

Skilled or Gullible? Gender Stereotypes Related to Computer Security and Privacy


Miranda Wei^{*}, Pardis Emami-Naeini[†],
Franziska Roesner^{*}, Tadayoshi Kohno^{*}
^{}University of Washington, [†]Duke University*

gender stereotypes exist elsewhere...

...what about in everyday security and privacy?



nurturing psychology
accommodating humanities
emotional nurses
caring teachers
graceful **stay at home mothers**
irrational *passive* *diligent*



self-confident *logical* math science
aggressive doctors
ambitious engineers
muscular **breadwinners**
rational *active* *careless*

stereotypes: “qualities perceived to be associated with particular groups or categories of people” *[Schneider 2004]*

stereotypes are about **groups**,
focusing on individuals misses the point

we study gender stereotypes (as a group-level dynamic) for two main reasons

- 1. gender stereotypes perpetuate harm**, including harassment, health problems, lower pay, fewer opportunities, and more bias
- 2. gender stereotypes are a causal explanation** for gendered correlations in prior work, with respect to:
 - password strength [Bonneau 2012, Mazurek et al. 2013]
 - use of private browsing [Habib et al. 2018]
 - phishing susceptibility [Sheng et al. 2010, Halevi et al. 2013]

research questions

- what gender stereotypes (about women or men) do people in the U.S. hold about everyday computer security and privacy?
- what rationales do people give to justify gender stereotypes?

positionality statement

our position as researchers and our identities influence our research

- research team: 2 cisgender women, 2 cisgender men, all lived in the U.S. 6+ years, all observed instances of gender stereotyping in S&P
- this work is motivated to contribute to the awareness and combating of gender stereotypes

methods

our study methods

prestudy

identify potential stereotypes

affinity diagramming

select additional potential stereotypes

main study

evaluate potential stereotypes

our study methods

prestudy

identified 9 potential stereotypes

affinity diagramming

select additional potential stereotypes

main study

evaluate potential stereotypes

our study methods

prestudy

identified 9 potential stereotypes

affinity diagramming

select additional potential stereotypes

main study

evaluate potential stereotypes

our study methods

prestudy

identified 9 potential stereotypes

- affinity diagramming: process for grouping data items
- consulted papers on security advice and security behaviors
- developed list of 5 positive and 5 negative S&P behaviors

main study

evaluate potential stereotypes

our study methods

prestudy

identified 9 potential stereotypes

affinity diagramming

selected 10 additional
potential stereotypes

main study

evaluate potential stereotypes

our study methods

prestudy

identified 9 potential stereotypes

affinity diagramming

selected 10 additional
potential stereotypes

main study

evaluate 19 potential stereotypes

survey U.S. Prolific crowdworkers about

- stereotype beliefs
 - who is more likely to X?
- stereotype rationales
- sexism scale (ASI) and demographics

our study methods

main survey instrument

social desirability bias: participants answer the way they think we want them to

- to mitigate: “In this survey, we are interested in your honest thoughts and opinions. **There are no right or wrong answers**, and your responses have no impact on your compensation.”

ethical considerations

- IRB determined exempt
- avoid suggesting gender differences are true through neutral wording, as well as many rounds of iteration and pilot testing

results

what stereotypes exist about how **women** do computer security and privacy?

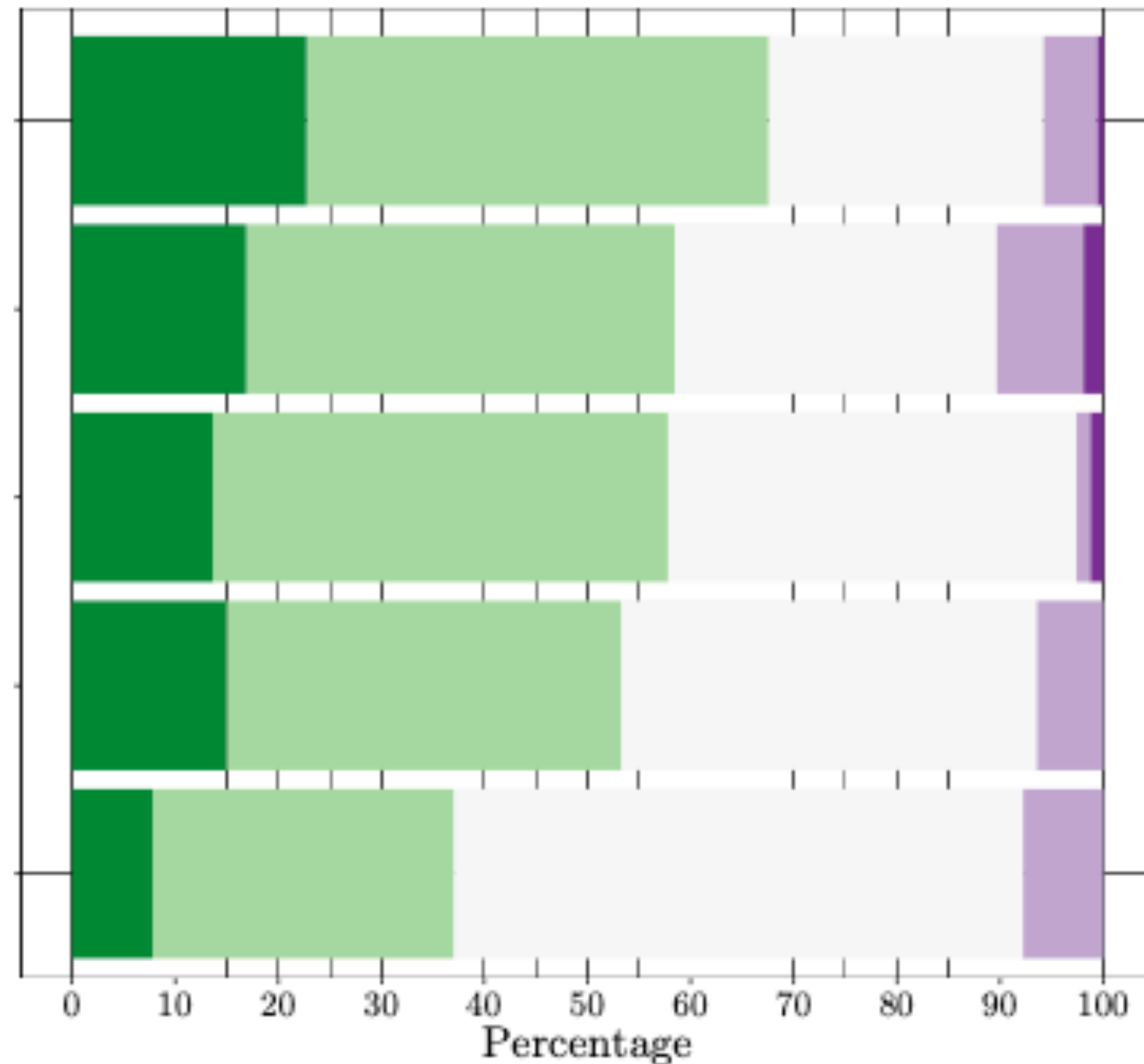
share sensitive information on social media (-)

be emotional (-)

fall for shopping scam (-)

ask for help if have questions (+)

be gullible (-)

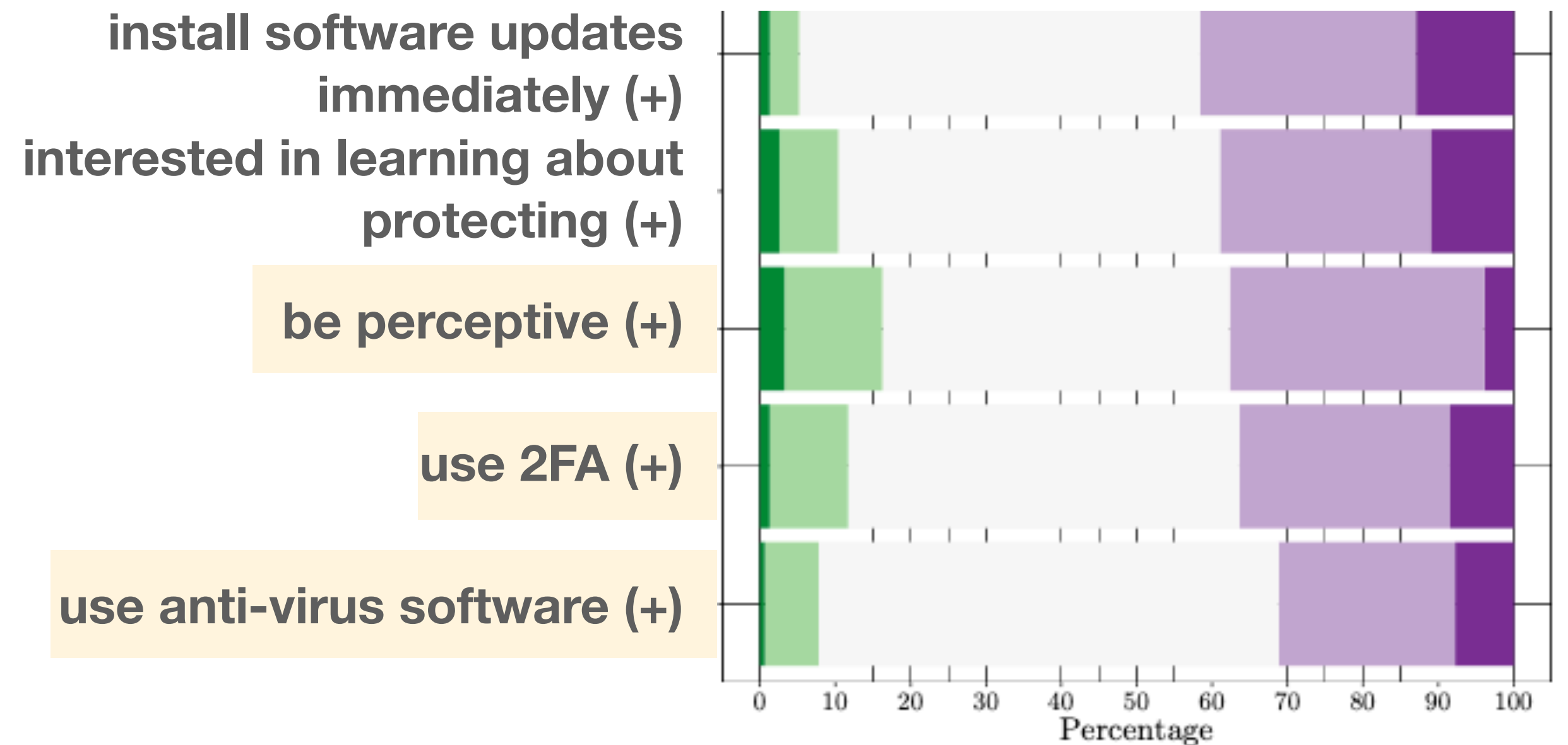
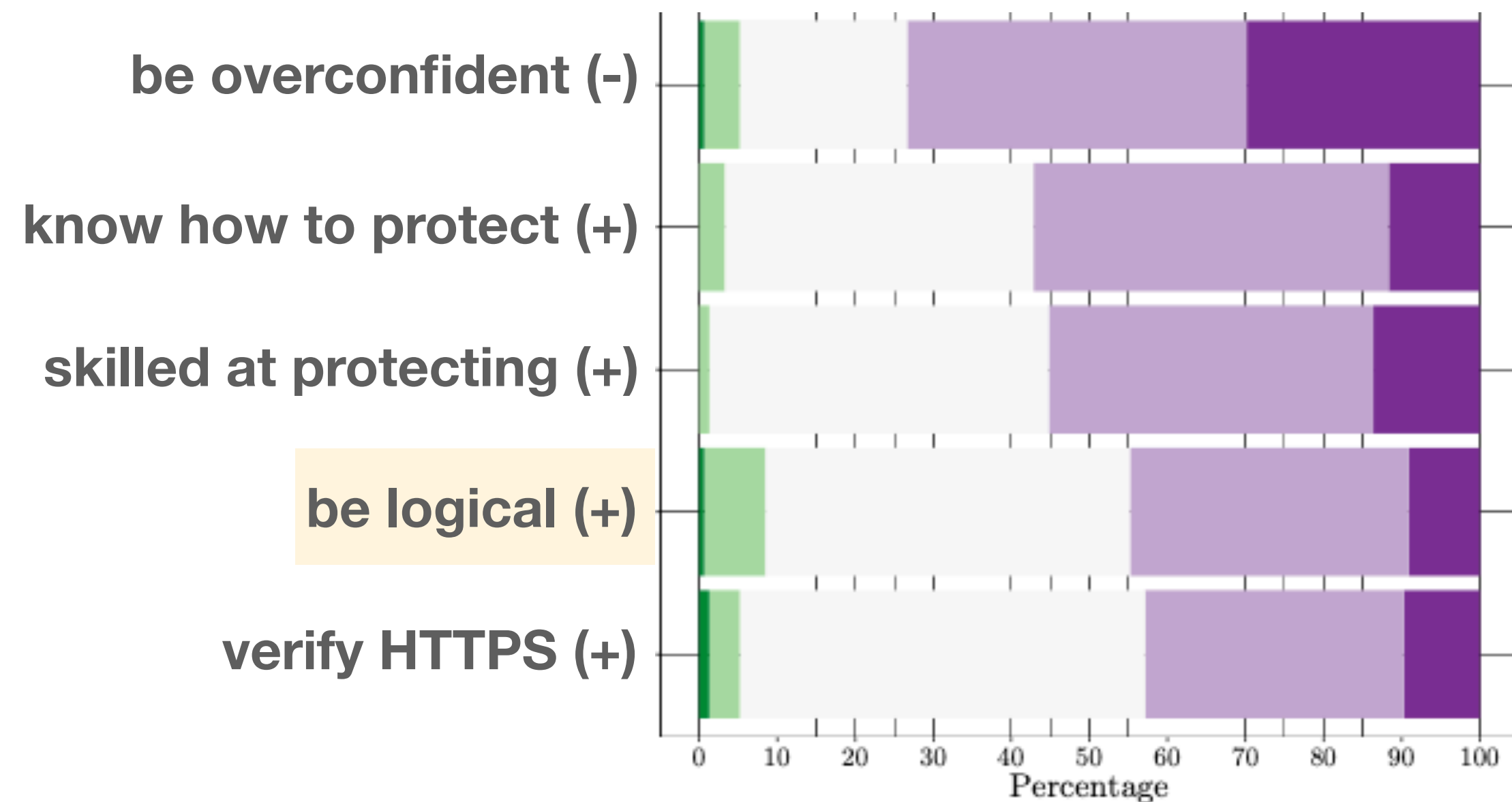


Definitely women
Probably women
Men and women equally
Probably men
Definitely men

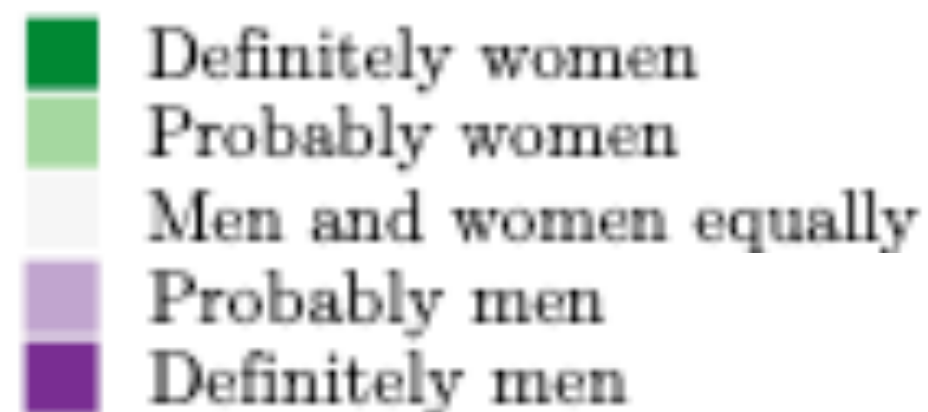
differences between responses **towards women** and **towards men** are statistically significant (two-sided exact binomial tests).

what stereotypes exist about how **men** do computer security and privacy?

also... was participant gender correlated with stereotype beliefs?



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stereotype beliefs that men believed but women did not

how do stereotype beliefs vary by participant sexism?

sexism measured with the Ambivalent Sexism Inventory (ASI), validated scale from psychology

stereotypes about women

- share sensitive information on social media
- be emotional
- fall for shopping scams
- ask for help if have questions
- be gullible

stereotypes about men

- be overconfident
- know how to protect
- skilled at protecting
- be logical
- verify HTTPS
- install software updates immediately
- interested in learning about protecting
- be perceptive
- use 2FA
- use antivirus software

not stereotypes overall

- be lazy
- fall for dating scams
- leave devices unlocked
- reuse passwords

stereotype beliefs believed by participants with higher ASI scores

stereotype beliefs believed by participants with higher ASI scores about women

what are participants' rationales for stereotype beliefs?

open-ended responses

- other stereotypes
 - leverage common heuristics

**“Women have a tendency to be compassionate... and listen to others and that often gives scammers the opportunity to fool them”
(P117)**

what are participants' rationales for stereotype beliefs?

open-ended responses

- other stereotypes
 - leverage common heuristics
- societal expectations
 - acknowledge discourse about interests and knowledge

“The social coding of [security and technology] hobbies as ‘masculine’” (P122)

“Women are seen by society as worse with technology, so they would be more interested in learning a lot to prove others wrong” (P18)

what are participants' rationales for stereotype beliefs?

open-ended responses

- other stereotypes
 - leverage common heuristics
- societal expectations
 - acknowledge discourse about interests and knowledge
- gendered threat models
 - assume innate valuations of security or understanding of threats

“Men probably have more to hide on their devices, honestly, like to lock up porn history” (P142)

“Women are more often targets of cyberstalking, doxxing campaigns... so they have a more obvious reason to learn” (P186)

conclusion

summary of results

stereotypes about women: be emotional, gullible, and take poor S&P actions

stereotypes about men: engage with S&P topics and take protective actions

belief in stereotypes correlated with higher sexism scores

participants' rationales for stereotypes

- drew connections to stereotypes and societal expectations outside of S&P

“the proposed research lacks scientific merit”
**“the proposed research is not addressing the
most urgent problem that is facing the society”**
[NSF GRFP review, 2021]

“the proposed research lacks scientific merit”
“the proposed research is not addressing the
most urgent problem that is facing the society”
[NSF GRFP review, 2021]

- gender is one of the most impactful social factors today
 - over lifetime, median U.S. woman makes \$590k less than median U.S. man
 - gender equality is one of UN’s Sustainable Development Goals (SDGs)
- studying gender and other social factors is one of the most urgent questions in security and privacy research

recommendations

for practitioners:

- avoid system designs and evaluations that reinforce gender stereotypes
- consider hidden assumptions because there is no “average” user

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for researchers now:

- consider that crowdworkers (and likely other populations) hold gender stereotypes
- use ASI as a proxy for stereotype belief

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- consider that crowdworkers (and likely other populations) hold gender stereotypes
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for future research:

- investigate impact of specific stereotypes
- study stereotype threat’s impact on performance
- probe other disparate impacts of gender by regarding as a social concept

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Miranda Wei (weimf@cs.washington.edu)

Pardis Emami-Naeini (pardis@cs.duke.edu)

Franziska Roesner (franzi@cs.washington.edu)

Tadayoshi Kohno (yoshi@cs.washington.edu)

- stereotypes about women: emotional, gullible, more likely to take poor security and privacy actions
- stereotype belief correlated with sexism scores
- stereotypes believed mostly, but not entirely, for non-biological reasons
- studying gender is necessary for future security and privacy research
- stereotypes about men: engage with security and privacy topics, more likely to take protective actions