

How does (work related) smartphone usage correlate with levels of exhaustion

2nd MASS Workshop

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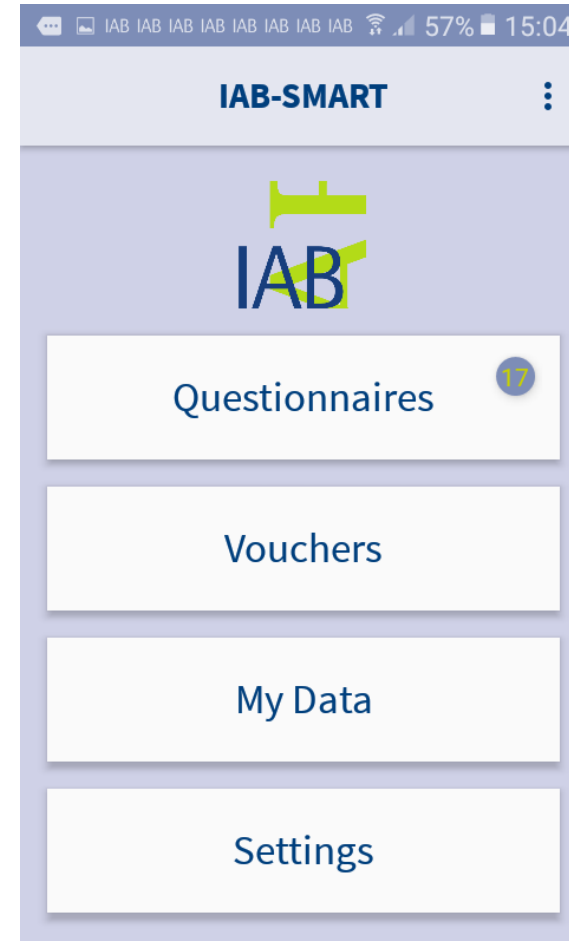


Background

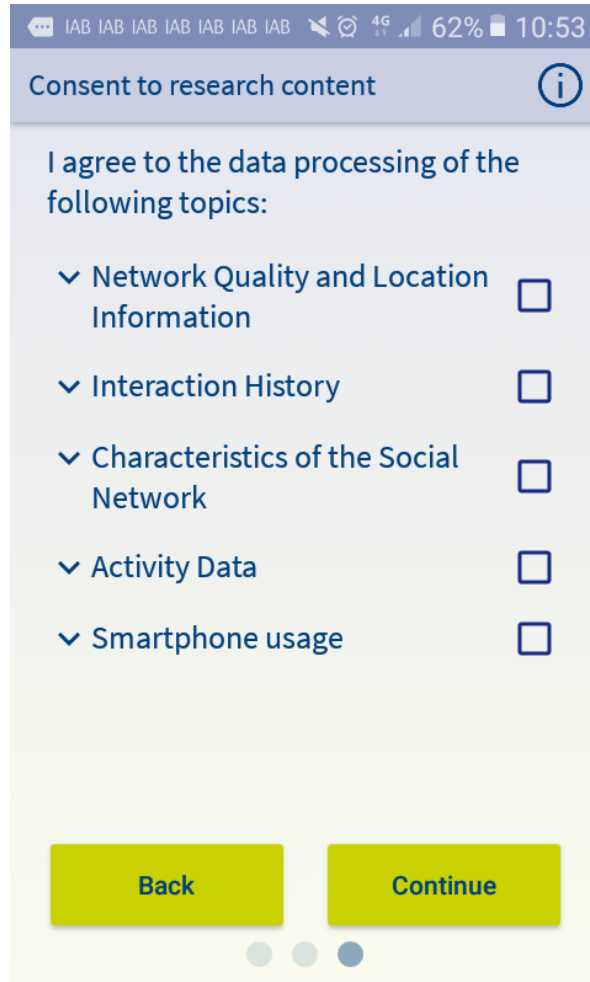
- **How does work related smartphone usage affect the well-being of employees?**
- Discussion in Scientific Community if work related smartphone usage affects well-being, i.e., exhaustion, negatively (Derks, van Mierlo, Schmitz, 2014; Ohly & Latour, 2014; Xie, Ma, Zhou, & Tang, 2019)
- Effects are especially strong if work happens outside of formal work hours (Schlachter, McDowall, Cropley, & Inceoglu, 2018)
- Studies use subjective assessments from self-report data

IAB-SMART App

- An app, that ...
 - ... launches surveys.
 - ... passively collects smartphone data
- Collected data can be combined with...
 - ... German panel data
 - ... administrative data



Sensor data



- Network quality and location information (every half hour)
- Interaction history
- Characteristics of the social network
- Activity data (every two minutes)
- **Smartphone usage**

Building indicators with smartphone usage data

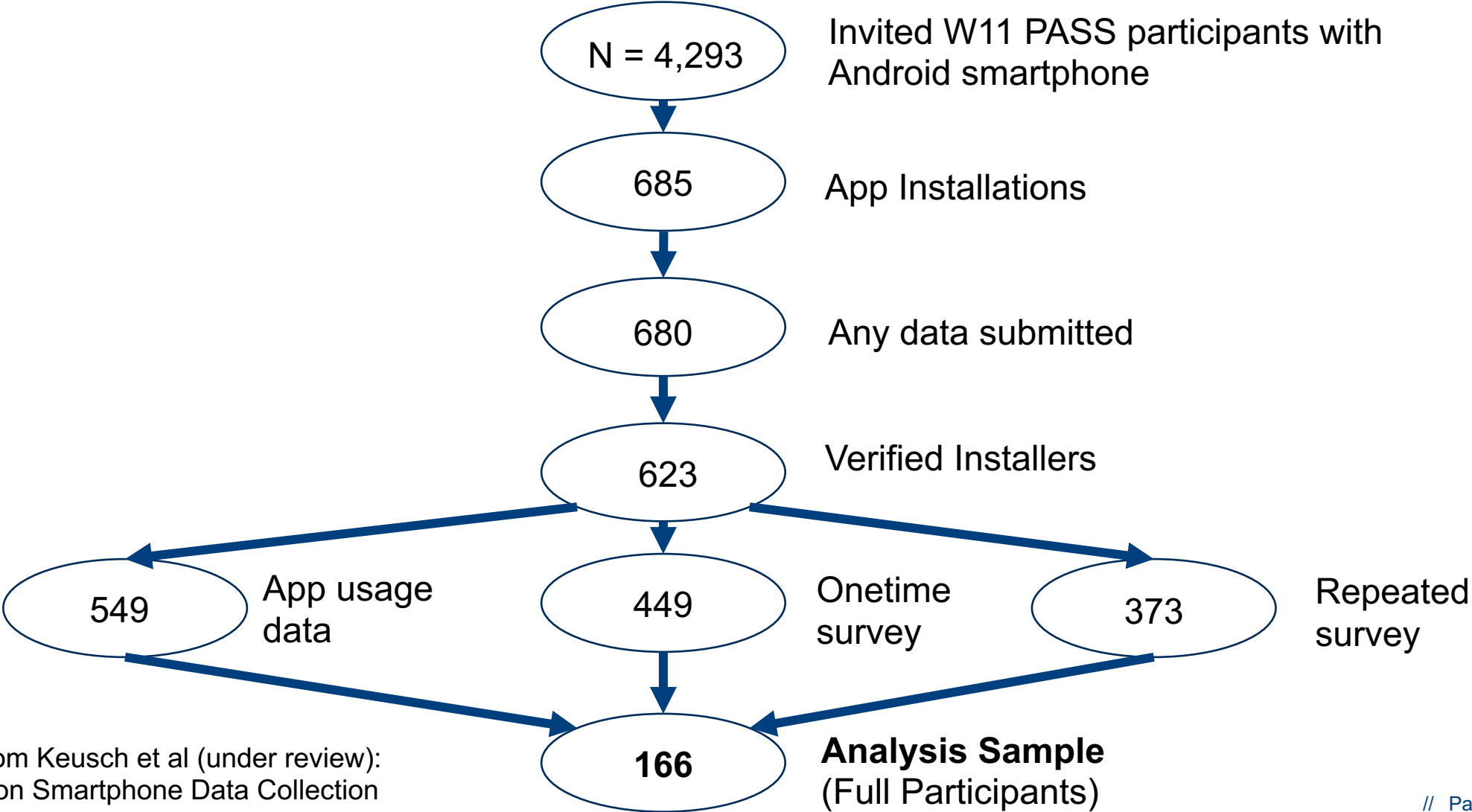
- Daily smartphone usage
 - Smartphone usage 1, 2, 4 and 8 hours before survey response
 - Daily work-related smartphone usage
 - Work-related smartphone usage 1, 2, 4 and 8 hours before survey response
 - Number of immediate switches
 - Switches between...
 - work related apps
 - work related apps, (mixed apps count as work related)
 - work related and leisure apps
 - work related and leisure apps, (mixed apps count as work related)
 - work related and leisure apps, (mixed apps count as leisure)
- 10 Variables
- 30 Variables

Survey Data

- One time survey
 - Activates 83 days after installation
 - contains 9 questions: frequency of smartphone use for work related tasks and 8 questions evaluating the burden and resource perspective when using the smartphone for work related tasks
 - 459 survey invitations (97.8 % responded)
- Repeated survey
 - Activates 84 and 174 after installation for 7 days
 - Invitation is send after 5pm
 - contains 3 questions: how (1) burdensome and (2) resourceful is smartphone usage for work related tasks and (3) current exhaustion level
 - 6,235 survey invitations;
 - 548 participants responded to 84.4 % of all invitations. On average, each participant
 - 9.6 responses per participant



Sample – Selection Process



Adapted figure from Keusch et al (under review):
Nonparticipation on Smartphone Data Collection
Using Research Apps

Methods

- Multilevel regression (Level 1: days; Level 2: IAB-SMART participants)

| | Outcome | Independent Variables | | | |
|-------------|---|--|-----------------|---|--|
| Variable(s) | Exhaustion | PASS data | App usage data | Onetime survey | Repeated survey |
| Level | Day | Participant | Day/Participant | Participant | Day |
| Details | At the moment I feel exhausted^a | <ul style="list-style-type: none"> Age Gender Education | 40 indicators | <ul style="list-style-type: none"> Burden-indicator for work related smartphone usage Resourcefulness-indicator for work related smartphone usage | Today, work related smartphone usage was... <ul style="list-style-type: none"> ...burdensome ... helpful |

^a(5 point scale from does not apply at all – completely applies)

Preliminary Results

1. Based on 40 smartphone usage indicators, we find no correlation between actual smartphone usage and exhaustion.
2. Work-related smartphone use is a question of attitude: the higher the smartphone is perceived as a burden, the higher the exhaustion.
3. The subjective assessment of whether work-related smartphone use is perceived as positive and enriching is not relevant for exhaustion.
4. Older age groups (34-47 years and older than 48) are on average less exhausted than younger ones (33 and younger).

Conclusion

- Studies use subjective assessments from self-report data to evaluate effects work related smartphone usage on peoples well-being
- Smartphone sensor data should be used to verify those studies
- Smartphone usage data is not helpful to explain daily exhaustion
- Current results suggest: work related smartphone usage is a question of attitude

Future research

- Feature engineer more indicators
 - Combine the information about where participants are (home/workplace/somewhere else) with the smartphone usage data.
 - Average number of call or text messages that are sent and received.
 - Indicators resulting from the Wi-Fi information
- Using machine learning algorithms to predict work related apps
- Using a different system assign apps to work related and entertainment apps, instead of using Google Play categorizations

Limitations

- Distinction between work and entertainment apps is not precise
- Good vs. bad exhaustion
- How the smartphone is used may play a bigger role
- Relationship between smartphone usage and exhaustion may only hold for certain groups