Public Messaging during Conflict

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Motivation

Public messaging during conflict is an important policy tool, remains a black box

- Interstate military disputes, especially those that unfold in densely populated urban areas, disrupt civilian life, undermining human welfare and reducing economic activity.
- In an attempt to reduce civilian casualties and promote freedom of movement, governments often engage in extensive messaging about where and when potential attacks may occur.
- By informing the public during conflict, governments and aligned private actors may thwart harm.
- There is no evidence to date on whether and under what conditions these alerts impact public behavior.

Our study, I

- We provide such information by presenting the first study of behavioral change in response to alerts of imminent risk. We study these dynamics in Ukraine following the February 2022 invasion by Russian forces.
- After the incursion of military forces into urban areas, the Ukrainian government developed a platform for assessing and transmitting public alerts about impending Russian military operations.
- These messages were then circulated via a collection of mobile device applications as well as through social media platforms (e.g., Telegram).

Our study, II

- We compile these messages about location and minute-in-day risks to quantify the information available to civilians.
- We combine the location and timing of these messages with high-frequency, spatially disaggregated data on device mobility.
- This pairing of messages and mobility enables us to study whether mobility changes discontinuously as alerts are transmitted to mobile devices.

Data

Measuring population movement

- Anonymized device-level location data is obtained from location data provider Veraset[1].
- The data consists of “pings”, which are timestamped GPS locations shared by the device with a mobile app.
- Veraset aggregates and cleans such data, obtained from thousands of so-called “Software-Development Kits” (SDK).
- Location data from the same device but different SDKs can be combined by relying on the anonymized device ID, which is a unique string associated with a particular mobile device and can only be changed through a factory reset.

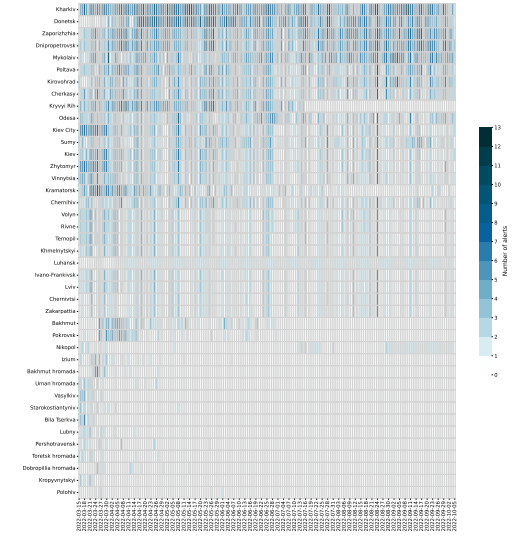
[1] https://www.veraset.com/

Information on air raid alerts

- Data on the start and end times of region-wide air raid alerts was scraped from the Telegram channel of the popular mobile app Air Alert Ukraine by Volodymyr Agafonkin[2] and published online.
- The Air Alert app was developed by Ukrainian software development company stfalcon[3] and Ukrainian security company Ajax Systems[4] with support from the Ukrainian Ministry of Digital Transformation.

[2] https://agafonkin.com/
[3] https://stfalcon.com/
[4] https://ajax.systems/

Evolution of air raids over space/time



Estimation

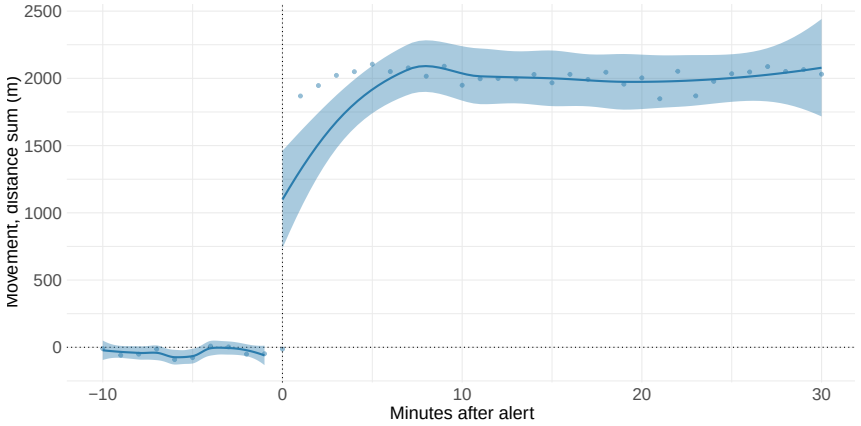
To assess civilian response to air raid alerts, we estimate the following event study specification for a window of 30 minutes around each alert,

$$Response_{it} = \sum_{t=t_0-10}^{t_0+30} \delta_t + \varepsilon_{it}, \tag{1}$$

where i indicates a unique mobile device; t is a minute of the hour (e.g. 5pm to 5:01pm); $Response_{it}$ is a measure of device i's movement in minute t, where our main measure is the total distance the device moved between subsequent pings; δ_t is a dummy variable for being in minute t; the sum iterates over all such dummies from 10 minutes before to 30 minutes after the alert; and ε_{it} is an error term.

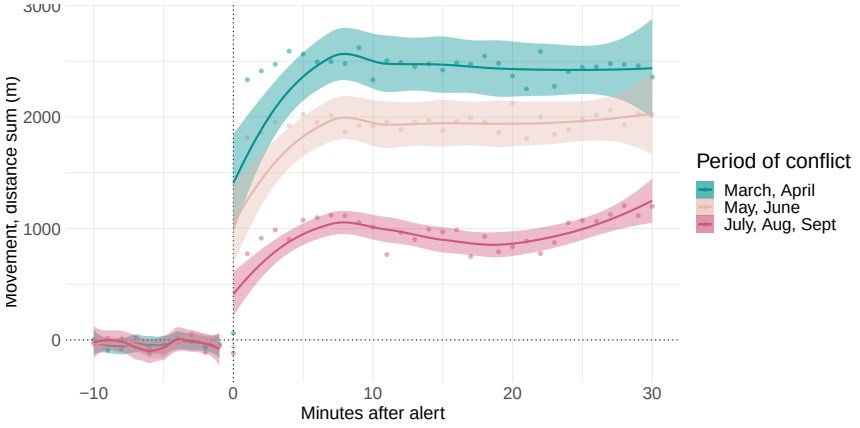
Results

Result I: population movement surges after alerts (x/y)



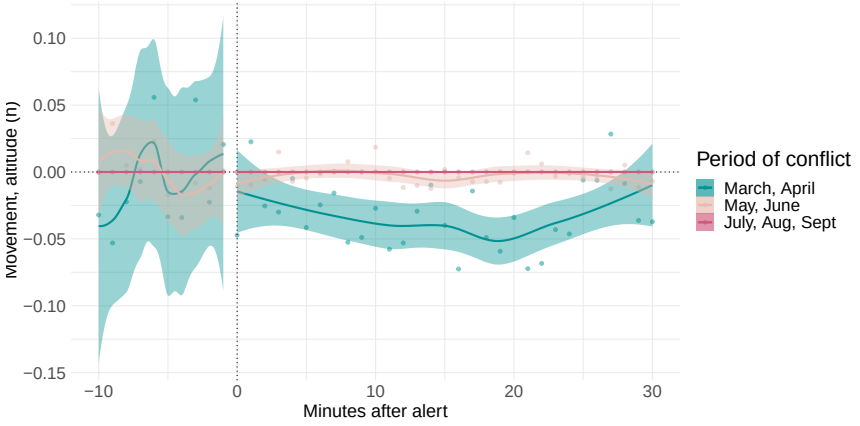
Strong overall public response to bombardment alerts

Result II: population movement post-alert attenuates over episodes of the conflict (x/y)



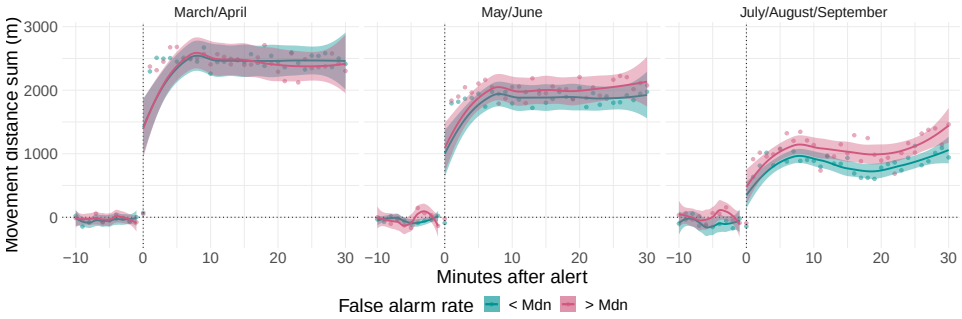
Strong public response to alerts declines as war progresses

Result III: attenuation in x/y movement not due to improved sheltering mechanisms



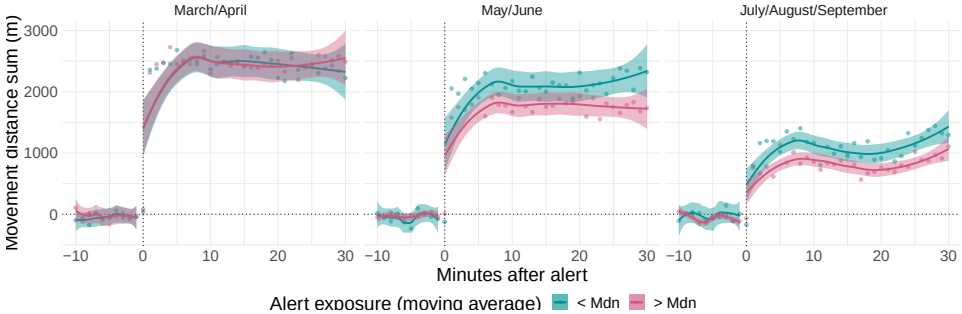
Altitude response suggests decline in movement due to fatigue

Result IV: stronger signals do not counteract attenuation over time (x/y)



Stronger signals do not counteract attenuation over time

Result V: alert duration accelerates attenuation over time (x/y)



Increased exposure to alerts associated with decreased response

Conclusion

- We aim to study a prominent gap in our understanding of messaging during conflict.
- We find that the public is responsive to imminent threats using novel behavioral data, but these effects attenuate significantly over time.
- Our evidence suggests that fatigue may shape risk preferences dynamically.