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HUMAN
ELEMENT

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Social Cybersecurity: Social Influence and Design In End-User Cybersecurity

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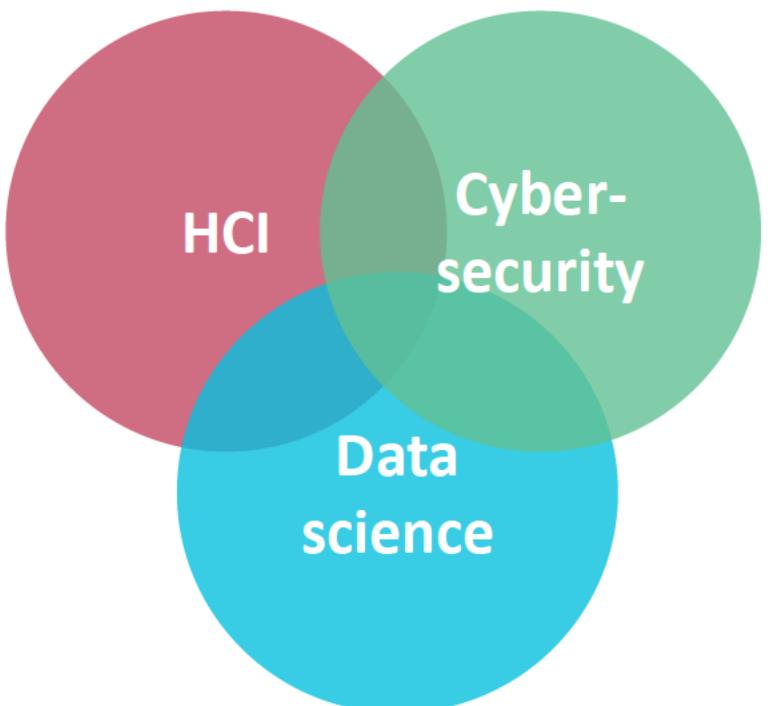


A bit about me...

Joined the Georgia Tech faculty in January 2018

Ph.D. from CMU, 2017

I direct the GT **SPUD** Lab (Security, Privacy,
Usability and Design)



How can we design *systems* that
encourage better cybersecurity
behaviors?

Cybercrime

\$600

billion per year in
damages

<https://www.mcafee.com/enterprise/en-us/assets/executive-summaries/es-economic-impact-cybercrime.pdf>

Internet users

66

percent have had
personal data stolen

Malware

323

thousand new files
per day

<https://www.darkreading.com/vulnerabilities--threats/kaspersky-lab-323000-new-malware-samples-found-each-day/d/d-id/1327655>

CYBERCRIME COULD BE HAMSTRUNG IF USERS...



Kept software up-to-date



Used two-factor on important accounts



Used a password manager & regularly updated passwords



Used e2e encryption services



Avoided untrusted & unencrypted WiFi

End-User Behaviors Today



<10% of Google consumers enabled two-factor authentication

Grzegorz Milka. The Anatomy of Account Take-Over. In USENIX ENIGMA, 2018.



22% of smartphone users lock screens & update their phones

Monica Anderson and Kenneth Olmstead. Many smartphone users don't take steps to secure their devices. Technical report, Pew Research Center, 2017.



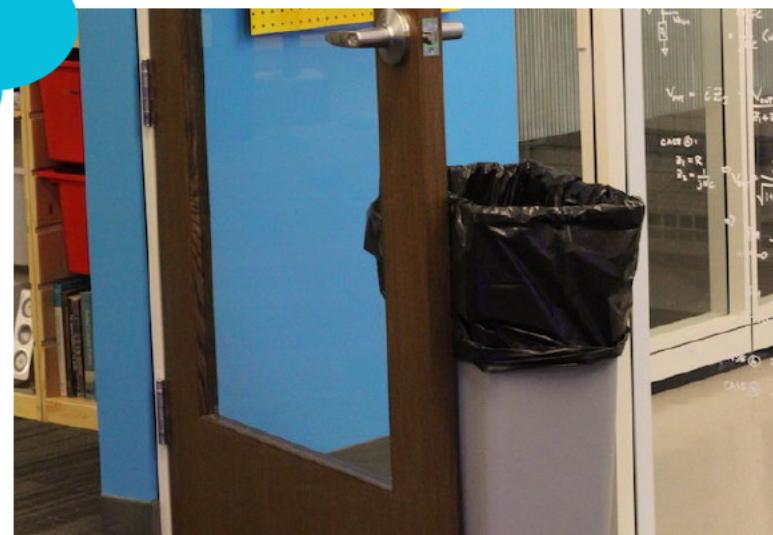
12% of U.S. Internet users use password managers

Kenneth Olmstead and Aaron Smith. Americans and Cybersecurity. Technical report, Pew Research Center, 2017.



10% of Android devices using newest major version. 2.3% using latest minor version.

<https://www.androidauthority.com/android-distribution-chart-1105405/>



What makes people...

...use a PIN on their phone?

...enable two-factor authentication?

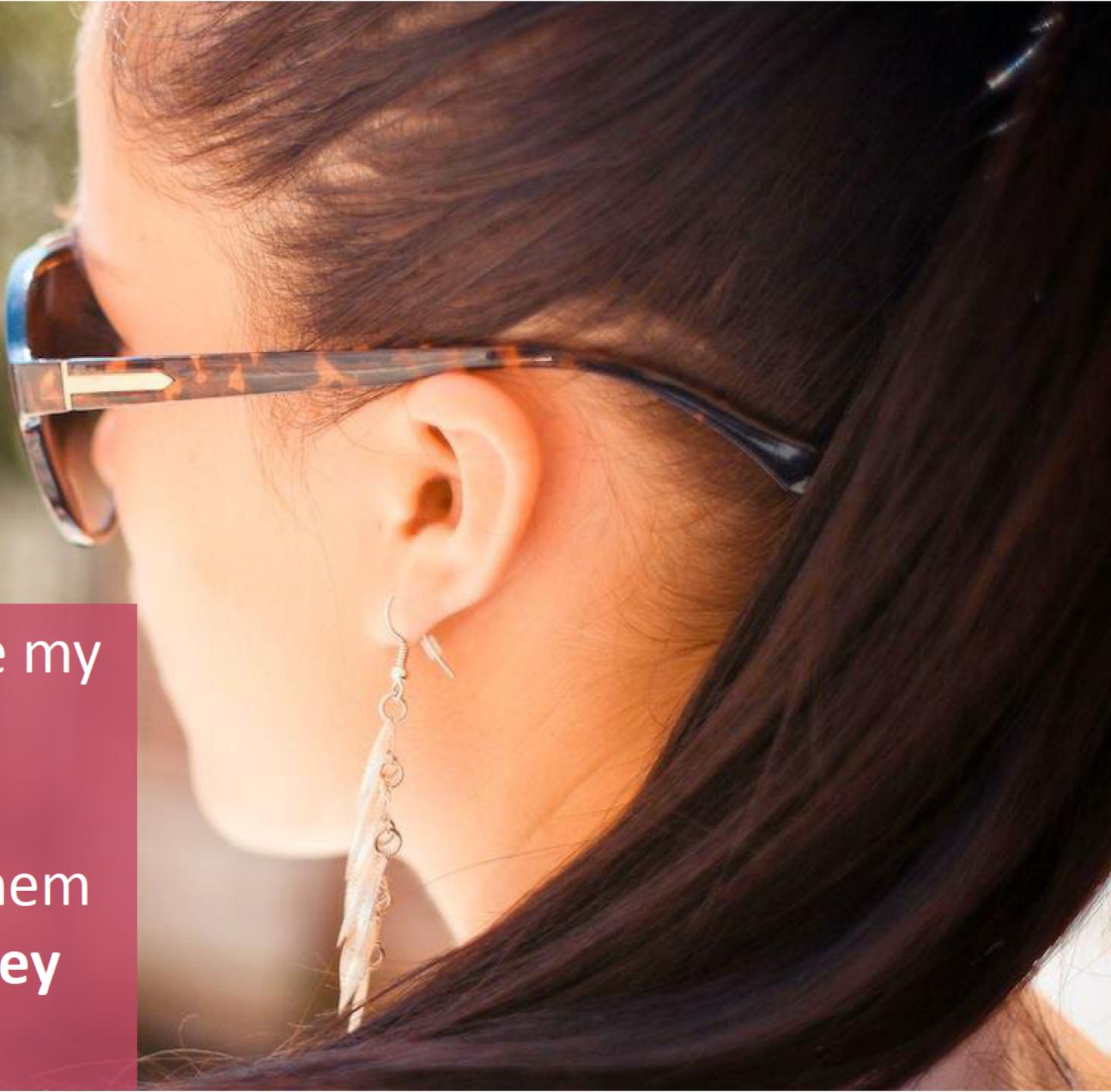
...keep their software updated?

...behave “securely”?

“I started using [a PIN]
because **everyone around me had**
a [PIN] so I kind of felt a group
pressure to also use a [PIN].”



“One of my boys wanted to use my phone...so I gave them my passcode. And not that I have anything that I don’t care for them to see or anything, but after they did that then I changed it”



“my friends...have a lot of different accounts, the same as me. But they didn’t get into any trouble. So I think maybe it will not be dangerous [to reuse passwords].”





HACKERS, TOM



HACKERS EVERYWHERE

Absent knowledge of how social influences affect security behaviors, we have little hope of doing better.



Social influence drives security behaviors, and **design affects the potential for social spread.**



We can **encourage better security behaviors** by making security more social.

Social influences **drive cybersecurity behaviors.** We can encourage better behaviors by **making cybersecurity more social.**



design affects the potential for social spread



encourage better security behaviors

Measuring Social Influence In Security Behaviors

Das, S., Kramer, A., Dabbish, L., and Hong, Jason I. [The Role of Social Influence in Security Feature Adoption](#). Proc. CSCW'15.

Analyzed how the (non)-use of **three optional security tools** was affected by friends' use of those tools for 1.5 million Facebook user's social networks.

Standard

A screenshot of a Facebook login notification. The top bar shows the Facebook logo and search bar. Below it, under 'Notifications', there is a message: 'An unrecognized device recently attempted to access your account, let us know if it was you.' A timestamp indicates it happened 'about a minute ago'. At the bottom, there is a detailed log of the login attempt, including the operating system (Win7), browser (Chrome), and location (Makati, MAN, PH). It also includes a note about location being based on ISP information and links for reporting or ignoring the alert. The message concludes with thanks from the Facebook Security Team and a note that Facebook never requests login info via email.

Login Notifications

A screenshot of a Facebook login approval screen. The top bar shows the Facebook logo and search bar. Below it, there is a message: 'Logging in from a new computer? Enter the code below.' In the center, a large number '297743' is displayed. Below it is a large circular button with a smaller circle in the middle. At the bottom, there is a button labeled 'My code doesn't work'.

Login Approvals

Social

A screenshot of a Facebook 'Trusted Contacts' page. The top bar shows the Facebook logo and search bar. Below it, there is a header: 'Call Your Friends to Get Your Security Codes'. The main content area shows a list of three friends: Jonathan Frank, Dustin Ho, and Jake Brill, each with a small profile picture. To the right, there are three small rectangular boxes with icons for 'Call', 'Text', and 'Email'. At the bottom, there is a large blue button.

Trusted Contacts

Data Collected

750k

users who newly adopted one of the security tools.

750k

“use-nots” who had not adopted one of the security tools.

Users

Use-nots



Social
influence?

Matched Propensity Sampling Analysis

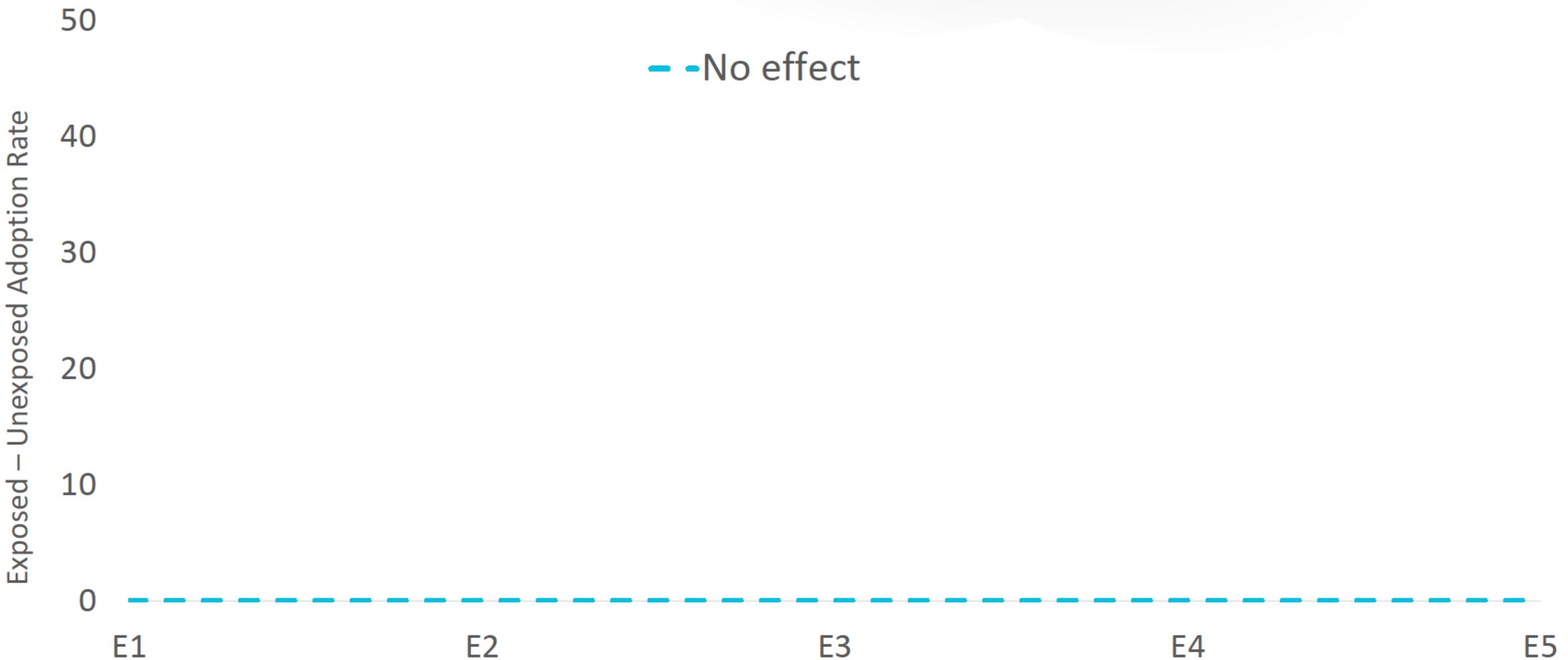
For a given security tool, empirically select **exposure levels** to friends who use that tool.

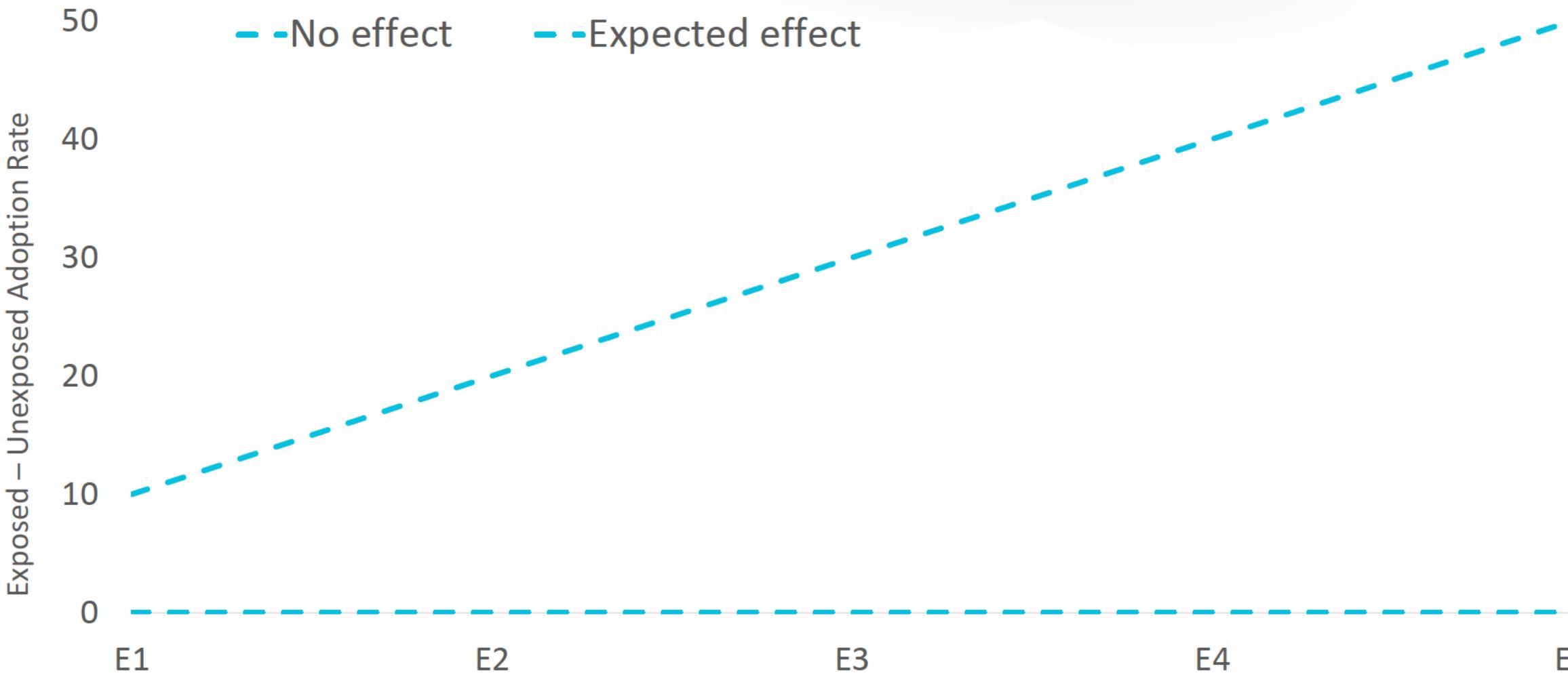
e.g., 1%, 5%, 10%...

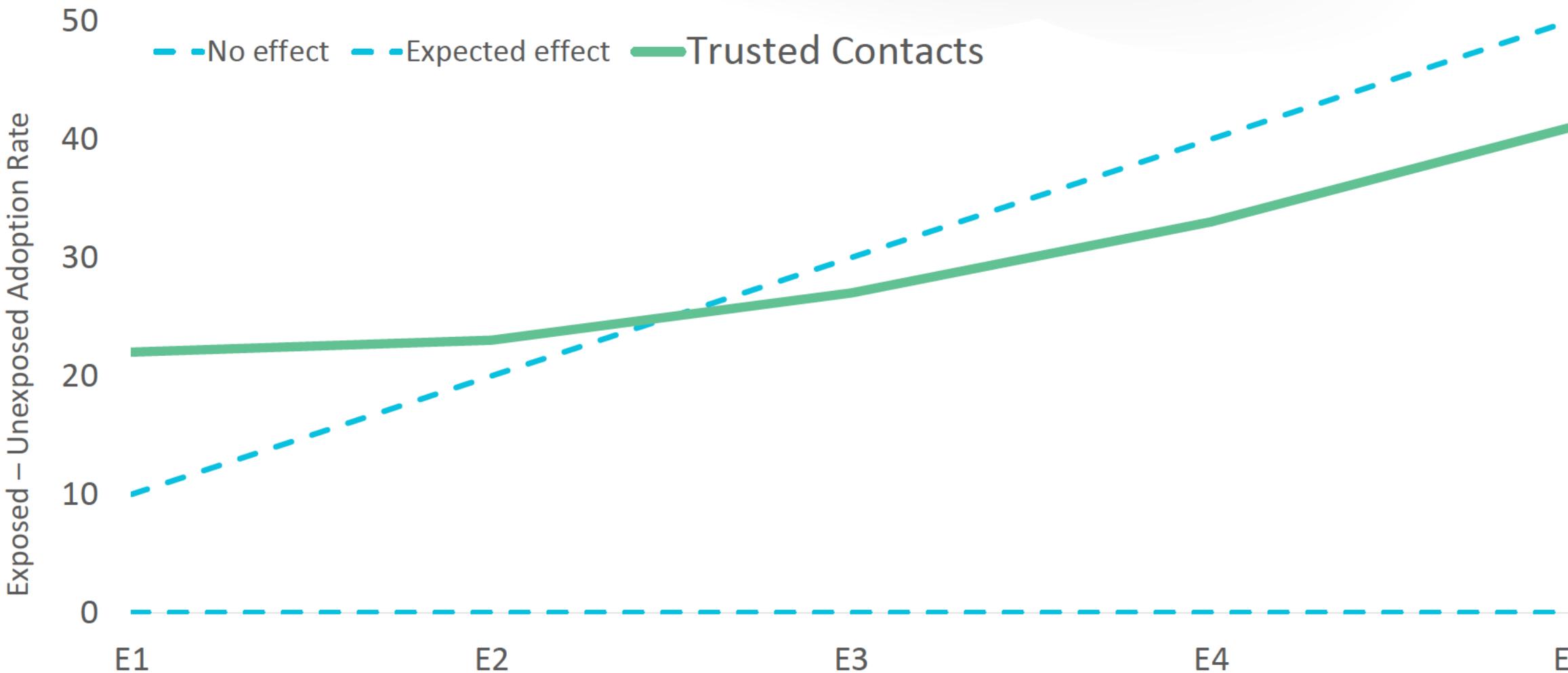
For each **exposure level**, compare adoption rate of those who **are** exposed versus those who **are not**.

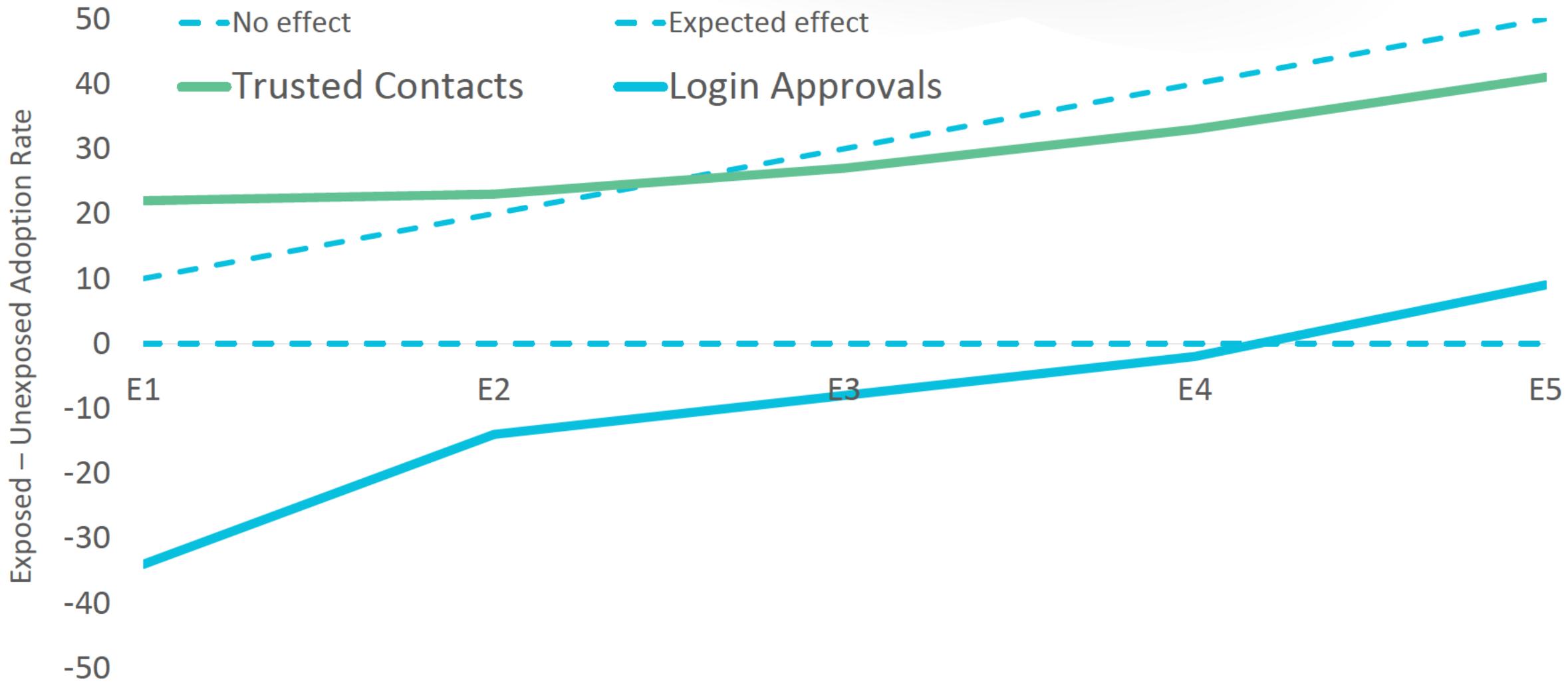
This difference is the effect of social influence.

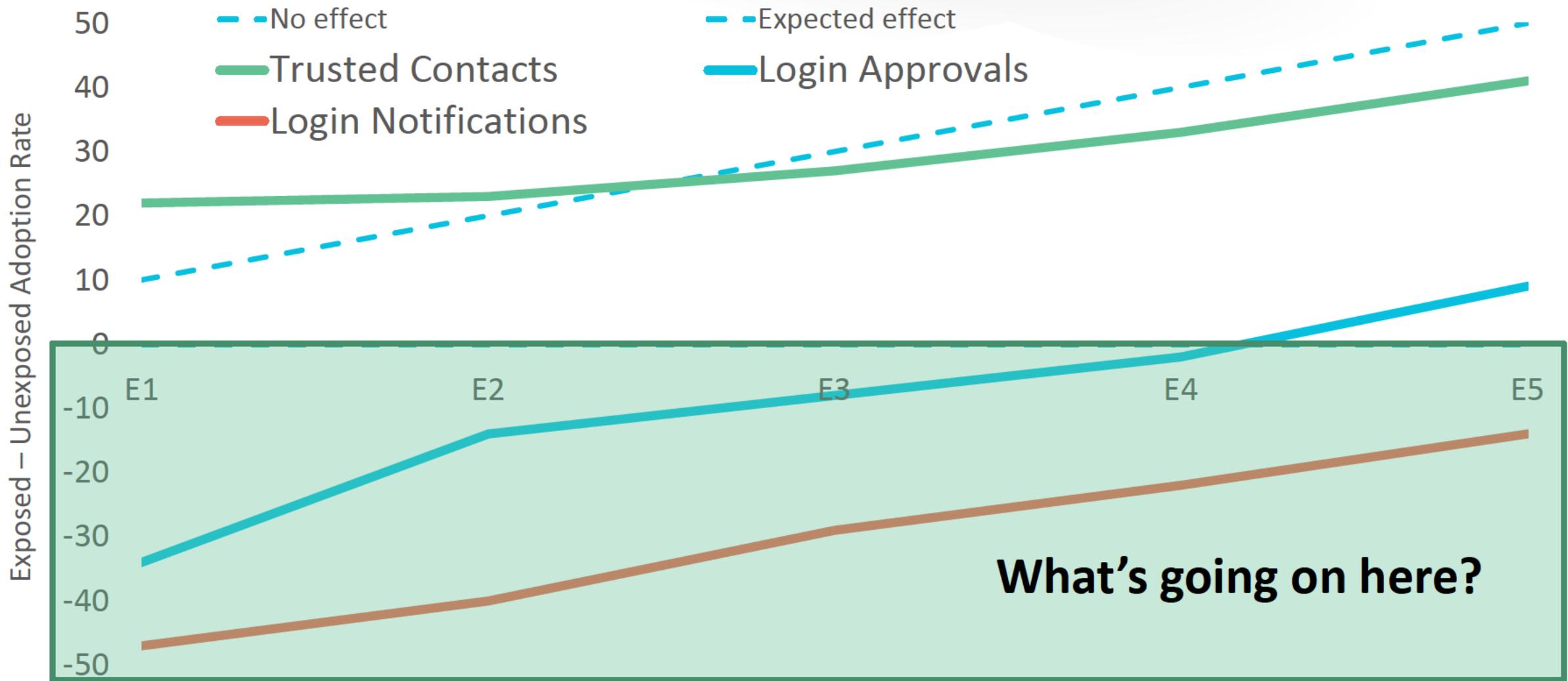












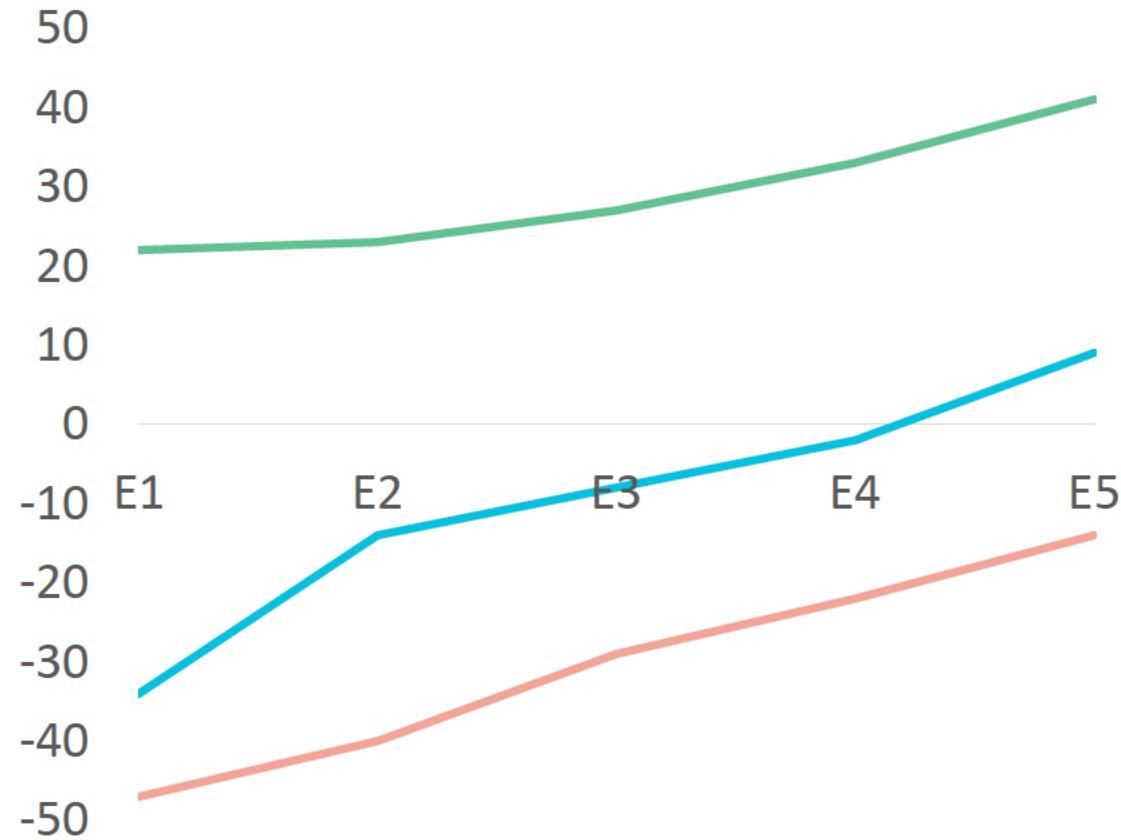
Disaffiliation

e.g., teenagers who dislike facebook because parents now use it



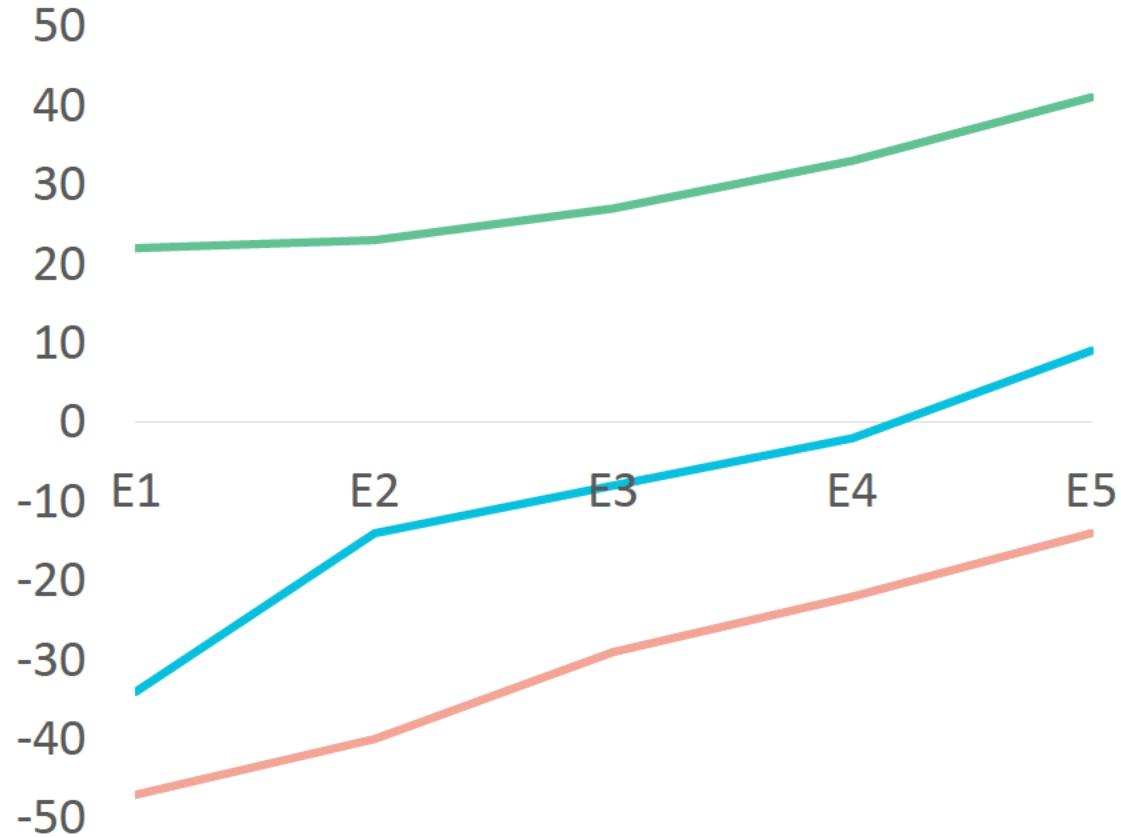


The Good News



All effects go up and to the right. **More exposure is good!**

The Good News



The **design** of a security tool affects its **potential** for social spread.

Design Dimensions for Making Security More Social



Observability



Cooperation



Stewardship



Social influence drives security behaviors, and **design affects the potential for social spread.**



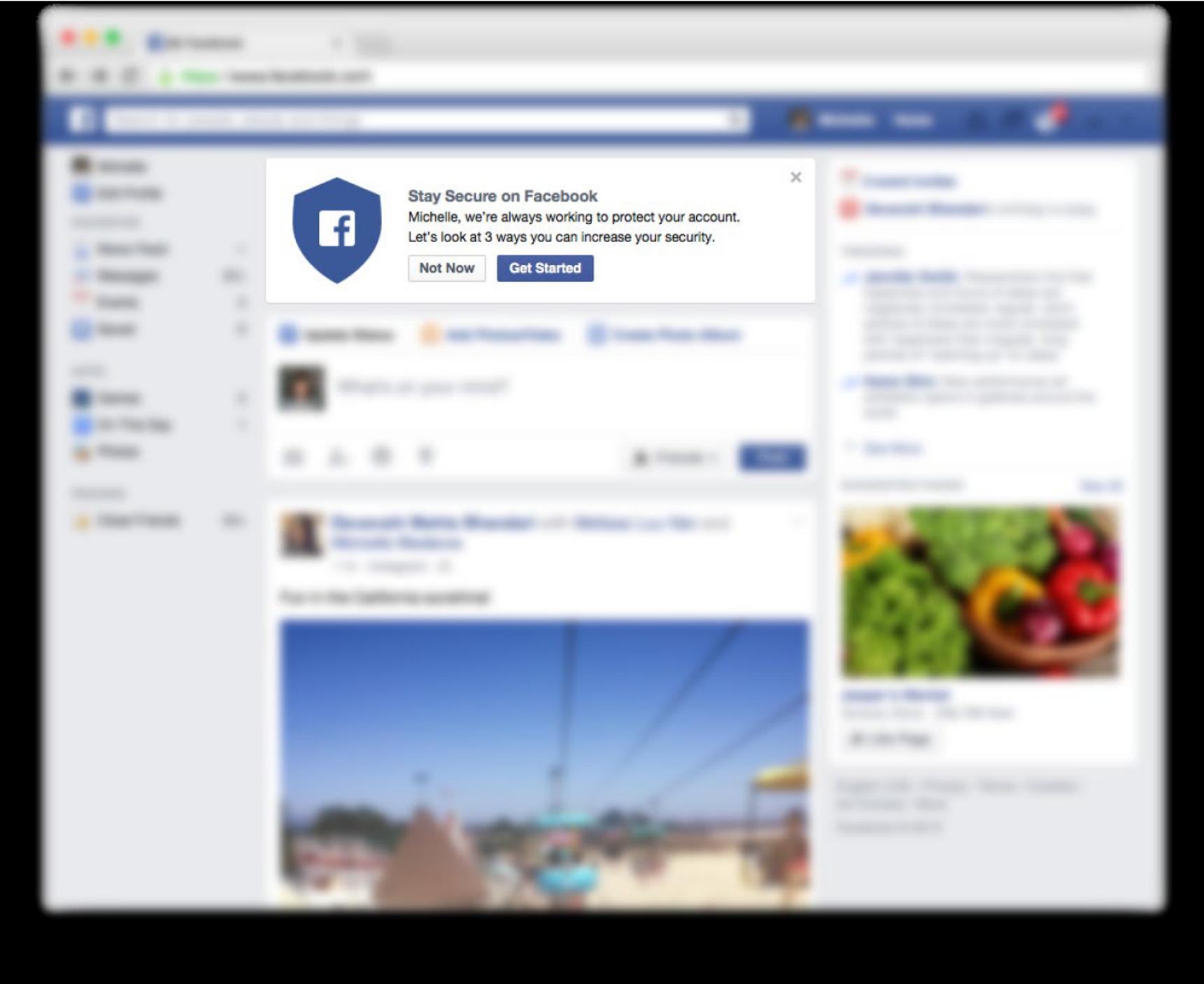
encourage better security behaviors

Improving Security Behaviors with Social Influence



Das, S., Kramer, A., Dabbish, L., and Hong, Jason I. [Increasing Security Sensitivity With Social Proof: A Large-Scale Experimental Confirmation](#). Proc. CCS'14.

Counterbalanced, between-subjects
experiment with 50,000 Facebook users.





Keep Your Account Safe

You can use security settings to protect your account and make sure it can be recovered if you ever lose access.

[Improve Account Security](#)



Announcement text



Keep Your Account Safe

108 of your friends use extra security settings. You can also protect your account and make sure it can be recovered if you ever lose access.

[Improve Account Security](#)



Keep Your Account Safe

Over 20% of your friends use extra security settings. You can also protect your account and make sure it can be recovered if you ever lose access.

[Improve Account Security](#)

Only (#/%)



Keep Your Account Safe

Only 108 of your friends use extra security settings. Be among the first to protect your account and make sure it can be recovered if you ever lose access.

[Improve Account Security](#)



Keep Your Account Safe

Some of your friends are using extra security settings. You can also protect your account and make sure it can be recovered if you ever lose access.

[Improve Account Security](#)

Some (#/%)

8 conditions: 7 social + 1 non-social control

6250 randomly assigned participants per condition

Experiment ran for 3 days

Measures

CTR

(click through rate)

7d

adoptions

5mo

adoptions

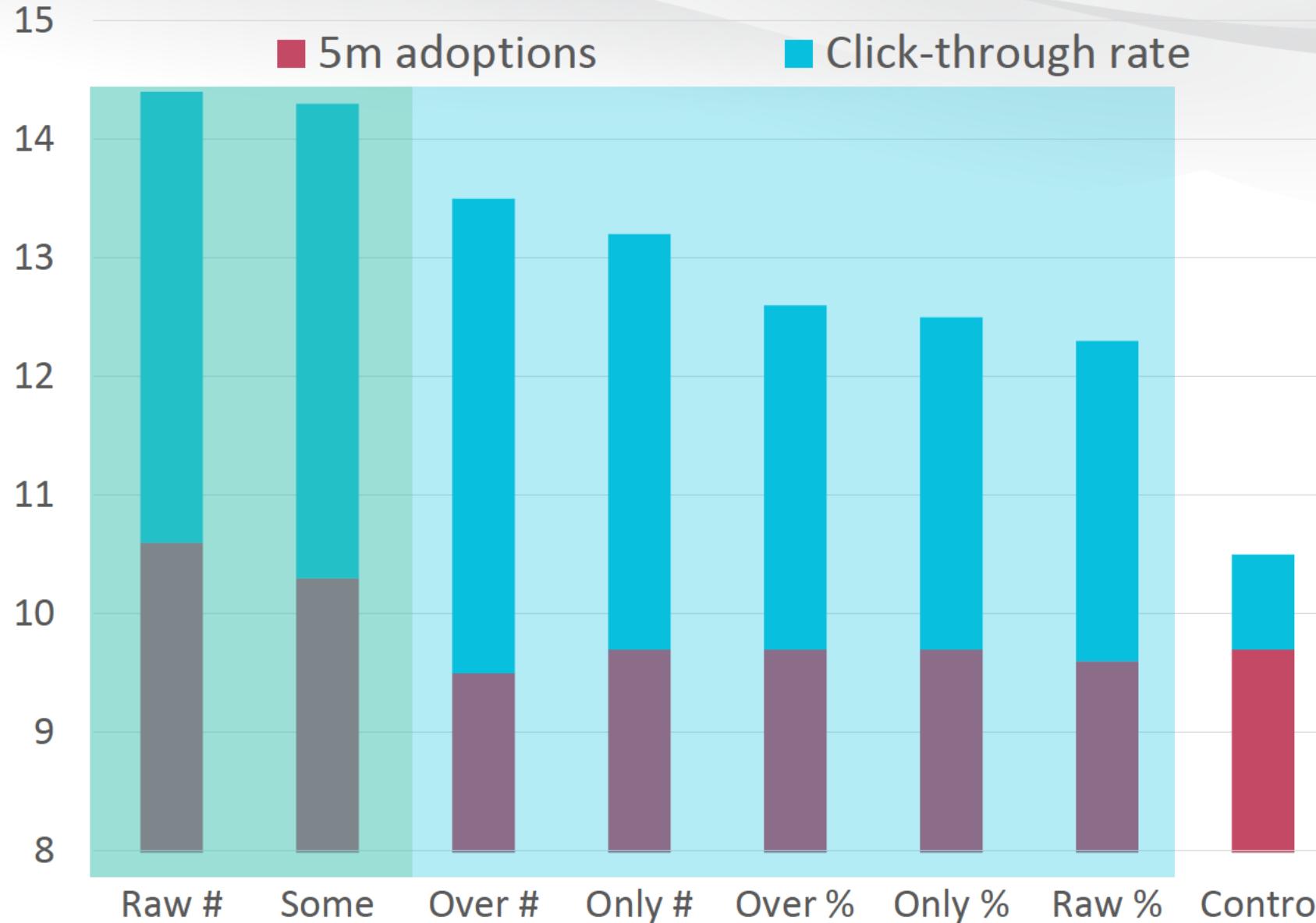
Descriptive Stats

46,235 (93%) logged in and saw announcement

5,971 (13%) clicked on an announcement

1,873 (4%) adopted one of the promoted tools within 7 days

4,555 (10%) adopted one of the promoted tools within 5 months



Raw # vs Control

1.36x
improvement in
CTR

1.10x
improvement in
adoptions



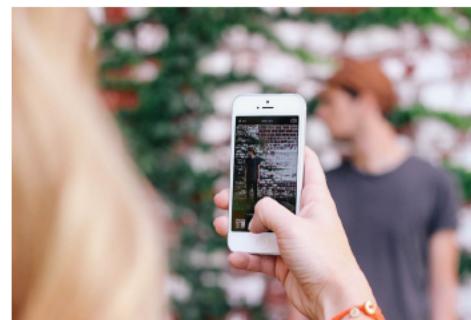
Social influence drives security behaviors, and **design affects the potential for social spread.**



We can **encourage better security behaviors** by making security more social.

How can we design *systems* that
encourage better cybersecurity
behaviors?

There is a **fruitful but largely untapped** opportunity to improve cybersecurity behaviors by making social systems that are more:



Observable



Cooperative



Stewarded

OBSERVABLE

How can we make it easier for people to observe and emulate good security behaviors?



COOPERATIVE

How can we design **cooperative security systems** that make group security a joint effort?



STEWARDED

How can we design systems that allow people **to act on their concern for the security of their loved ones?**

“Apply” Slide: Small Steps to Make Security Social

- **Share your knowledge!** Have a regular public conversation about your pro-cybersecurity behaviors and why they are important to you.
- **Be a “safe” ambassador!** Make a dedicated safe space / time for friends, family and colleagues to ask for help and advice.
- **Advocate for pro-social design:** Consider how you can integrate “just-in-time” social proof cues for pro-security behaviors in your product / organization.

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