

Estimating measurement quality in digital trace data and surveys using the MultiTrait MultiMethod model

Alexandru Cernat (*University of Manchester*)

Florian Keusch (*University of Mannheim*)

Ruben Bach (*University of Mannheim*)

Paulina K. Pankowska (*Utrecht University*)

www.alexcernat.com

@cernat_a

Social media data in social research

Social media increasingly important in the social world

Their use and effects analysed in a number of fields

Most studies rely on self-reports from surveys

Surveys vs. digital trace data



	Surveys
Strengths	<ul style="list-style-type: none">- Probability samples- Freedom of design- Long term comparability
Weaknesses	<ul style="list-style-type: none">- Fragmentary/discrete information- High burden- Measurement error

Surveys vs. digital trace data



	Surveys	Digital meter data
Strengths	<ul style="list-style-type: none">- Probability samples- Freedom of design- Long term comparability	<ul style="list-style-type: none">- Direct measurement- Low burden- Detailed/high frequency
Weaknesses	<ul style="list-style-type: none">- Fragmentary/discrete information- High burden- Measurement error	<ul style="list-style-type: none">- Selective/small samples- Technology dependent- Measurement error/missing data

How best to measure mobile app usage?

Digital trace data is increasingly used as “gold standard”

This ignores limitations of this data source

Our design

29.08.2021 —————> 04.10.2021



Our design

29.08.2021 → 04.10.2021



Our design

29.08.2021 → 04.10.2021



Our design







29.08.2021 → 04.10.2021

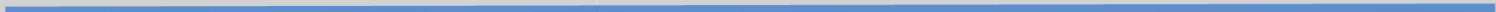
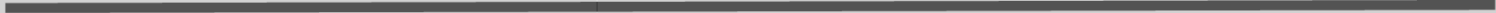


The data

29.08.2021 → 04.10.2021

This paper





S+D

Topics/traits of interest

Using the phone to:

- call
- write text message
- take photos
- social media
- web browsing

Measurements

Survey:

- 5 point scale
- 7 point scale
- Durations (hours and minutes)

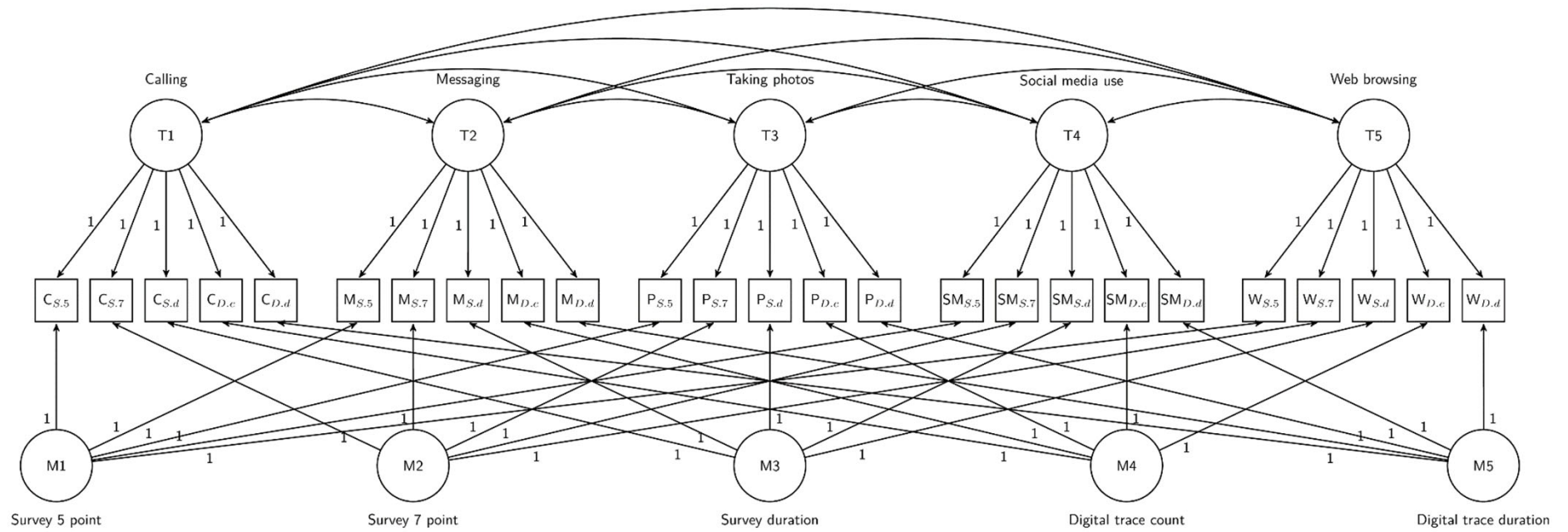
- Once a month or less often
- Several times a month
- Several times a week
- Every day
- Several times a day

- Less than once a month
- Once or twice a month
- Several times a month
- Once or twice a week
- Several times a week
- Once or twice a day
- Several times a day

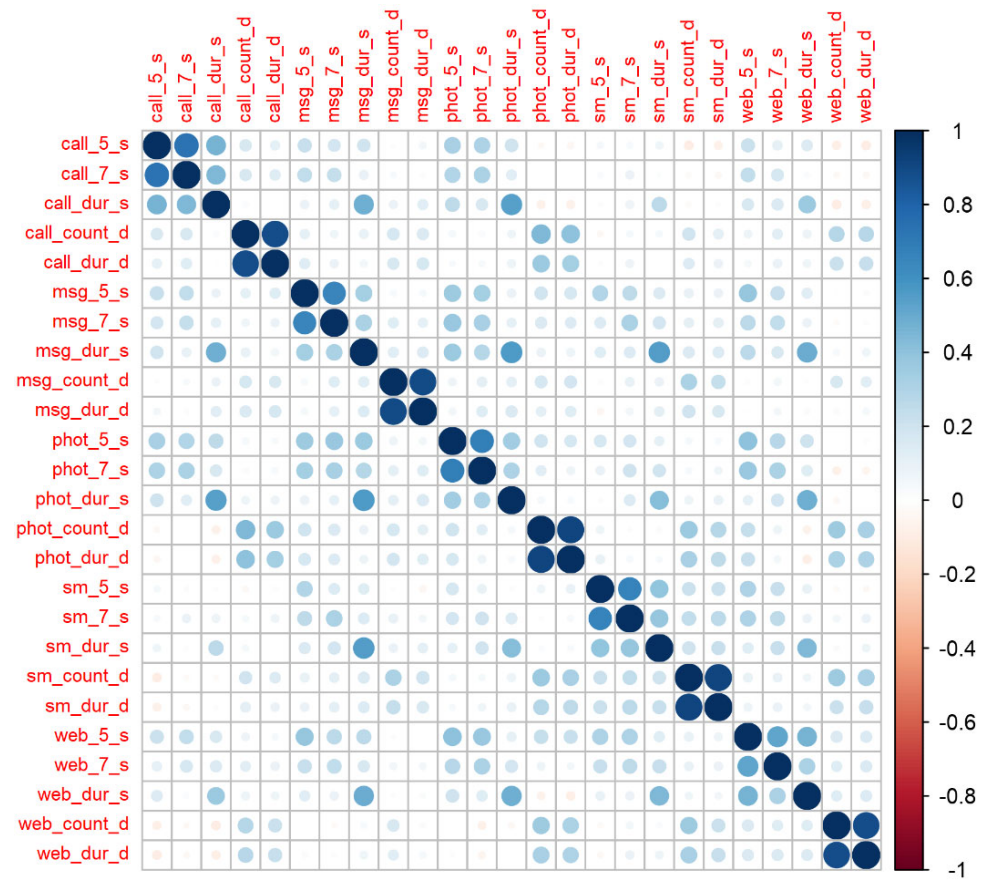
Digital trace data:

- How many times they do the activity
- How much time they spend doing the activity

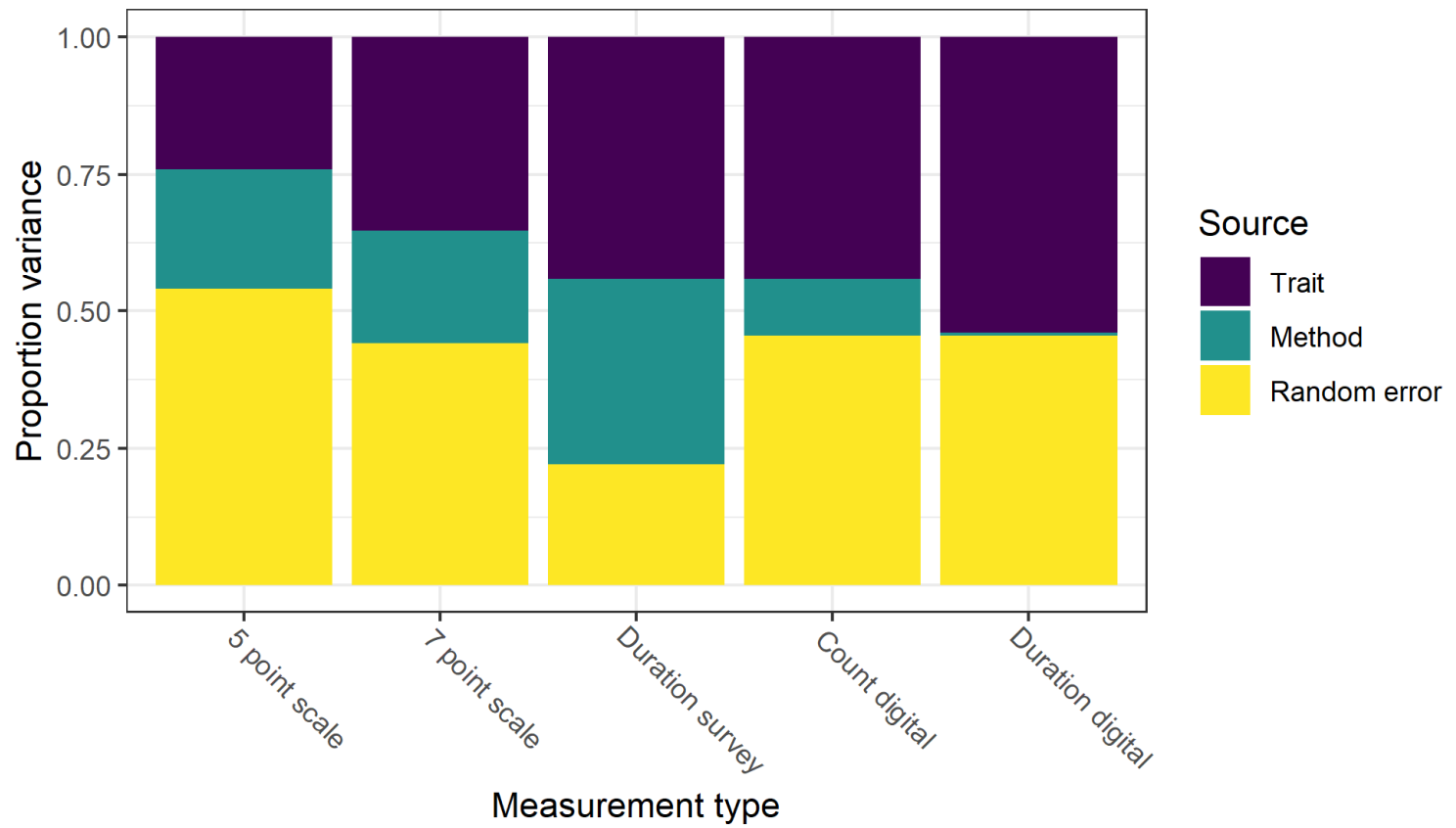
MTMM model



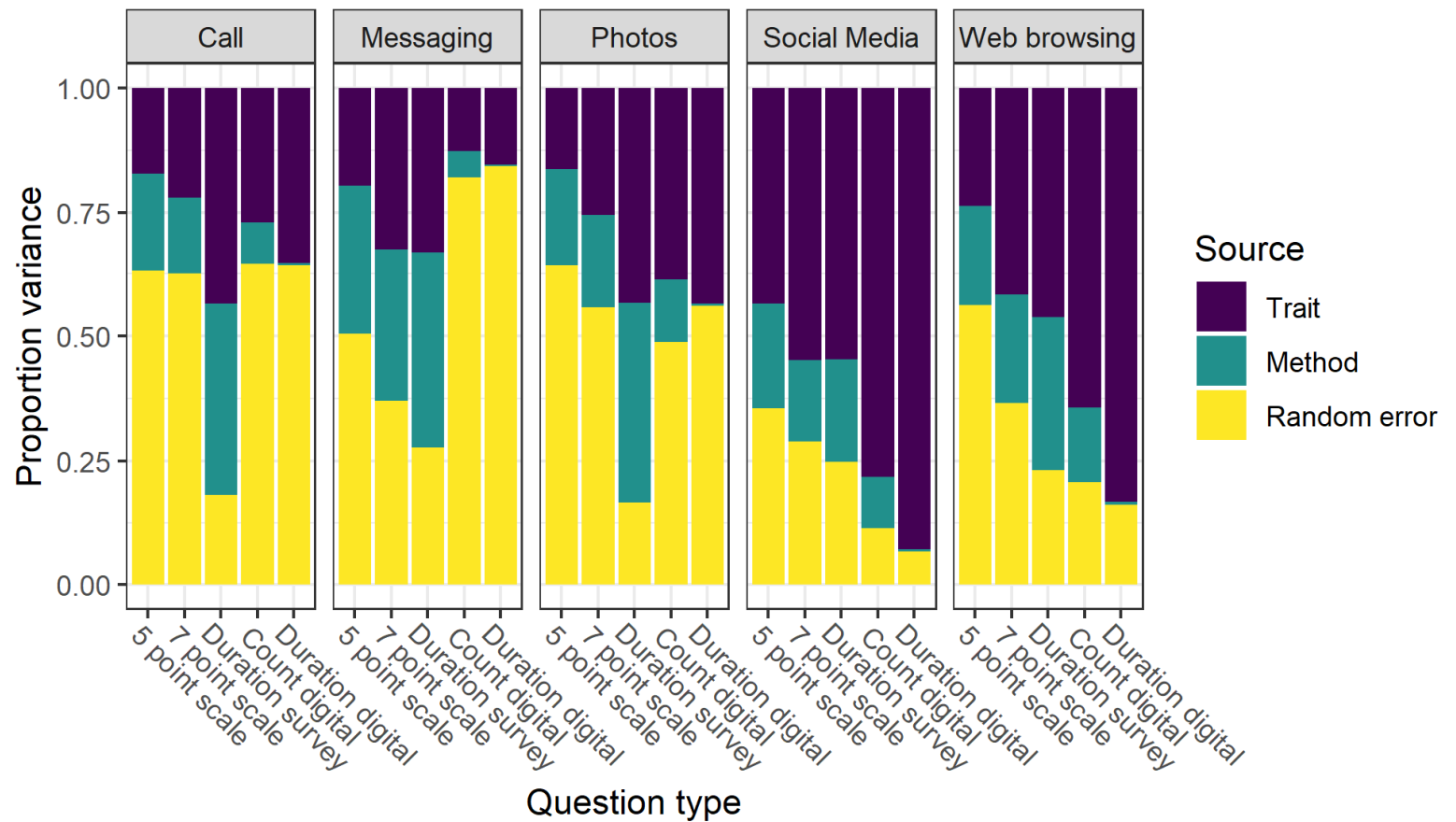
Correlation matrix



Variance decomposition



Variance decomposition by topic



Conclusions

- low correlations between the survey data and the digital trace data
- none of the methods implemented to capture smartphone usage is perfect
- digital trace data, especially the duration measures, show higher quality, this is not always the case(e.g. text messaging)

Estimating measurement quality in digital trace data and surveys using the MultiTrait MultiMethod model

Alexandru Cernat

University of Manchester

Social Statistics Department

www.alexcernat.com

[@cernat_a](https://twitter.com/cernat_a)

