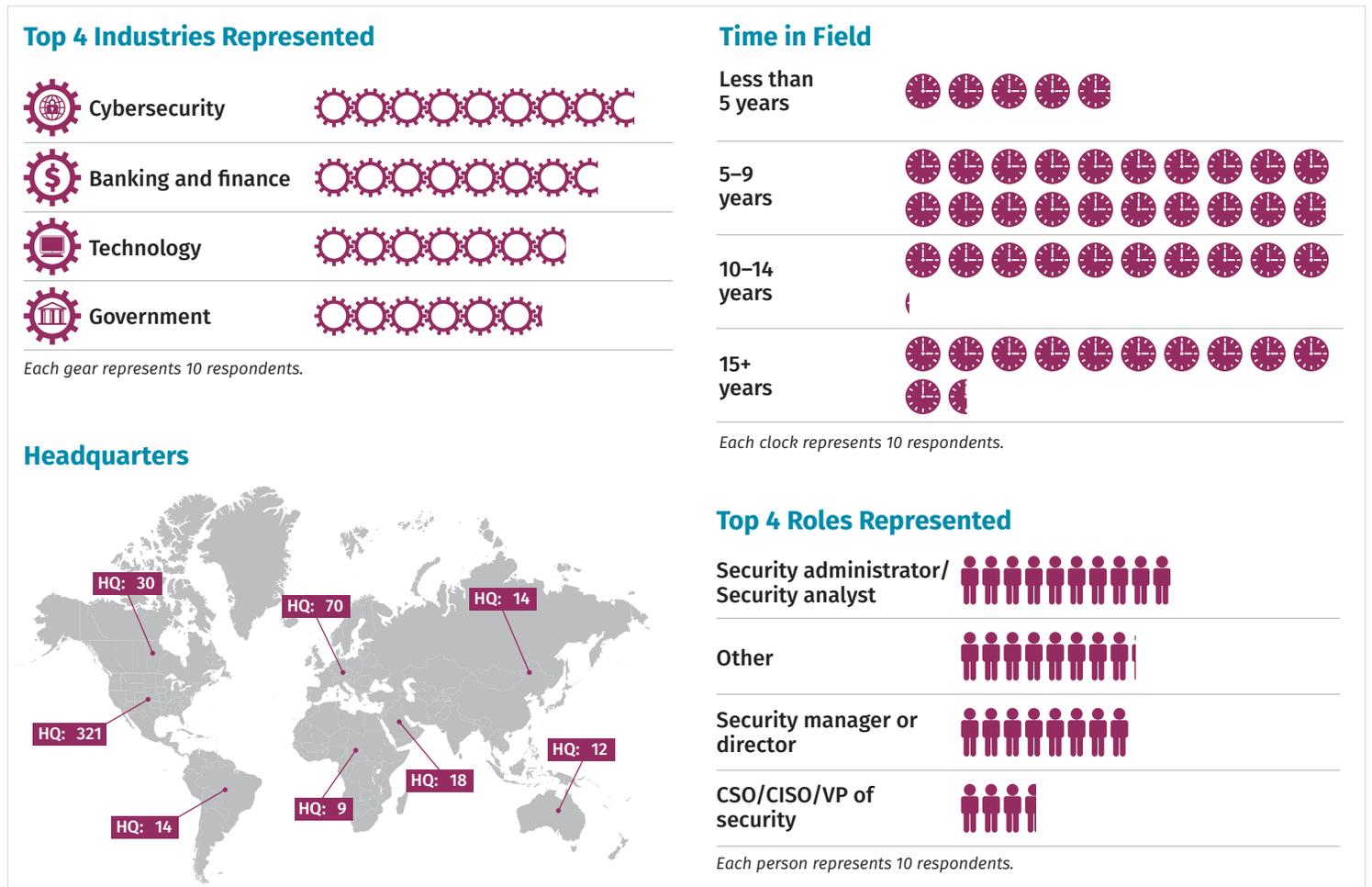


Figure 1. Survey Demographics

To find 488 women who deem themselves “leaders” in this field was not a simple task and is impressive. Why? Is it because women do not identify as leaders if their title doesn’t specifically say that? Do women experience “imposter syndrome,” as one respondent stated? We have all probably questioned where we fall in this field and whether we are leaders. This is something you should consider while reading this paper. What does it mean to be a leader, manager or hold a leadership role in cybersecurity?

Respondents’ job functions ranged from detective to the most popular, security administrator/analyst, with primary roles ranging from information security to e-discovery and consulting services, which means we have a wide range of opinions and experience. Having such a wide variety adds a great deal of value to this paper, as the perspective is unique, yet unanimous at times. You may find it interesting how women with such different backgrounds have similar experiences in cybersecurity.

What makes a leader? Is it your title? Time in the field? Your experience? One aspect that really matters in a survey such as this is how much time respondents have accrued in cybersecurity. Does it add more impact if a respondent is a seasoned analyst or someone who landed a leadership role with five years’ experience? Let’s see what our results show in Figure 2.

Bottom line: The respondents come from various regions, with differing job titles; some manage large teams and others don’t. What really matters is how they made it to the top in cybersecurity. Curious as to how these women landed their positions of leadership? Keep reading to find out.

Personal Perspective

As a government contractor, I’ve held positions within my organization that differ from the titles assigned by the government. That makes defining one’s role very important.

How many years of cybersecurity experience do you have?

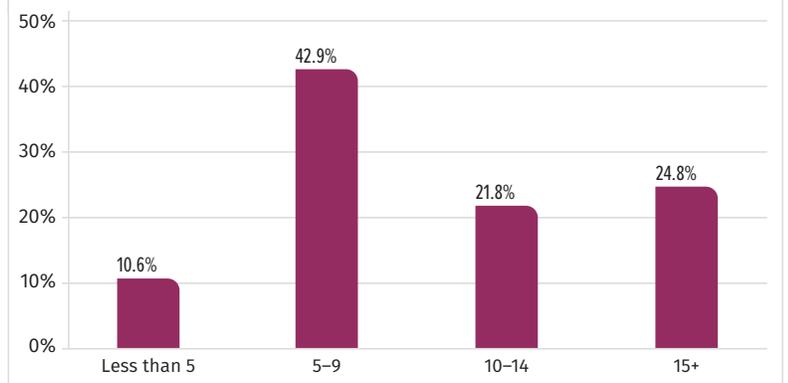


Figure 2. Years of Experience

TAKEAWAY

The respondents have a great deal of experience in the field and self-selected as being in a senior or leadership position—a perfect position from which to provide valuable lessons for other women in the field. Your title and time in the field do not define what you know and the impact you can provide to this community. They do not define your impact or even narrow in on your capabilities—your actions do!

How Did We Get Here?

How did you land your first cybersecurity job? Or are you looking to get your foot in the door? Let's glimpse at how our respondents achieved their success.

Education

Education assists in landing a cybersecurity job, but a degree is not the deciding factor: 45% of our respondents obtained a master's degree, 43% obtained a four-year undergraduate degree, only 5% have achieved a doctoral degree, and 8% have a high school diploma. See Figure 3.

If you are among the lucky few who know their calling, research the job requirements to land that job. From there, choose an educational path that is required for those positions to make the transition into the field easier.

TAKEAWAY

The answer is always “no” if you don't ask or try. Do your research and find what inspires you. When you find it—chase it!

Experience

As we saw in Figure 2 at the beginning of the paper, approximately 47% of respondents have 10 or more years of experience in cybersecurity. While most of the respondents have more than 10 years of experience, 43% have five to nine years dedicated to the field and have earned a leadership position. Thus, effort and hard work seem to be paying off for women in cybersecurity. While one respondent credits her success to “taking the initiative to get technical and focus on an in-demand skill,” the majority of respondents believe they were in the right place at the right time, as seen in Figure 4.

What is your highest level of completed education?

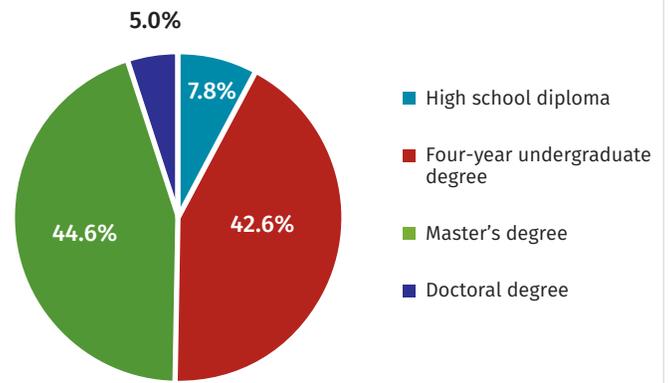


Figure 3. Level of Education

Personal Perspective

I'm often asked about my background and how I ended up in digital forensics. We all take different paths. But I can tell you, I have interviewed men and women who have no degrees in any field related to cybersecurity. When I hired them, though, many of those folks became rock stars!

What are the top three factors you credit for your rise to a senior or leadership role? Please select exactly three choices.

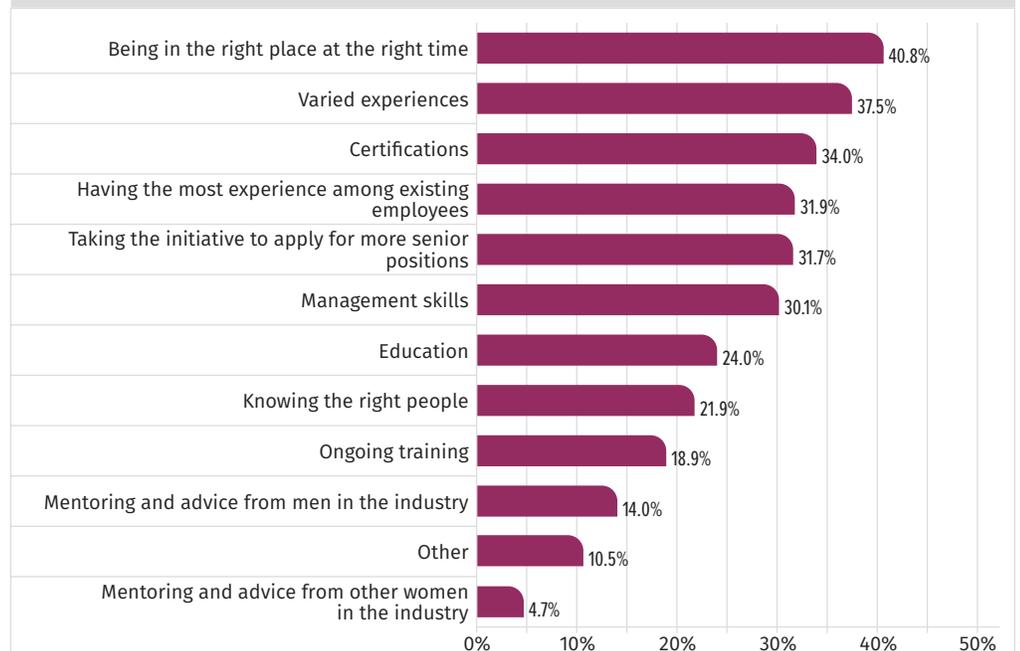


Figure 4. Success Factors

Keep in mind that the top three—being in the right place at the right time, having varied experiences and pursuing certifications—all play into the ability to rise into a senior or leadership position. Those are all things you can control.

We, especially as women, need to put ourselves out there. We must network and throw our names in the hat. It is up to us to land the jobs we want. The number of comments from the respondents on this topic was astounding. And we didn't even ask the question, "Why do you think there aren't more women in leadership positions in cybersecurity?" We all agree that it is up to us to not doubt ourselves, to dream big and to apply ourselves. The survey shows that education helps, but in the end it's hard work that really pays off.

The Big Break

For some, the "big break" didn't come immediately. When reflecting on education, 23% of our respondents with an undergraduate degree and 12% with a graduate degree earned a position in cybersecurity more than one year after completing their degree. However, 16% were lucky enough to be hired within three months of completing their undergraduate degree.

Table 1 shows the keys to the big breaks.

Of our respondents, 14% were hired more than one year after completing a tech school, certification or other professional training and 9% immediately after completing the same. Does this mean specialized training could also be key? Is the undergraduate way the fastest means to success? Another 19% of respondents credit ongoing training to their rise to leadership and 34% credit certifications. It appears that training and achieving certifications helped some get their start and others to rise in the career field. This means that if you identify a path for your career aspirations and stick to it, you will get there faster. If you aren't sure, getting a graduate degree may cement your future. It is difficult to know what you want to do for the rest of your life the minute you start your undergraduate career. Do as much research as you can so you can be sure you start as early as possible to gain the footing you need to excel in cybersecurity.

TAKEAWAY

If you want a job in cybersecurity—put yourself out there. Meet people, apply for that job and never give up.

Table 1. Career Cadence

Time to break into field after ...	Immediately	Within one year	More than one year
Completing tech school, certification or other professional training	8.7%	6.2%	13.8%
Completing undergraduate degree	16.0%	7.3%	22.7%
Completing graduate degree	8.0%	5.6%	11.8%

Personal Perspective

For me, I felt it was being in the wrong place at the wrong time. I was working on a case in Europe and was presented with a cell phone that was not in English and wasn't supported by the tools. What started as a frustrating experience with a cell phone and tears ended up as a career in smartphone forensics. (Yes, this took a few years to accomplish, but I always reflect on that day in Budapest with that horrible phone.)

TAKEAWAY

If you want to move forward, you must remain current and continue your education. Find training that speaks to you and take it. Then be sure to keep your certifications current.

Training and Specialties

What is your budget? What are your goals? How can you learn a skill that helps you land a position or gain a leadership role in cybersecurity? In our survey, 87% of the respondents credit on-the-job experience for their training. Professional training paired with on-the-job training creates the strongest impact in cybersecurity.

Not only does training matter, certifications hold their weight—75% of the respondents maintain certifications pertinent to their career field. The results show that certifications and working with smart people who are willing to mentor you are the most popular methods for staying current. See Figure 5.

More than 66% of respondents consider themselves as having a specialty, while others associate with the generalized title assigned to cybersecurity. For those with specialties, 57% applied their skills and learned on the job, while 48% trained, certified and chased that specialty. The other 4% of respondents randomly landed in their specialty.

If you are passionate about your specialty, spread the word. Many don't know what they want to take on in the field of cybersecurity. In honesty, you don't need a specialty to succeed. You can pave your way in a generalized field. Specialties are what we end up branching into at some point, and sometimes this wasn't even the plan. It might just have happened.

The Mission Should Matter

You should be invigorated by what you do and enjoy it. Mission matters—and when it doesn't, it's time to find a new job. When we think about how many hours we put into our work, we really need to consider the *why* as that is what really matters.

Some of the respondents are mothers who mentioned feeling held back because they have children. While this is a stigma we need to change in cybersecurity, we also must consider the mission. Is it worth the time away from your family? If your answer is *no*, it's time to get out there and find the *yes*.

TAKEAWAY

While training and certifications prepare you for the job, nothing will cement your knowledge like working alongside a seasoned security professional.



Figure 5. Training

ACTION ITEM: Pay It Forward and Share Your Knowledge

As women in cybersecurity, we must take those entering the field under our wings and show them the way. It is up to us to secure the future. Find someone you can mentor and do it today! Share what you've learned through your experience and help grow the role of women in cybersecurity.

Some of us are driven by the possibility of the next cyberattack, while others are driven by the field of digital forensics and making the world a safer place. No matter what, you need to find what drives you. Without drive or purpose, you are not going to remain in this field, nor will you help invigorate those just entering it.

Upward Mobility and Your Goals

Management and leadership are often placed in the same bucket, but they are vastly different. Anyone can be a leader, if they apply themselves. Table 2 illustrates the differences between leaders and managers.

Managers are either hired or promoted into that role. You may find managers who are not good leaders and leaders who will never manage a person in cybersecurity during their entire career. But you can be in a senior role without the label of manager or leader. Thirty-seven percent of our respondents obtained a senior position within one to four years after serving in a midlevel or junior role. This means that when you put in your time, you can earn a senior position if you apply yourself. Only 5% of respondents immediately entered a senior role when obtaining a cybersecurity job. See Figure 6.

Does having a senior role make you a leader?

Not necessarily; your actions make you a leader.

Holding a senior position might not make you a manager either. This is where some respondents weren't sure where they fell. This was also the point in the survey where responses varied the most. Some respondents indicated they wanted to avoid management roles. Management does not mean you made it, and not wanting to be a manager does not mean you cannot hold a senior position. Only 60% of survey respondents manage other security professionals. This means 40% are in a senior/leadership position and are not responsible for managing others (see Figure 7).

ACTION ITEM: Create Your Destiny

You create your own destiny. Find something that drives you and is invigorating. It's only work when you don't love it.

Table 2. Differences Between Leaders and Managers²

Leaders	Managers
Create vision	Create goals
Change agents	Preserve the status quo
Self-aware and unique	Mimic competencies and behaviors
Take risks	Take control
Think long-term	Think short-term
Grow personally	Rely on existing skills
Build relationships	Build systems and processes
Coach employees	Assign tasks and direct completion
Create followers	Have employees

How long did it take you to reach a senior position?

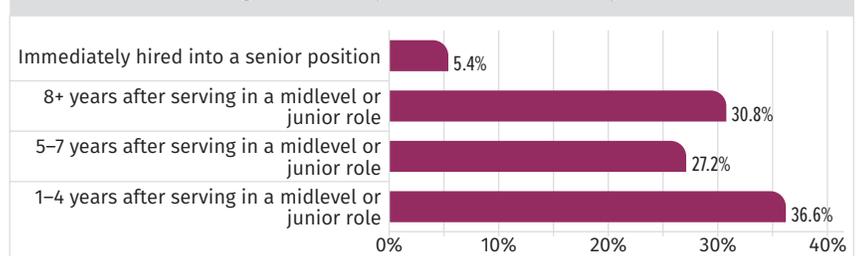


Figure 6. Landing a Senior Position

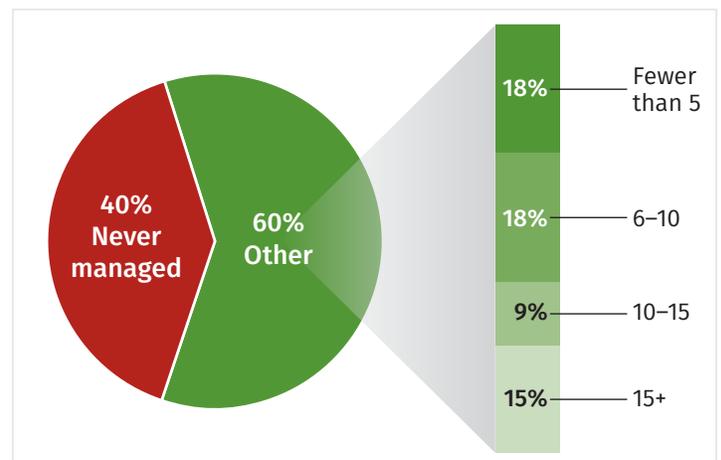


Figure 7. Team Management

² "9 Differences Between Being a Leader and a Manager,"

www.forbes.com/sites/williamarruda/2016/11/15/9-differences-between-being-a-leader-and-a-manager/#238ea1e54609

Why do we not have more female managers? Is it the stigma that cybersecurity is a male-dominated field? This is important because some of the responses show that women may not want to change jobs or seek promotions because they don't want to manage. Why? Is it because women do not feel they will earn the same respect as male managers? Have we simply not applied for the positions? Some respondents feel that their voices are heard, and they are respected as leaders and managers, while others feel differently:

As professionals in this field, we must change how the world sees us. In cybersecurity, we should be valued based on our knowledge and skills—not on gender, race or age.

Staying Vigilant

Sharp minds are required in cybersecurity, and 34% of respondents find that strong mentors/champions along with teamwork help them remain current in the field. Mentoring will be covered later in this report, so let's focus on collaboration and teamwork. If you find yourself in a room of cybersecurity professionals but you cannot learn one thing from everyone in that room, it's time to find a new room! We are all unique and our methods for conducting incidents vary—sharing is a fantastic (and free) way to learn.

Another aspect of staying vigilant is training. One respondent credits continuous learning and hands-on experience as ways to remain current. Further, 32% of respondents undergo training at least once per year, while 29% take advantage of professional training twice per year (see Figure 8).

Fewer than 8% of respondents take no training at all. Why not? Is it a budget issue? Is it not required because you are in a senior role and allocations go to those below your pay grade? Often, those who didn't take training were simply not asking for it. We all need training.

[I experience] direct opposition from leadership who think I don't deserve a voice and experience dismissal by other members of leadership despite proficiency.

—Survey respondent

[I am] overworked, underpaid, with very little support from [the] line manager [and] often dismissed [because of] what I suspect [is] being perceived as “young.”

—Survey respondent

ACTION ITEM: Take a Chance

Apply—even if you don't think you are completely qualified. If you are confident that you can learn the skills you are lacking, apply anyway.

How many times per year do you take training?

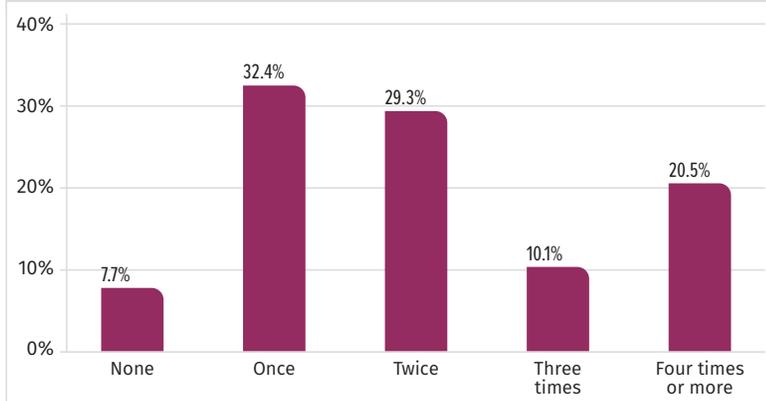


Figure 8. Annual Training Rates

ACTION ITEM: Seek Out Training

If you want to move forward and remain current in cybersecurity, take training to ensure you are aware of the current trends, methods and technologies.

Not only does training matter, but certifications heavily weigh into the “staying vigilant” theme. One way to prove you have absorbed your training is to become certified. Once you are certified, you should aim to keep that certification active to prove you are remaining vigilant. Nearly 38% of our respondents have two to three certifications that they have earned and keep current. Oddly enough, 21% hold no certifications relevant to cybersecurity. See Figure 9.

Most companies require their professionals to remain proficient and prove that they are maintaining certifications. Others will hire you and then pay for you to train and obtain certifications. There is no right or wrong way. For those with no certifications, we should follow up to determine why that’s so.

Respondents further highlighted the importance of on-the-job training (87%) and certifications (75%), which significantly outpaced graduate degrees (22%) in terms of training methods used by our sample of women in senior and leadership roles.

You have trained, certified and thrown yourself into the mix of cybersecurity positions. Now what? How can you move up? Do you have a mentor or someone to pull you into new opportunities? Do you network? Have you established a good reputation for yourself in the community? Respondents note that these key items are what they credit for their upward movement. See Figure 10.

The “other” category is interesting here, because we all find our own ways and have our own success stories. Some might believe that women should mentor women and men should mentor men, but this is not a common sentiment among most of our respondents. One respondent provided excellent advice to those wishing to advance their careers: “The only thing that stops me is the story I tell myself. Confidence.” To overcome that, put yourself out there. Apply for what you want and fight until you get it.



Figure 9. Current Cybersecurity Certifications

TAKEAWAY

It is up to you to grow your own brand. Ask for training and take certification seriously. Sometimes a certification goes further than an educational degree.

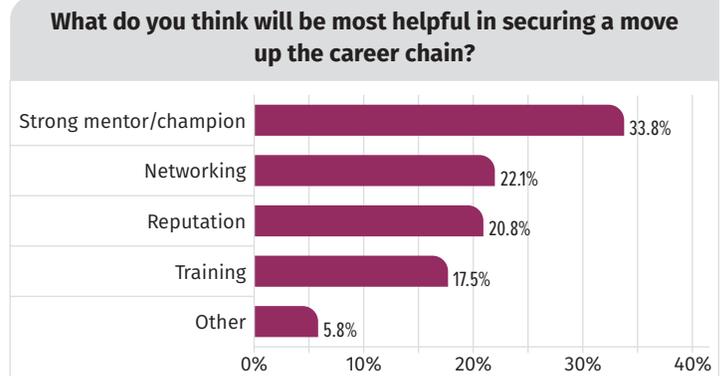


Figure 10. Climbing the Corporate Ladder

Personal Perspective

I, like several other respondents, believe I was in the right place at the right time. I also had amazing male mentors to lead me along the way. I mention male here because I have heard that men do not mentor or groom women in their career path. I have found the complete opposite to be true.

Don't Hold Back

It would be obtuse to say that women don't feel slighted when it comes to opportunities in cybersecurity and upward mobility. A full 35% of respondents feel they are not progressing in their careers due to gender, while 23% responded that "other" is holding them back. Men also feel slighted, but for potentially different reasons. Personality can be a key factor. One respondent stated that she feels that professionals with introverted personalities are often overlooked regardless of qualifications. This is not based on gender, because men experience this as well. One respondent indicated that her introverted personality was her greatest challenge when it came to advancement.

Another respondent stated that she doesn't see herself moving up because, "Honestly, I just don't think I'll ever get there, so I hesitate to even try."

Sometimes our perceptions of ourselves and our skill sets hold us back. You are female, single, married, a mother, an adventurer—who cares? You should not hold yourself back and neither should your employer. If you find you are being held back due to any of these factors, it's time to move on. There are great companies out there that promote based on skill.

One respondent wrote that she is keeping her options open for career advancement by continuing to "work hard, prove myself and expose myself to different experiences to gain as much OJT [on-the-job-training] as possible. Continue to learn and grow in DFIR [digital forensics and incident response] to make sure I'm not stagnant." Do you see a common theme here? Cybersecurity professionals need to put in the work, get the training, maintain the certifications and sharpen their knowledge to really excel in the field.

For my current role, I was the best fit for the organization, but it took some time before I believed it. I took the shot, out of my comfort zone. And I got it, and I'm good at it. And ... I was pregnant, they knew about it and I even got it.

—Survey respondent

My greatest challenge was learning to present myself in a confident manner when speaking to others in discussion. Having the confidence to speak about things I was proficient in rather than playing a more submissive role was a key movement for me. It allows for more contribution and the establishment of your reputation in any field.

—Survey respondent

ACTION ITEM: Be Your Own Advocate

You must be your own advocate. The strongest women in cybersecurity got where they are by self-promotion. Do not hold back. Continue to seek growth and don't be afraid to go after new opportunities. Chase your dreams!

Don't Let Our Community Die

Mentoring matters. Think about who has groomed you and how you can give back. Only 7% of women in cybersecurity have been mentored by another woman. That is low! Thirty-seven percent have been mentored by both men and women, while 31% have been mentored by men alone, leaving 25% who have never benefited from being mentored!

Clearly, women have been groomed by strong professionals in our community, and gender does not play a role here. The results show that mentorship is gender-neutral, as it should be.

While some women perceive men as the reason they have not progressed, a vast number of respondents credit men for their jobs and growth in cybersecurity. Some respondents even went as far as to comment about women not grooming other women and how men “tend to encourage; women express their frustrations.” Some respondents seek out a female mentor because they want gender empathy, while others seek out men because they believe that men often occupy senior roles, are more direct and are more focused on skill advancement. There really isn't a correct answer here. Mentorship is sometimes sought out, and sometimes it happens organically.

The future of cybersecurity is the responsibility of everyone. We need to reach out and become mentors. Fifty-seven percent of respondents mentor both men and women in cybersecurity (see Figure 11).

Being a mentor doesn't have to be daunting. It can be a natural way to just check in on someone and make sure they are advancing. Throw ideas back and forth with your protégé and invite her or him to networking events that make sense. We all know that time is precious and many of us don't have extra to spare, but if we care about the future of cybersecurity, a few minutes a week may be all it takes to change someone's vision and path in this field.

Do you actively seek out opportunities to mentor others in cybersecurity?

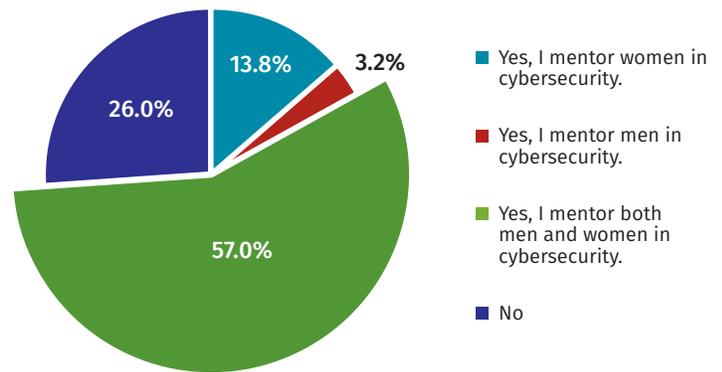


Figure 11. Mentoring Results

ACTION ITEM: Become a Mentor

Make someone's day: Reach out and find someone for whom you can make a positive impact. You might be surprised. Someone may already consider you to be their mentor. Get started by reading Monster's "How To Be a Good Mentor,"³ National Center for Women & Information Technology's "Mentoring Basics – A Mentor's Guide to Success,"⁴ and The Balance Careers' "Eight Qualities of a Good Mentor."⁵

³ "How To Be a Good Mentor," www.monster.ca/career-advice/article/tips-on-how-to-become-a-mentor

⁴ "Mentoring Basics – A Mentor's Guide to Success," www.bc.edu/content/dam/files/centers/cwf/individuals/pdf/MentorGuide.pdf

⁵ "Eight Qualities of a Good Mentor," www.thebalancecareers.com/qualities-of-a-good-mentor-1986663

Conclusion

Our first women's survey provided impactful insight for women in cybersecurity who wish to advance their careers. Results indicate that:

- Mentorship is gender-neutral, and we need more of it.
- Career growth often falls prey to our own perceptions (or misperceptions), which might hold some women back.
- One does not need to be a manager to hold a senior position, and many respondents are living proof.
- Training, certifications and collaboration with peers are key to staying current and gaining traction in the field.

Additionally, we identified areas where women feel they are held back and provided solutions to overcome those obstacles.

The worst thing women in cybersecurity can do is to settle for mediocrity. They must chase their dreams, believe in themselves and achieve their goals

It's a great time to be a woman in cybersecurity. The doors are opening, and more women should be walking in.

Don't be afraid [of] being a minority.

Cybersecurity needs more of us!

—Survey respondent

About the Author

Heather Mahalik is a SANS senior instructor and course lead for [FOR585: Smartphone Forensic Analysis In-Depth](#). As the senior director of digital intelligence at Cellebrite, Heather focuses on forensic research and making the community smarter on all aspects of digital intelligence. Her background in digital forensics and e-discovery covers smartphone, mobile device, Mac and Windows forensics, including acquisition, analysis, advanced exploitation, vulnerability discovery, malware analysis, application reverse-engineering and manual decoding. Prior to joining Cellebrite, Heather focused on mobile device forensics in support of the federal government and served as a technical lead performing forensic examinations for high-profile cases. Heather maintains www.smarterforensics.com, where she blogs and shares presentations.

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