Detecting iPhone Security Compromise in Simulated Stalking Scenarios: Strategies and Obstacles

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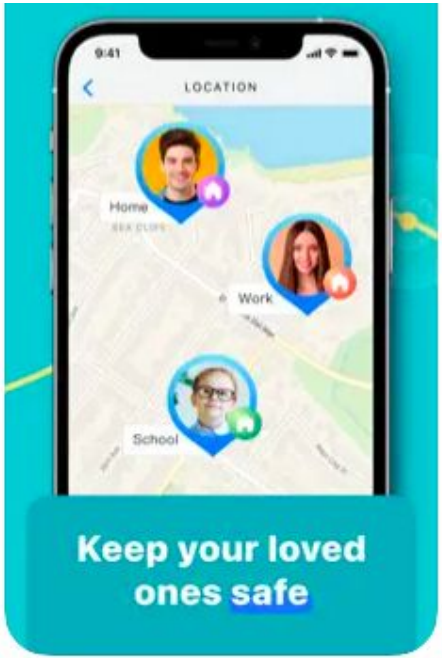
Widespread Problems: Intimate partner violence & Stalking

- 1 in 3 women 15-49 years old, who have ever been in romantic relationship, experience intimate partner violence (IPV)*

- Digital technologies increasingly used to spy on, stalk, and harass intimate partners and stalking victims

*W. H. Organization. Violence Against Women. https://www.who.int/news-room/fact-sheets/detail/violence-against-women

Spyware & stalkerware are profitable apps…



★★★★★ [redacted] 06/17/2022

Excellent Tracking

Excellent. They did a great job giving me access to my husbands phone after three kids I never thought he'd have any reason to cheat on me but I was totally wrong. He sudde more

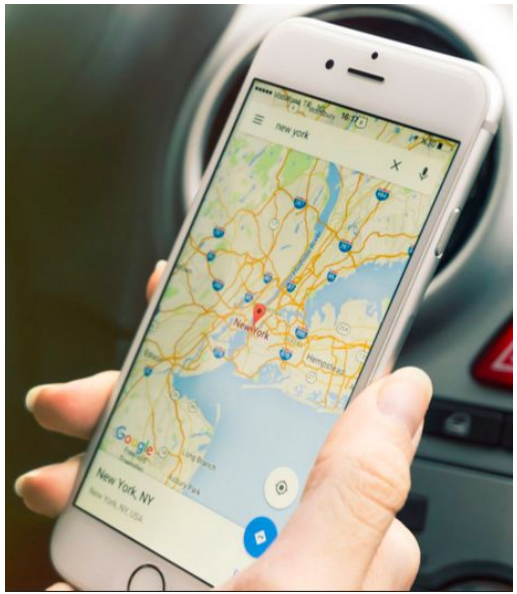
★★★☆☆ [redacted] 08/30/2017

Wouldn't Recommend It

Downloaded this on my wife's iPhone 7. At 1st I downloaded the lite version which was ok for gps, but that's about it, paid around $10 for the app. more

… but legitimate apps can be used for stalking

Location Tracking



iCloud Account

How to help **detect** compromises?

4 simulated stalking scenarios

Location sharing

Suspected spyware

iCloud compromise

Jailbreak detection

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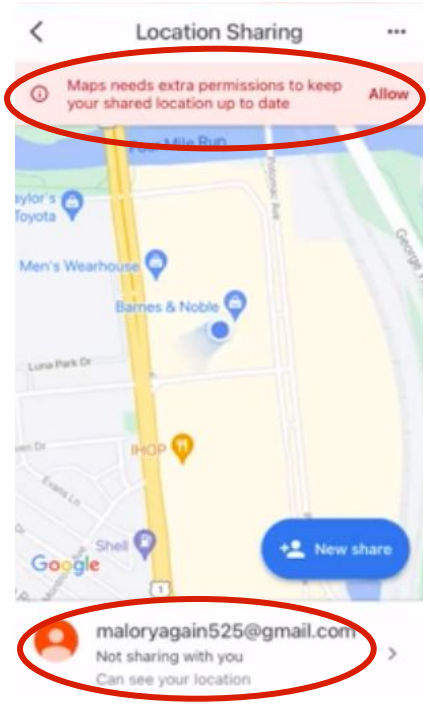
18 remote semi-structured interviews with participants acting as friends or coworkers

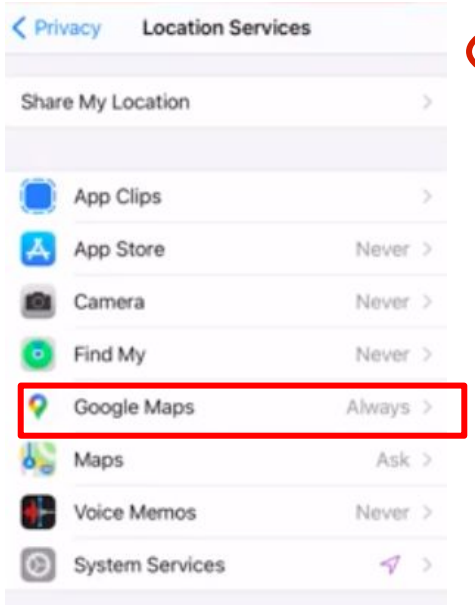
Scenario 1: **Location sharing**

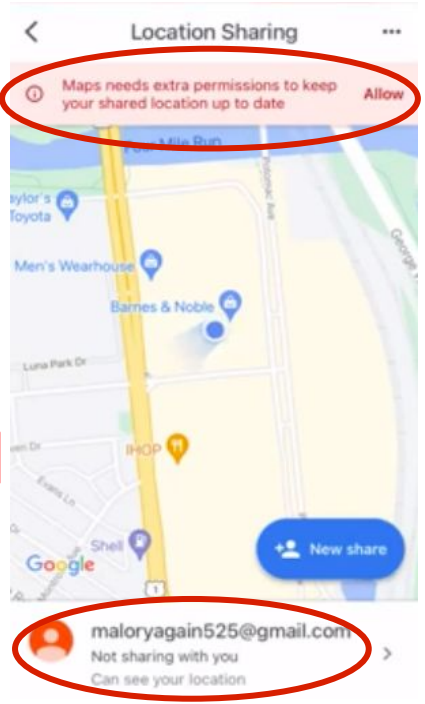
Challenge: Could you guide us through how you would confirm whether someone is tracking your coworker's location?



Scenario 1: **Location sharing**

Results: Most participants knew to search Location Services and that Google Maps was using the device's location, but…

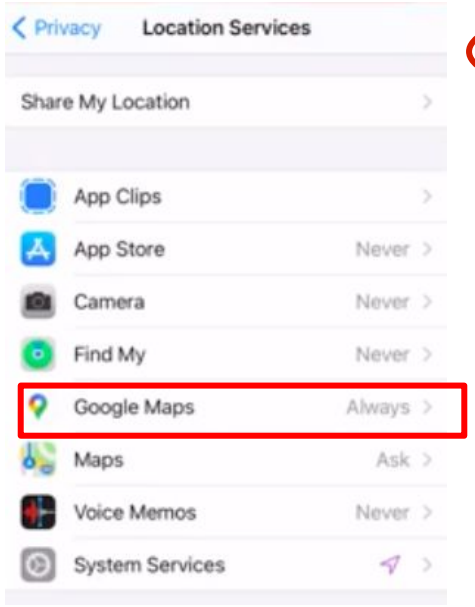


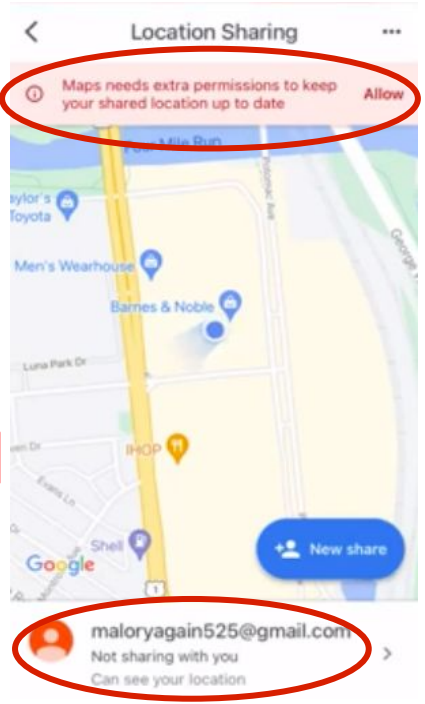


Scenario 1: **Location sharing**

Results: Most participants knew to search Location Services and that Google Maps was using the device's location, but…

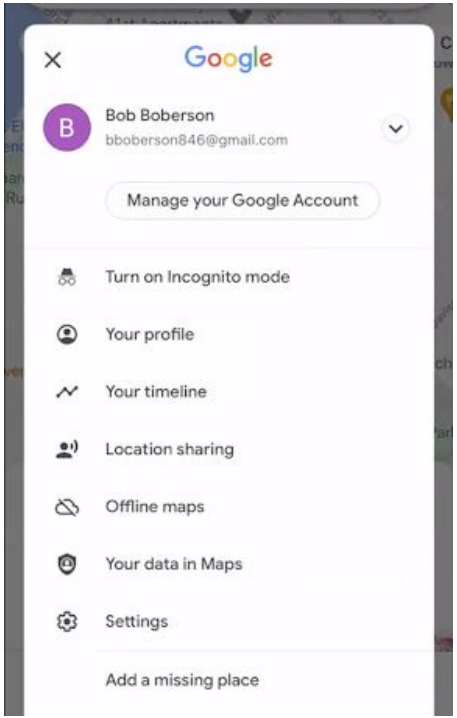
… no one searched within the Google Maps app





Scenario 1: **Location sharing**

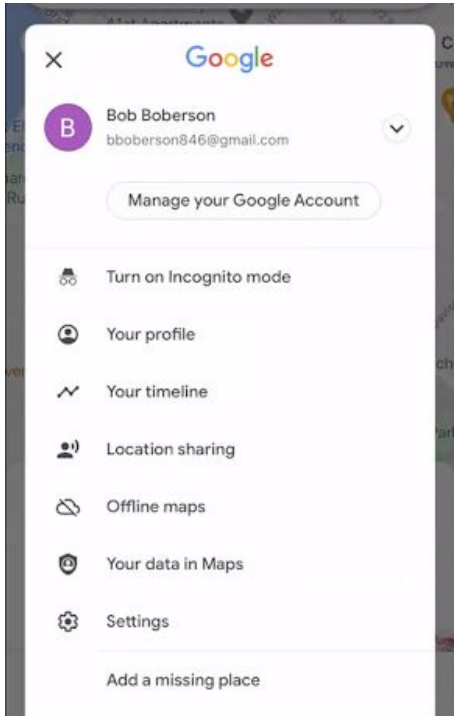
*"It was just too much **jumping around** …"*



Scenario 1: **Location sharing**

*"It was just too much **jumping around** …"*

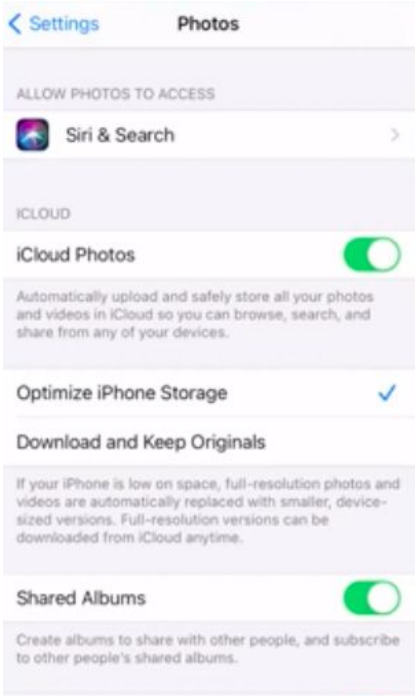
*"To go in the app itself, not just the iPhone, but the **app settings, that's tricky,** so I had a little bit of issue to find that, **but I mean, it was all there.**"*

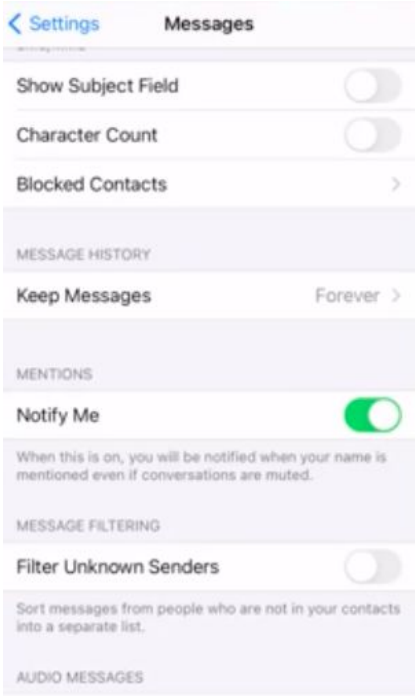


Scenario 3: **iCloud compromise**

Challenge: Photos and iMessages are disappearing, and new ones are appearing.

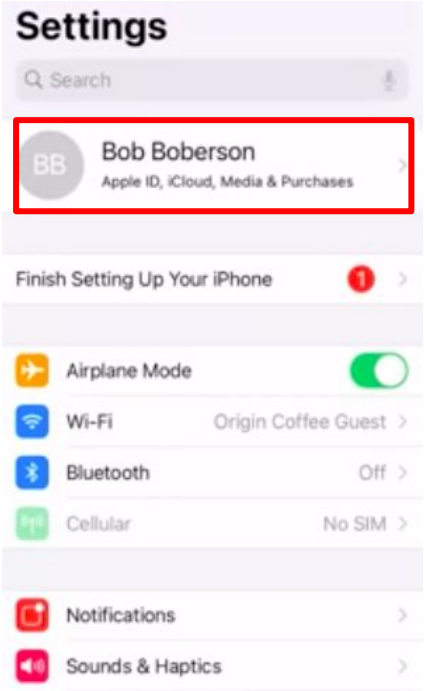
What are some steps you could take to figure out whether someone can see your friend's photos and messages?





Scenario 3: **iCloud compromise**

Results: 50% of participants could not find the iCloud devices list



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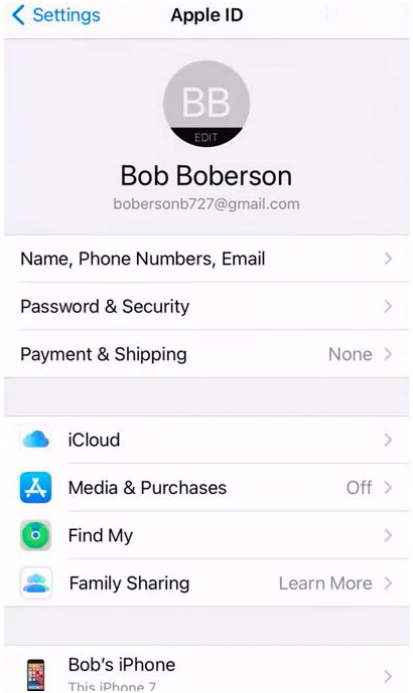
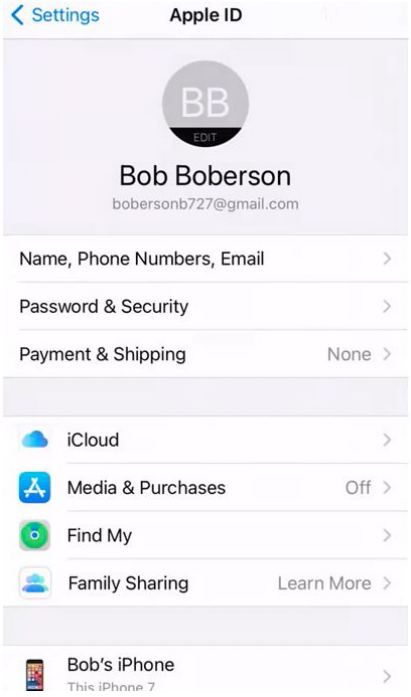
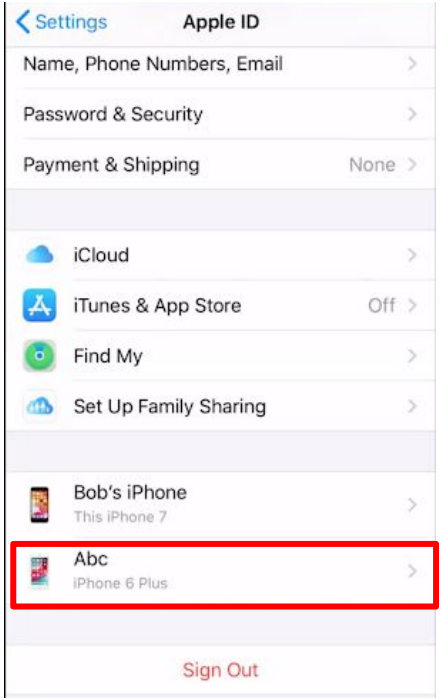


Scenario 3: **iCloud compromise**

Results: 50% of participants could not find the iCloud devices list

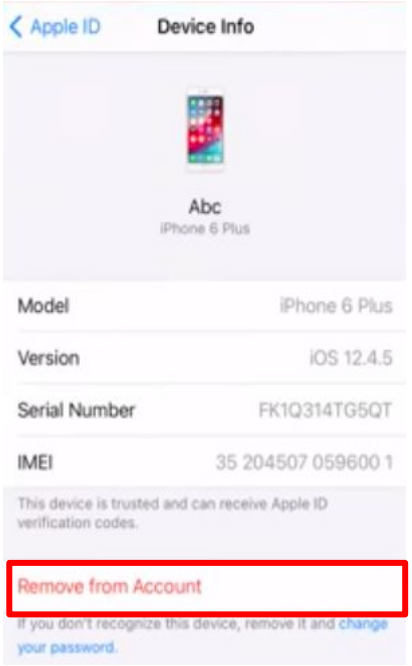
"I think I knew generally to look under iCloud, but I just didn't know the full screen."





Scenario 3: **iCloud compromise**

Results: Most participants found it easy to remove from account



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Location sharing recommendation: Make it clear that location is being shared with another user

- Provide users with persistent, immediate indicators for transmitting location to another user
  - ↳ Google's developer policy:

> **Stalkerware**
>
> Code that collects and/or transmits personal or sensitive user data from a device without adequate notice or consent and doesn't display a persistent notification that this is happening.

Location sharing recommendation: Make it clear that location is being shared with another user

- Provide users with persistent, immediate indicators for transmitting location to another user
- Generate less predictable notifications for an abuser
- Require authentication to users to start sharing with someone

Cloud access recommendation: Let users know who / what devices can access their cloud account

- Add indicators of devices in settings
- Make list of devices more immediately visible

“Detecting iPhone Security Compromise in Simulated Stalking Scenarios: Strategies and Obstacles”

- Difficult to detect when iPhone was transmitting information
  - → Inability to locate relevant options
  - → Lack of immediately visible indicators
- IPV and stalking threat model needs to be considered in design

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