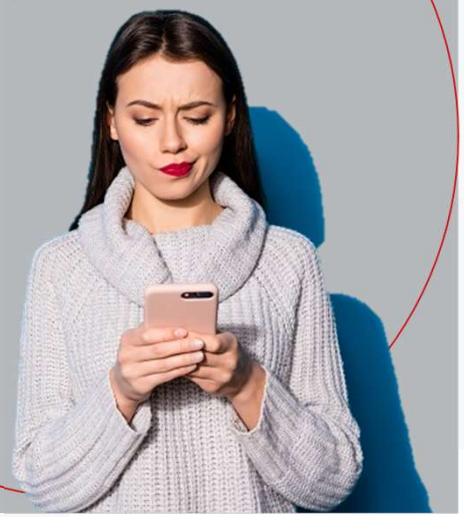
Mittelstand-Digital
Zentrum
Fokus Mensch

„Creating a human-centered digital future together.“

Fostering Digital Sovereignty:

Results of User Research of a Tailored App and Smartphone Analysis Tool



DGPs Kongress 2024, September 19th 2024

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Mittelstand-Digital

Bundesministerium für Wirtschaft und Klimaschutz

aufgrund eines Beschlusses des Deutschen Bundestages

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PANDERAM project

The project aimed to strengthen users' sovereignty and choices when using smartphones and smartphone apps. To this end, the actual handling of their own data was made visible and assessable. At the same time, users were provided with alternatives and options, enabling them to improve their own security and data protection.

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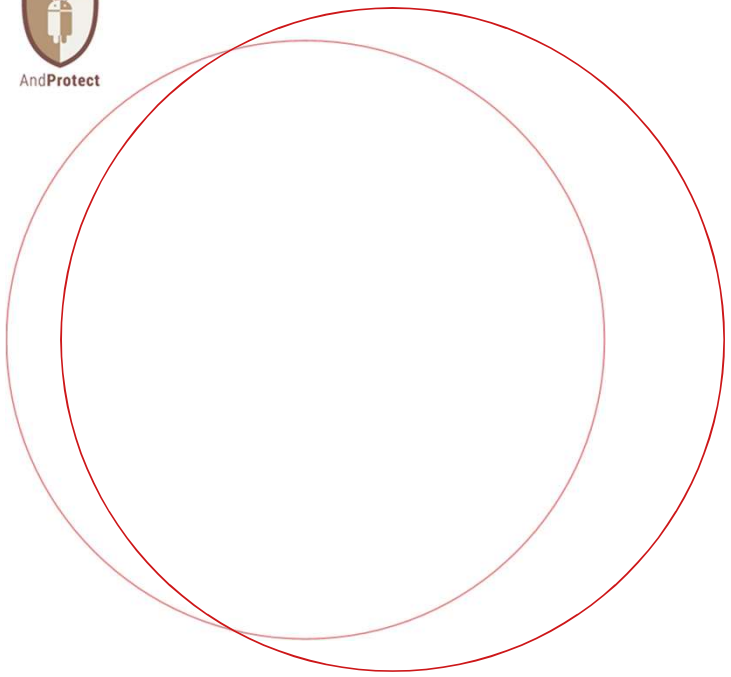
user-centered design and tailoring of a tool

PANDERAM project: User centered design process

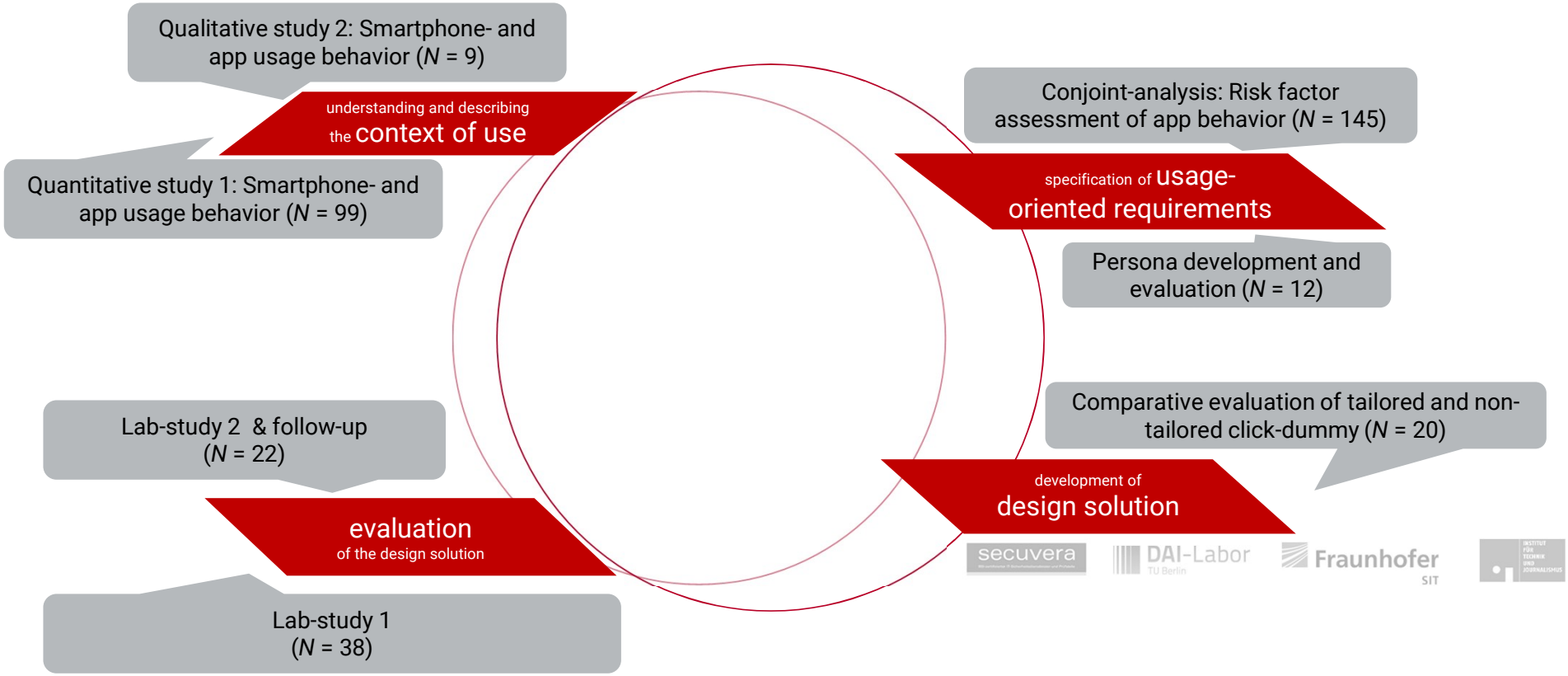
user centered design guidelines for tools that analyze app behavior

Döbelt, S. et al.: Clearing the Hurdles:
How to Design Privacy Nudges for Mobile
Application Users.

AndProtect



PANDERAM project: User centered design process



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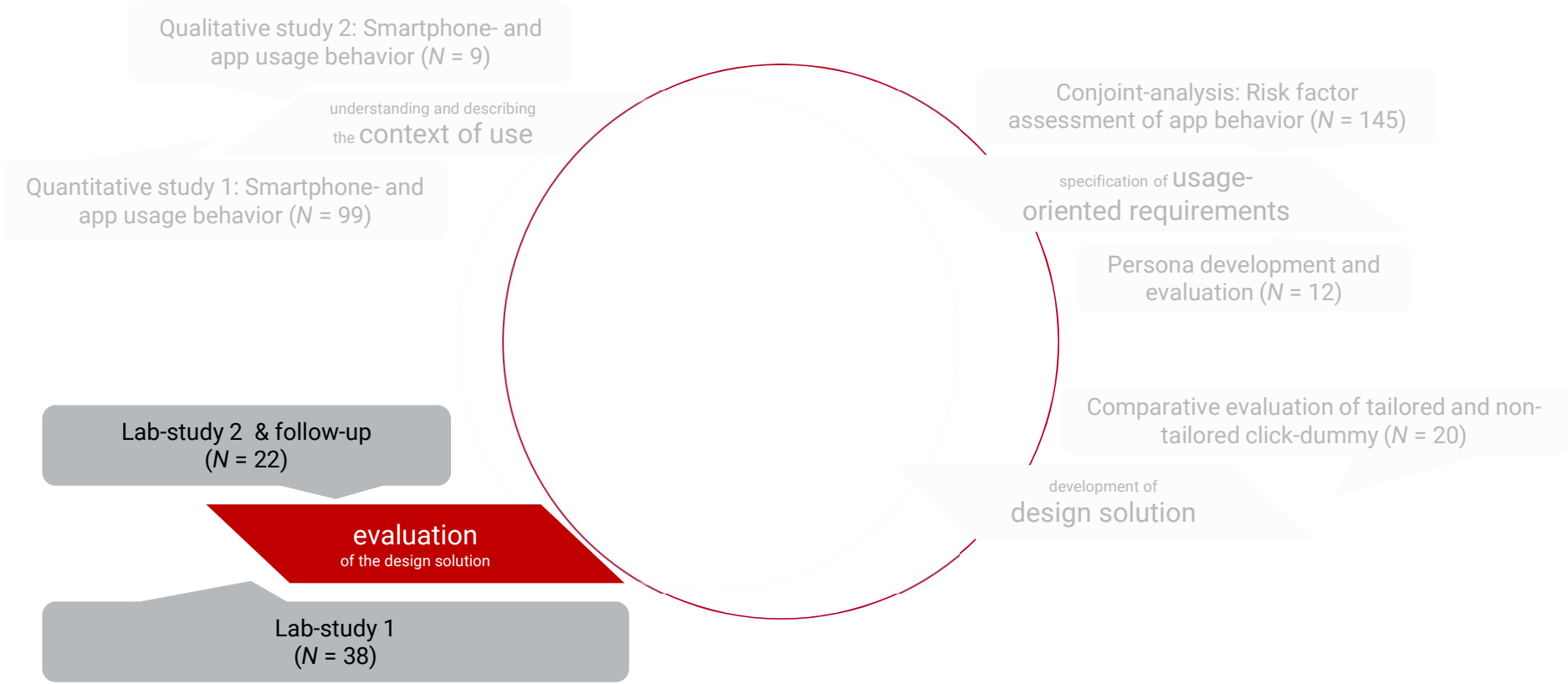
PANDERAM project: User centered design process



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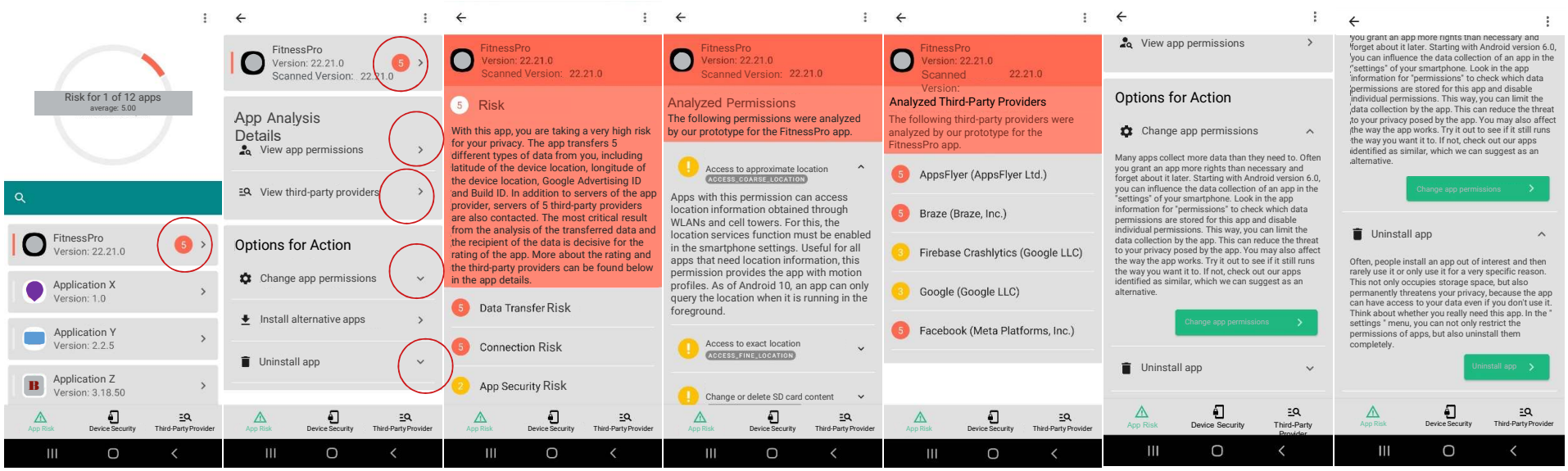
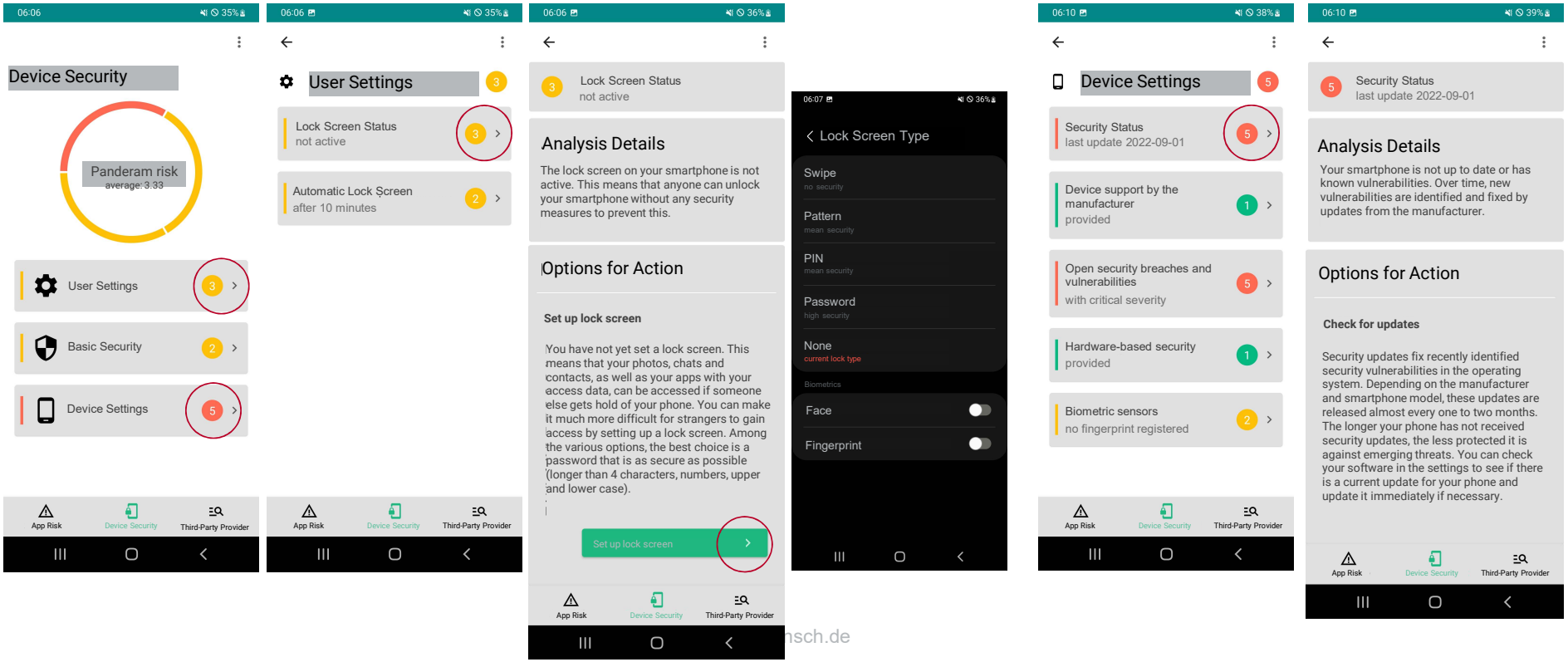
App prototype

User interface (study 1)



App prototype

User interface (study 2)



Research questions & hypotheses for both studies

RQ1: How is the prototype evaluated in terms of usability?

H1: The prototype is evaluated as above-average in terms of usability.

RQ2: Can our prototype increase self-efficacy regarding data protection and privacy preservation as well as information security of smartphone (app) users?

H2: Self-efficacy regarding data protection and privacy preservation and information security is higher after interaction with the prototype than before.

exploratory RQ3: Which UX factors are positively affected by congruent tailoring?

Study design

Independent variables:

H1 Interaction with our prototype (“intervention”)

H2 Time of measurement (before T1 and after T2, T3 the “intervention”)

RQ3 Behavioral congruent and incongruent condition

Dependent variables:

H1 Usability (SUS; Brooke, 1996; Rummel et al., 2013)

H2 Repeated self-assessment of self-efficacy (SWE; Schwarzer & Jerusalem, 2003)

RQ3 User experience ratings (UEQ; Laugwitz et al., 2008)

Sample

Study 1: *N* = 38 (26 female)

- 24 years old (*M* = 23.95; *SD* = 5.03; min = 18.00, max = 41.00)
- Majority (92%) third semester students, of which are psychology (69%) students
- Less tech-savvy (ATI scale; Franke, Attig, & Wessel, 2019) but more skilled (TAEG; Karrer et al., 2009) in the use of smartphones than comparison samples

Study 2: *N* = 22 (15 female)

- 25 years old (M = 24.82; SD = 5.03; min = 19.00, max = 36.00)
- Majority (72%) fourth semester students, of which are psychology (56%) students
- Comparable tech-savvy (ATI scale; Franke, Attig, & Wessel, 2019) and more skilled (TAEG; Karrer et al., 2009) in the use of smartphones than comparison samples

Yes, it is a student-sample…

And yes, this sample limits the external validity.

But, everything that lowers external increases internal validity.

Also, the rather large sample size (in terms of usability tests) limits the probability of undetected issues.

Procedure

Recruitment of participants

- Announced goal of the study: “app evaluation”
- Remuneration: test subject hours or raffle for recruitment questionnaire, cash or test subject hours for lab test
- Channels: off- and online (mailing lists, professorship website, chat-groups, posters, announcement in lectures)
- Via online questionnaire including demographics, smartphone usage and behavioral stage

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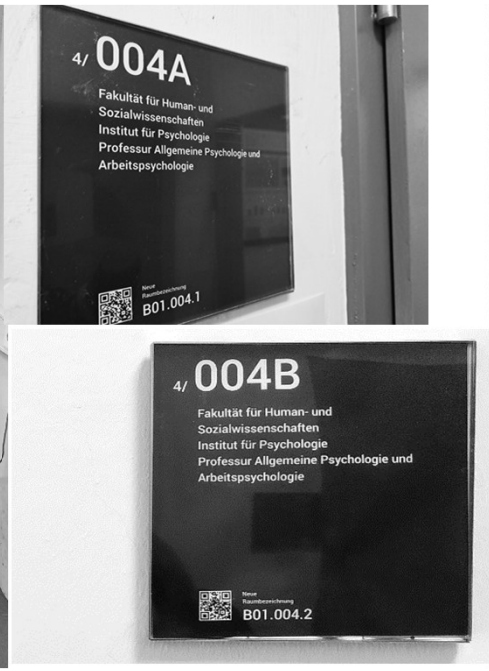
Procedure

Conducted face-to-face in our lab at the end of 2022 and summer 2023 under (some) pandemic-related restrictions



Procedure

Welcome (consent, demographics, experimenter consultation possible, no uninstallations, prototype not fully developed yet)

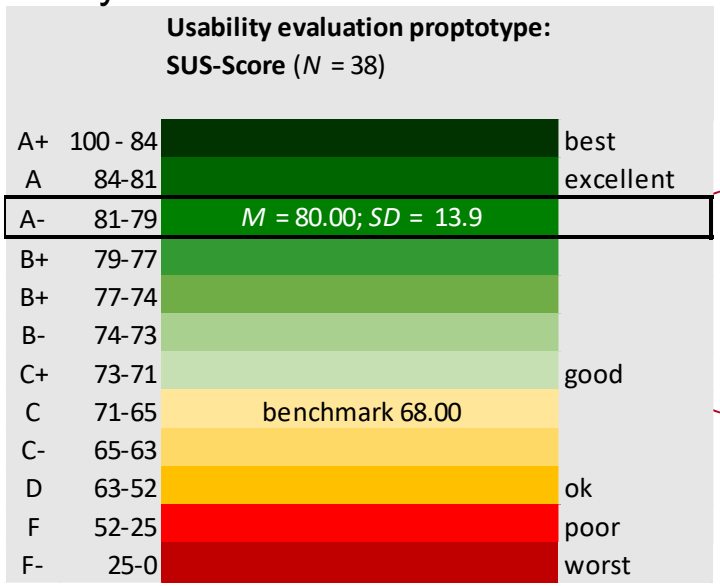
T1 (H2)	Self-efficacy, …
10min	Free exploration of the prototype
Task 1 (5min)	Inform yourself about the app *FitnessPro* with the help of the prototype. (study 1) Inform yourself about the security risks on the smartphone. (study 2)
Task 2 (5min)	Take action using the prototype to minimize the risk of the app *FitnessPro.* (study 1) Set up a lock screen with a password and then set an automatic screen lock. (study 2)
Task 3 (5min)	Check the security status of the smartphone and pay attention to how long it has been since the last system software update. (study 2)
H1/RQ3	Evaluation of usability and user experience
T2 (H2)	Self-efficacy, …
T3	Follow-up measurement after 10 days (study 2; self efficacy, …)

Results

RQ1: How is the prototype evaluated in terms of usability?

H1: The prototype is evaluated as above-average in terms of usability.

Study 1



Nonparametric, one-tailed
*W*s = 660.00, *z* = 4.02, *p* < .001, *d* = 1.86.

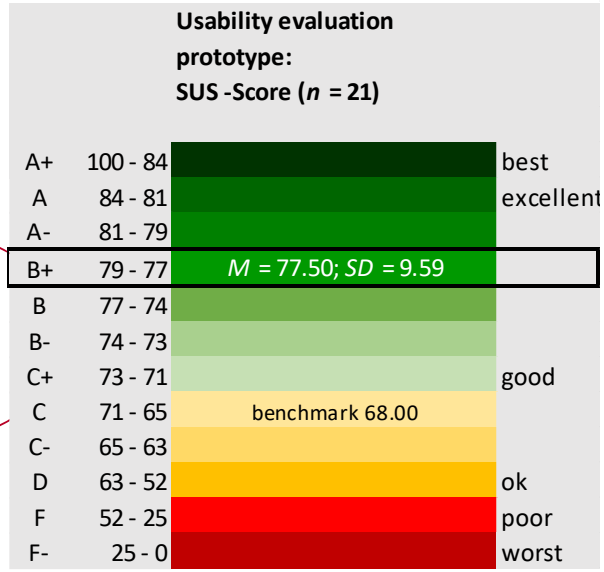
Results

RQ1: How is the prototype evaluated in terms of usability?

H1: The prototype is evaluated as above-average in terms of usability.

Parametric, one-tailed
$t(20) = 4.54$, $p < .001$, $d = 0.91$

Study 2



Results

very good and good

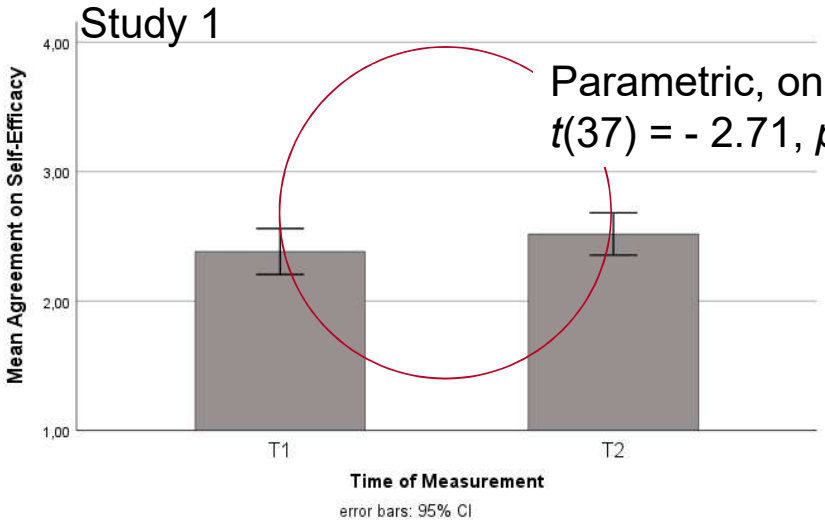
RQ1: How is the prototype evaluated in terms of usability?

H1: The prototype is evaluated as above-average in terms of usability.

Results

RQ2: Can our prototype increase self-efficacy regarding data protection and privacy preservation as well as information security of smartphone app users?

H2: Self-efficacy regarding data protection and privacy preservation and information security is higher after interaction with the prototype than before.



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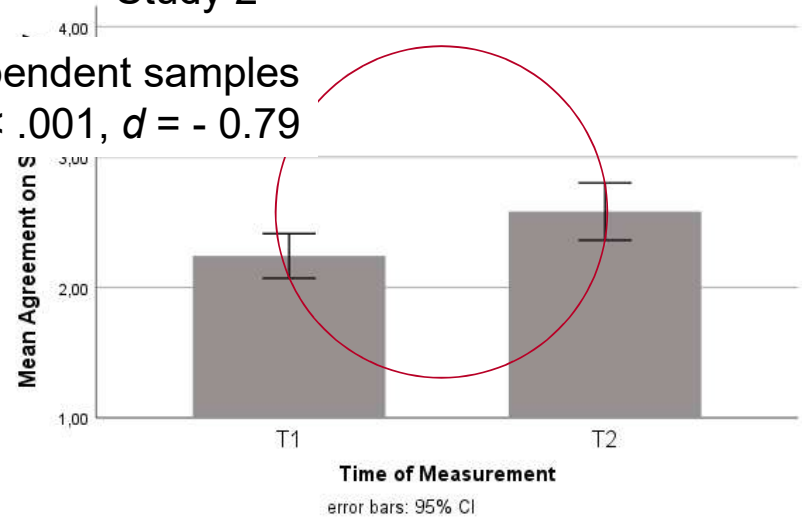
Study 2

Parametric, one tailed t-test, dependent samples

$t(21) = -3.70$, $p < .001$, $d = -0.79$



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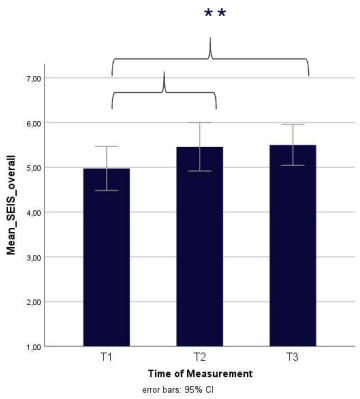
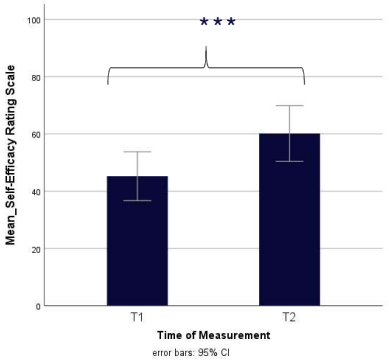
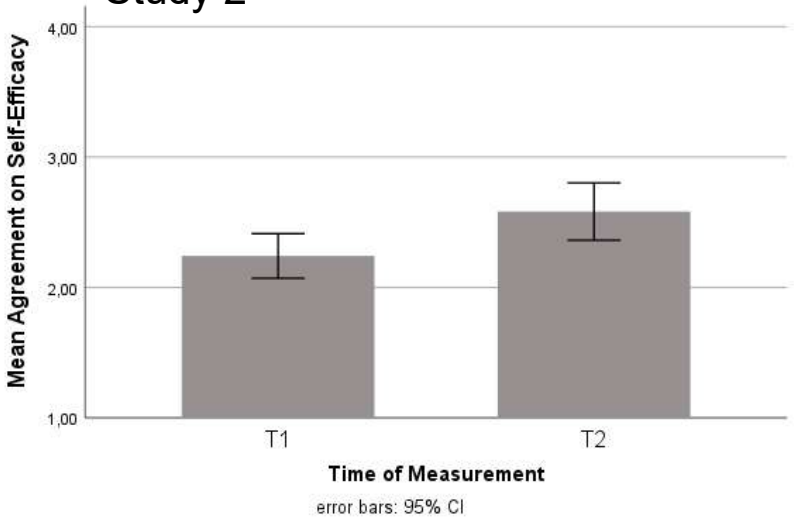




Study 2



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RQ1: How is the prototype evaluated in terms of usability?

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Yes, it can!

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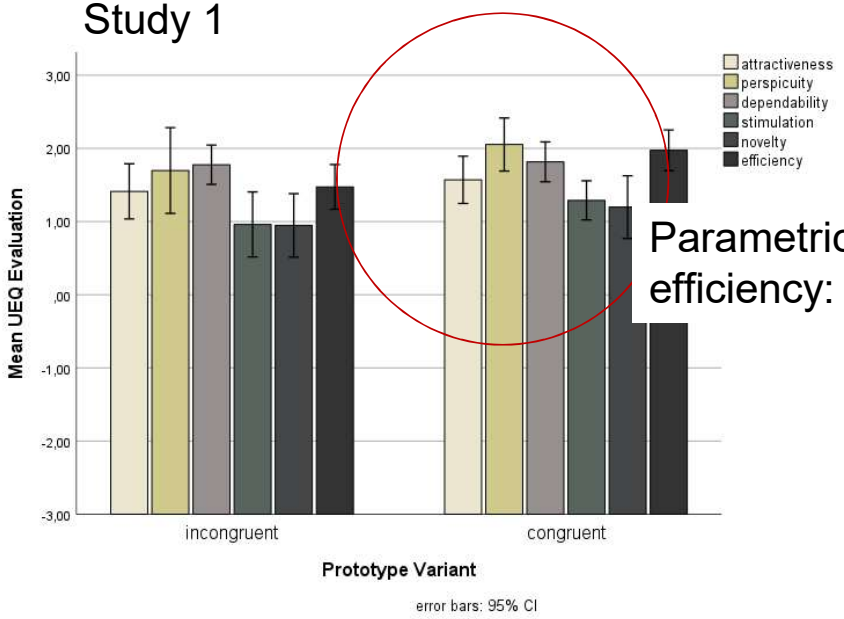
Results

exploratory RQ3: On which aspects of UX does the congruent tailoring to the behavioral stage have a positive impact?

Study 1



Parametric, one tailed, independent samples, Bonferroni corrected
efficiency: $t(36) = 2.543$, $p = .008$, $d = 0.83$

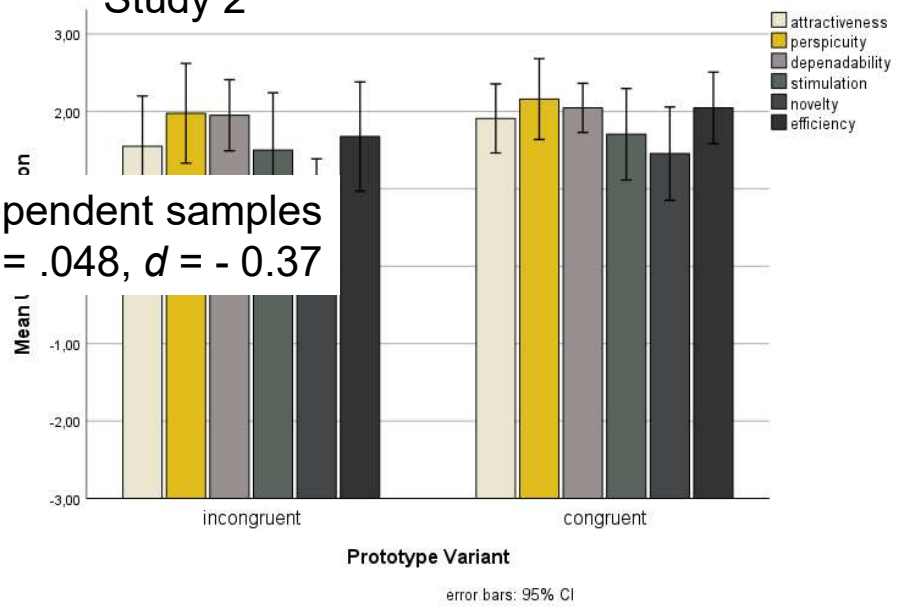
Results

exploratory RQ3: On which aspects of UX does the congruent tailoring to the behavioral stage have a positive impact?

Study 2

nonparametric, one tailed, independent samples

novelty: $U = 31.50$, $z = -1.611$, $p = .048$, $d = -0.37$



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exploratory RQ3: Which UX factors are positively affected by congruent tailoring?

Not that many, but efficiency and novelty.

Summary and discussion

User centered design pays off.

Positive biasing possible: prototype status, test situation, predetermined tasks

We can empower users and increase their digital sovereignty.

Positive biasing possible: aim of the prototype became apparent during the test

Tailoring of tools can create additional effects.

However, more creative ideas are needed here!

References

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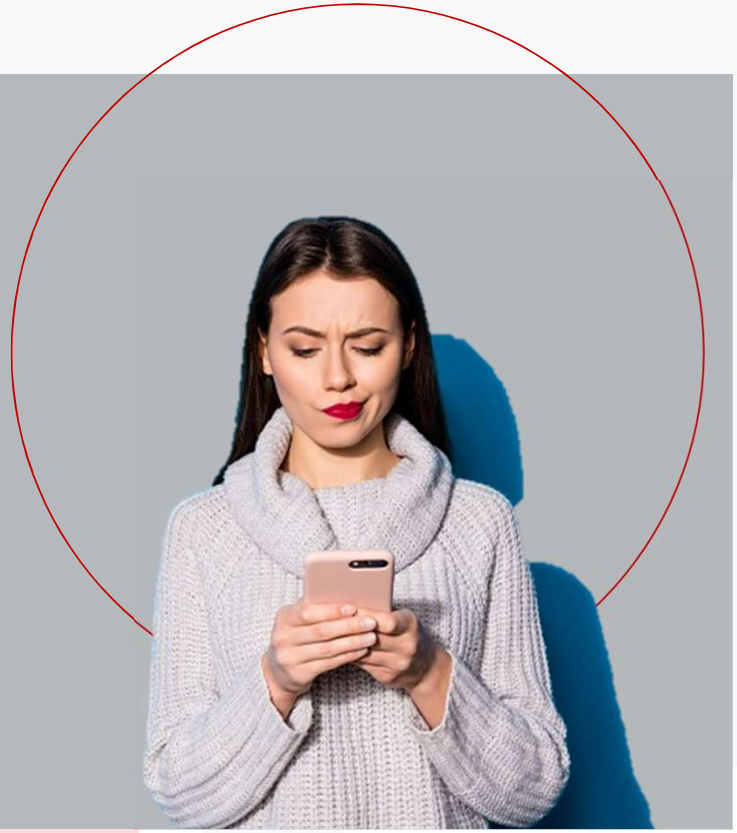
Thank you!

Further information:

https://www.tu-chemnitz.de/hsw/psychologie/professuren/allpsy1/forschungsthemen/AbgeschlosseneProjekte/panderam/index.html.en



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