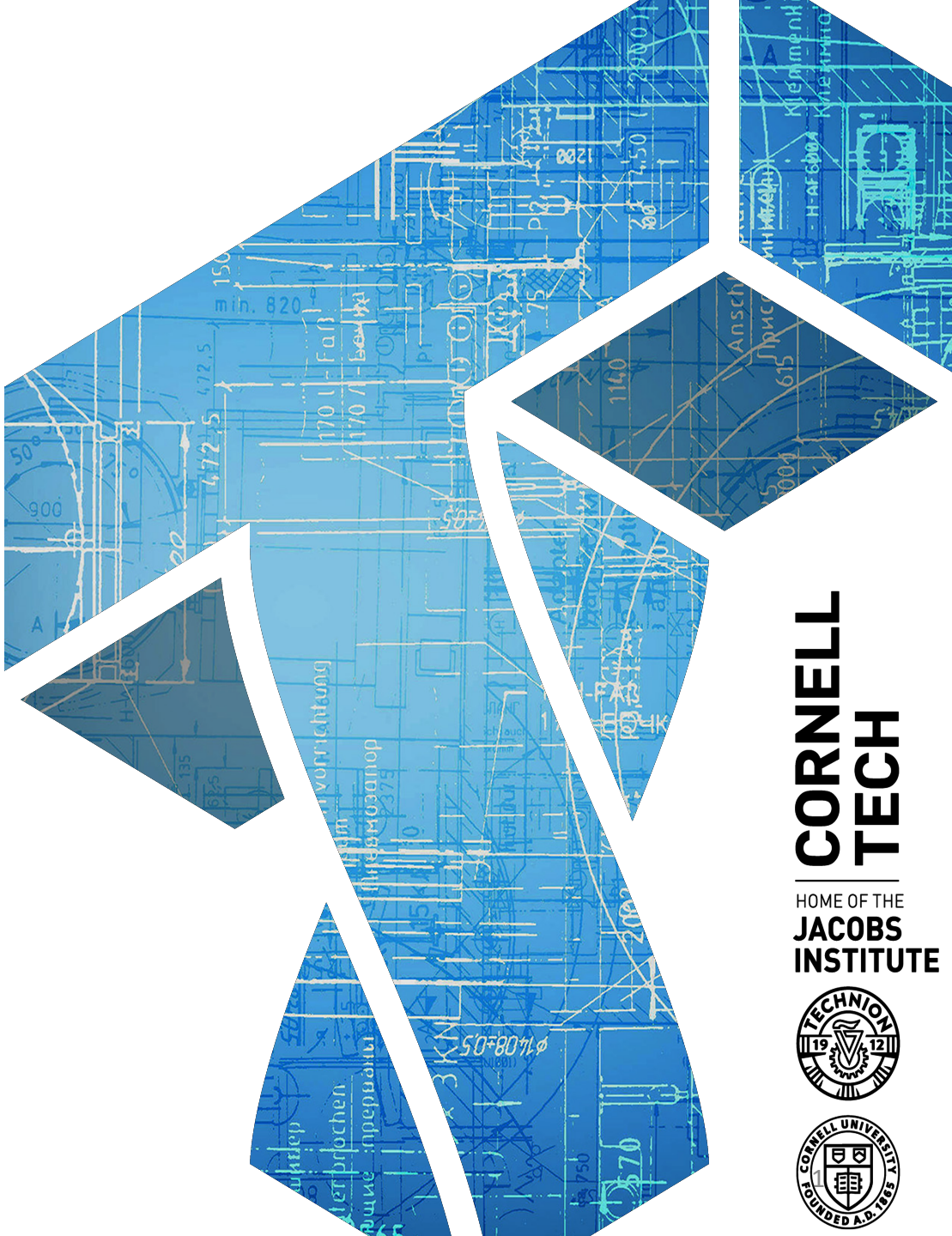
CS 6431: Tech Abuse & At-Risk Groups

Instructor: Tom Ristenpart

https://github.com/tomrist/cs6431-fall2021



CORNELL TECH

HOME OF THE JACOBS INSTITUTE

Reminder! Project proposal due pretty soon

- Posted some a handful of project ideas, will try to add more
- Feel free to bounce ideas off me, and I'll try to provide feedback quickly. Slack DM is probably easiest

Technology abuse

Hate videos

Cyberstalking

Online harassment

Misinformation campaigns

Computer security

Denial of service attacks

Malware

Data breaches

Account compromise

Moderation

De-platforming

Abuse-aware design

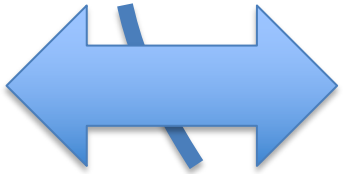
???

Access controls

Passwords

Cryptography

2FA and biometrics



Research on population-specific abuse

- At-risk groups: those who face more than “average” risk of tech abuse, security attacks
  - Could be due to intersectional issues (identity)
  - Historical marginalization
  - Jobs one performs
  - Political leanings
- What groups have been studied in tech literature?
  - Journalists, political dissidents, refugees, homeless people, sex workers, IPV survivors, women, trans people, elderly people, …
- ***Why?***

Research on at-risk groups: Why?

1. Threat models specific to these populations

2. Disproportionate impact of computer insecurity

3. Need different mitigations / interventions

Departure from prior security research

- Usable security:
  - Does this UI work well for security tasks? Work well for ***whom?***
  - Pitfalls of centering “WEIRD” users
    - White, Educated, Industrialized, Rich, & Democratic
    - E.g.: recruit a bunch of university students to do study
- Without special care, approaches often leaves invisible issues faced by at-risk populations
  - Attention reverts to the “mean” threat model
  - Approaches reflect life experiences of those building tech

Common pitfalls of research

- **Helicopter research** (neo-colonial research): Researchers "helicopter in", do research ***on*** (not with) developing country populations, & leave
  - Exploitative. Benefits to researchers, none to population

- **Technological solutionism**: ignoring complex socio-technical landscape & assuming changes to tech will fix problems

- **Making situation worse:** Research itself decreases safety & well-being of population; can be in subtle ways

Avoiding pitfalls ≠ don't do research

Partner with domain experts → Start by listening → Become an advocate → Research improvements

Avoid "extractive" research

- Start with proxies for the marginalized population, if possible
- Be sensitive to burdening domain experts / population
- Every study should provide tangible benefits to population
- Always run study designs by domain experts

How would you build a research program?

- Pick a population to consider
- Discuss how you would conduct an initial study
  - What would be ***good*** things to do?
  - What would be ***bad*** things to do?
  - How would this set you up for further beneficial work?

Rest of lecture will include discussions of physical & sexual violence and other potentially triggering topics

Intimate Partner Violence (IPV) is huge problem

25% of women
11% of men

suffered rape, physical violence, and/or stalking **by an intimate partner**

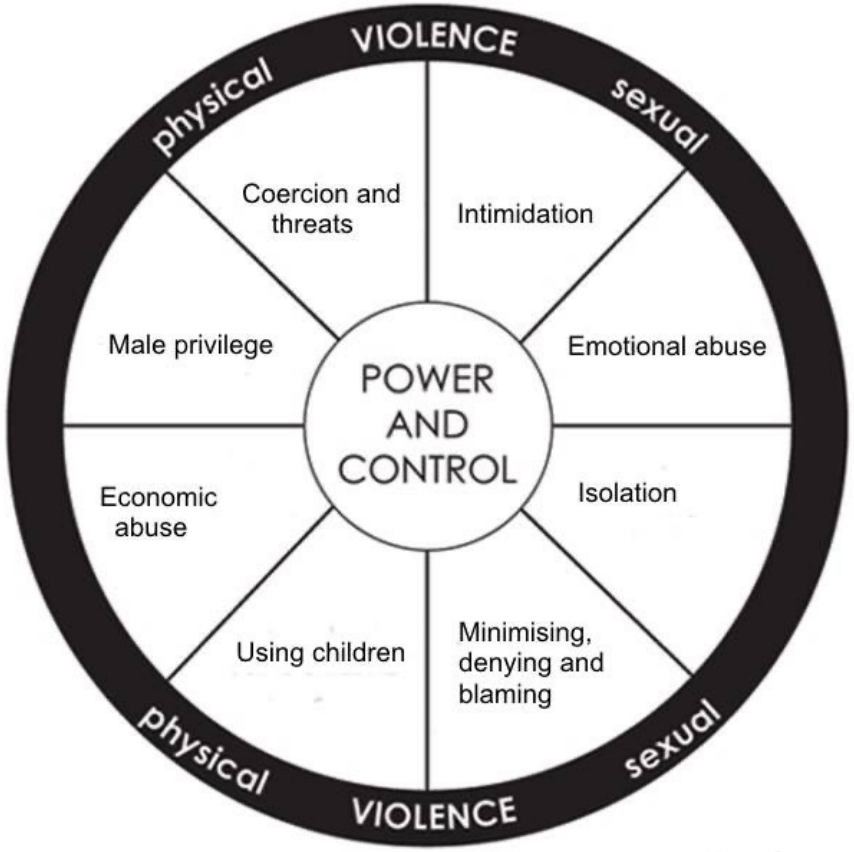
[USA CDC's National Intimate Partner and Sexual Violence Survey 2010-2012]

Historically:

- Called domestic violence
- Focus on physical battery ("wife batterer")

National Domestic Hotline definition:

"pattern of behaviors used by one partner to maintain power and control over another partner in an intimate relationship"



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[USA CDC's National Intimate Partner and Sexual Violence Survey 2010-2012]

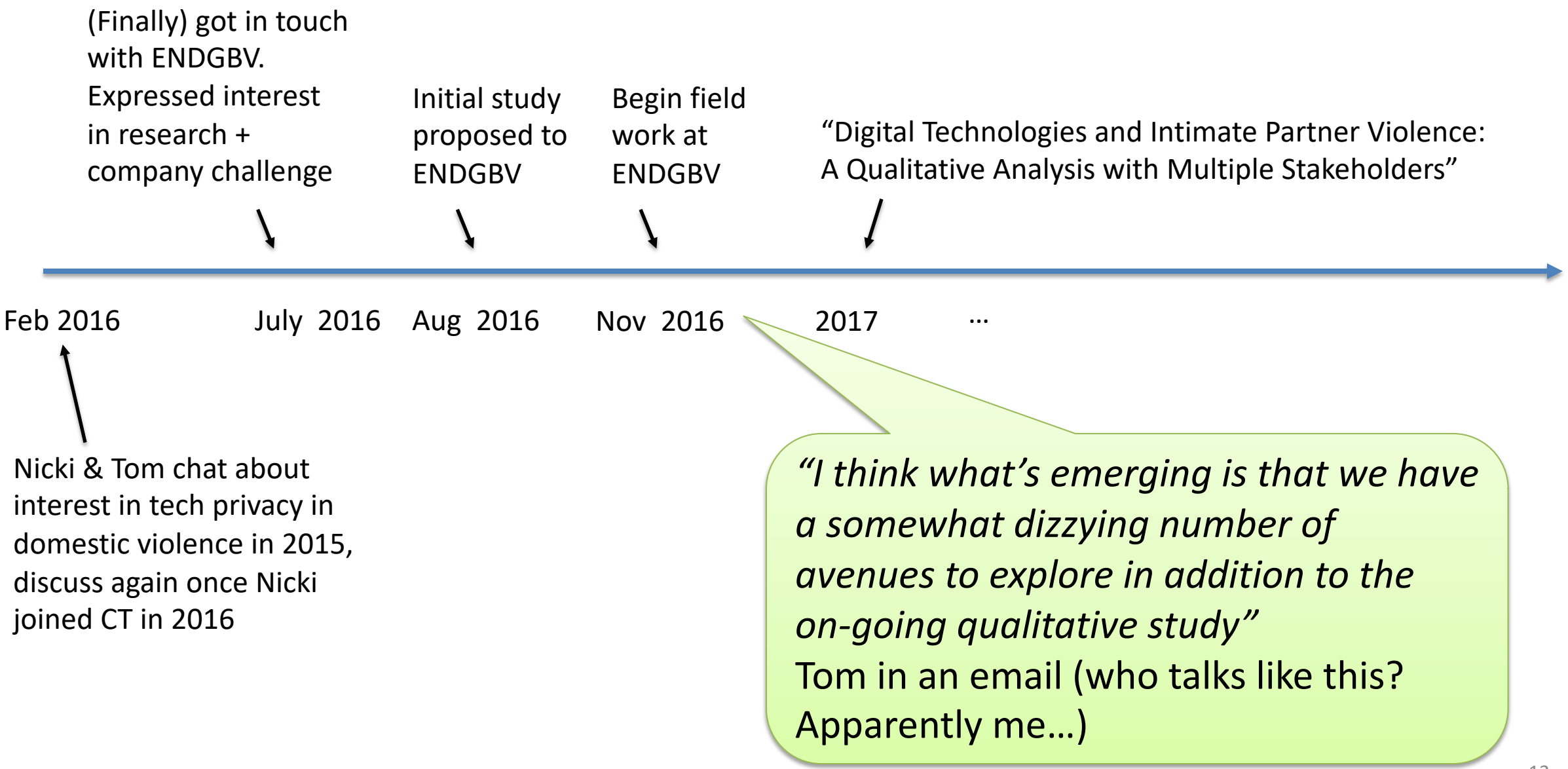
What role does technology play in IPV?

[Southworth et al. 2005, 2006, 2007]
[Melander 2010]
[Dimond et al. 2011]
[Burke et al. 2011]
[Woodlock 2016]
[Matthews et al. 2017]

Abusers exploiting technology:

- Harassing texts/messages
- GPS devices & spyware apps
- Victim accounts being "hacked"
- Physical device access
- …

Origin of our IPV tech abuse research program



New York City Family Justice Centers

NYC Mayor's Office to End Domestic and Gender-Based Violence

ENDGBV runs ***Family Justice Centers***
One in each neighborhood of NYC

Range of services for domestic violence, sex trafficking, and elder abuse victims:

- Civil / legal services
- Counseling & safety planning
- New York Police Department (NYPD)
- District Attorney's offices
- Access to emergency shelter
- Non-profit organizations

Year-long qualitative study: methods

Clients (Survivors / Victims)	11 focus groups with 39 women (English & Spanish) ages 18-65 (average 42) from 15 different countries with range of education levels most no longer living with abusive partner
Professionals	Semi-structured interviews with 50 professionals female (45) and male (5) case managers, social workers, attorneys/paralegals, & police officers

Largest and most demographically diverse study to date

A client story

"I was raised in a country in which women are trained to serve men. I'll say that he never hit me, basically, but he did the worst thing ever. Honestly, I would probably rather that he hit me instead of the things that he did to me.

Use shared ownership to install spyware

So he put a spyware in [our] computer. Obviously, I didn't know because he studied computer programming, so he was very savvy about it. …

Non-consensual intimate images

Account compromise

So he went into my computer, he got my Facebook password, email password, and he shared naked pictures of me. He sent them from his Facebook to my bosses. He took my phone and he sent them through private messages to several friends, but also through my email and my Facebook because he had the password.

Device compromise

Impersonate victim

The embarrassment that I went through, the public humiliation, it... beat me to the ground"

Qualitative research

- Research that relies on first-hand observation and/or accounts by participants
- **Observational studies / field research**
  - use observations of participants to drive improved understanding
- **Thematic analysis**
  - Identify & analyze patterns of meaning (themes) in data
  - Coding process: assign codes to transcripts, use as framework to discover themes in the data
  - Inductive coding: no prior framework for codes, develop code book from data
- **Grounded theory**
  - refers to developing hypothesis/theories from empirical data, rather than testing pre-conceived hypothesis/theories using empiricism

Year-long qualitative study: methods

39 hours of recordings
1,000+ pages of transcripts

Inductive coding → Code book covering major themes

Discuss code book
Look for ways to cluster these into themes
We wanted an inductive taxonomy of threats

- Facebook
- Abuser device access
- Privacy settings
- Control
- Location tracking
- Manipulation
- Physical abuse
- Escape
- Social media abuse
- …

Four categories of common attacks

Ownership-based

- Abuser owns device/account
- Shared account/device
- Buying children device

- Prevent use / destroy device
- Digitally control access
- Track location, monitor usage

Account/device compromise

- Physical access to unlocked device
- Force password / pin revelation
- Remotely “hack” via security questions / passwords

- Install spyware / “dual-use” app
- Track location, monitor victim
- Steal or delete info
- Lock victim out of account
- Impersonate victim

Harmful messages or posts

- Call/text/message victim (from spoofed account)
- Post harmful content (e.g., threaten violence)
- Harass victim’s friends/family
- Proxy harassment

Exposure of private information

- Blackmail by threat of exposure
- “Doxxing” victim
- Non-consensual intimate images
- Fake profiles/advertisements of sexual services

Other discussion points on paper?

Where would you have gone from here?

Our work in IPV tech abuse

NYC Mayor's Office to End Domestic and Gender-Based Violence

Qualitative studies of IPV tech abuse

[Freed et al. CSCW 2017]
[Freed et al. CHI 2018]

IPV spyware apps & defenses

[Chatterjee et al. Oakland 2018]
[Roundy et al. Oakland 2020]

reddit

Studying online infidelity forums

[Tseng et al. Security 2020]
[Bellini et al. CSCW 2020]

Clinical computer security

[Havron et al. Security 2019]
[Freed et al. CSCW 2019]
[Tseng et al. CHI 2021]

Security customer support

[Zou et al. Security 2021]

Our work in IPV tech abuse

Studying abusers & abuser resources

IPV spyware apps & defenses

[Chatterjee et al. Oakland 2018]
[Roundy et al. Oakland 2020]

Studying online infidelity forums

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Designing interventions to support survivors

Clinical computer security

[Havron et al. Security 2019]
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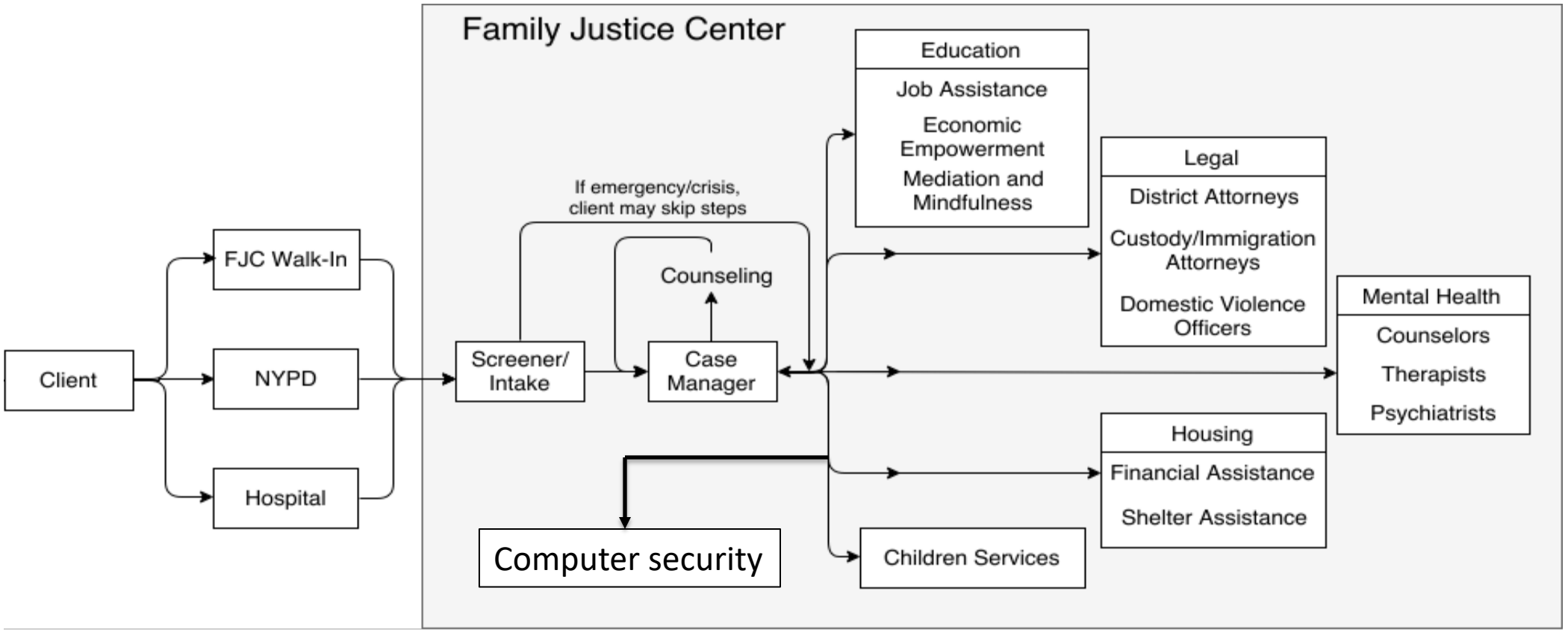
Clients and New York City Family Justice Centers



No best practices for evaluating tech risks

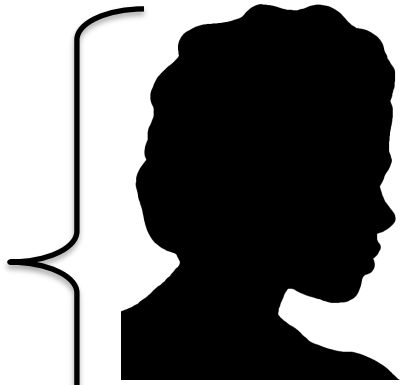
Victims & professionals overwhelmingly report having insufficient tech knowledge

Clinical computer security

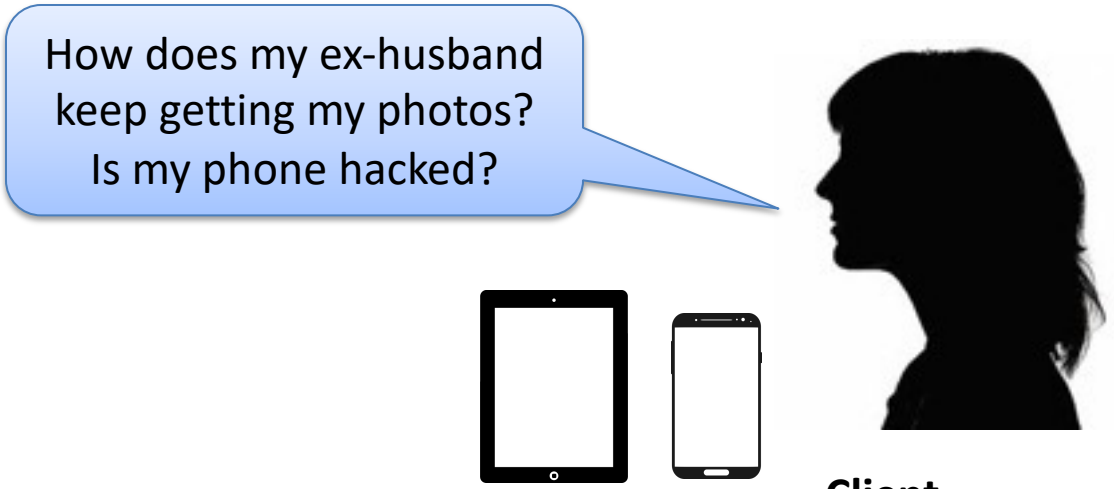
Developed procedures for NYC FJC context:

- 14 focus groups with 56 professionals to refine protocols

[Havron et al. 2019]
[Freed et al. 2019]



IPV Tech consultant



Client (IPV victim/survivor)

Initial field study started in 2018 (44 clients)

- 105 devices, scanned 75 for spyware
- (potential) spyware apps or browser extensions on devices of 3 clients
- 1 rooted Android tablet
- many account compromises
- reassured many clients about lack of tech problems or by improving their security

Towards CETA Today

Initial qualitative
+
online measurement studies
(2016-2017)

Initial design of clinical procedures
(2018)

Initial field study w/ 44 survivors (late 2018)

Ongoing in-person clinical work & hired clinic director
(2019-2020)

Remote clinic due to pandemic
(Spring 2020)

New direct-to-client protocols
(2021)

…

Academic research at every step

Lots of interaction with ENDGBV partners

Expansion of legal advocacy work (Sarah St.Vincent, Thomas Kadri)

Research with at-risk populations

- **Can be really challenging**
  - Emotional work load high
  - Partnership and relationship development takes time and energy
- **The advocate-scientist model**
  - Become an advocate for the population while doing research
  - My view is this helps avoid extractive/exploitative/harmful research
  - Also leads to ***better research*** because it drives ***deeper insights***