PANDERAM

Online study
Evaluating risk characteristics of Apps
"The App as friend and foe"

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Objectives of the survey

- Further characterization of different levels of behavior regarding privacy-protecting behavior when using smartphone apps

- Research question:

  - Do people of different behavioral levels differ in their evaluation of **app risk features**?

  - Do people of different behavioral levels differ in terms of problem **awareness of data protection and privacy** and the **mindfulness facet of (self-)observation**?

Study design

Quasi-experimental & between-subjects

UV: Behavioral levels

Selection from 4 described behavior levels [1]

Statements for Predecision, Preaction, Action, Postaction

Risk evaluation

AV1: Assessment of feature combinations and their features regarding their risk (Conjoint-analysis)

Problem awareness

AV2: Awareness of Consequences scale [6] adapted for data protection and privacy

Mindfulness facet of observation

AV3: German version of the Five Facet Mindfulness Questionnaires (FFMQ-D; [7])

[1] Bamberg, S. (2013a); [6] Stern et al. (1993); [7] Michalak et al. (2016); https://iconmonstr.com/paintbrush-6-png/

Hypothesis

People of different levels of behavior regarding data protection and privacy differ in terms of...

H1: ... the assessment of app risk features

H2: ... awareness of the problem of data protection and privacy

H3: ... the mindfulness facet of observation

...when using smartphone apps.

Organisation

Schedule

- Conception: 04 - 08/2021
- Implementation & Test in Sawtooth (Version 9.8.1) and LimeSurvey (Version 3.27.28+211208): 08 - 09/2021
- **Start survey:** 02.10.2021; **End survey:** 01.11.2021

Recruitment

- **Study participation distribution list** to students to students
- Message on the **homepage** of the **professorship AHF**
- Appeal in **lectures** and circle of **acquaintances**, **friends**, and **announcements**
- LinkedIn-groups „*Find survey participants […]*"

Participants: *N* = 145 people
Compensation either one "Versuchspersonenstunde" or participation in a raffle (1 x 50€, 30€, and 20€)

Procedure 1/3

- **Welcome**, Description of the **objective of the study**, privacy policy and consent form

- **Demographics** (gender, age, highest level of education, current employment)

- **Smartphone usage** (Operating system, daily app operating time, number of installed apps, frequently used apps)

- **Behavior level** assignment (5 statements)

- Description and **explanation** of the **app risk features** and their characteristics:

  - Data type (identification numbers, usage data, personal data)
  - Provider (app-provider, third-provider)
  - Server location (Germany, European Union, non-European country)
  - TLS-encryption (TLS-encryption, no TLS-encryption
  - Frequency of data transmission (once, repeated)

Procedure 2/3

- **Question block 1** (Risk assessment, selection tasks Conjoint–Analysis):

„Select the combination of data transmission that you think poses **the greatest risk** to protecting your data and privacy when using smartphone apps."

Datenart	Kennnummern	Nutzungsdaten	Nutzungsdaten
Anbieter	Dritt-Anbieter	App-Anbieter	Dritt-Anbieter
Standort des Servers	Deutschland	Europäische Union	Außereuropäisches Land
TLS-Verschlüsselung	TLS-Verschlüsselung	keine TLS-Verschlüsselung	keine TLS-Verschlüsselung
Frequenz der Datenübertragung	einmal	einmal	wiederholt
	Auswahl	Auswahl	Auswahl

Procedure 3/3

- **Question block 2:** Awareness of data protection and privacy issues, adapted Awareness of Consequences scale

- **Question block 3:** Mindfulness Facet Observation, Five Facet Mindfulness Questionnaires

- **Dismissal** and forwarding to LimeSurvey-part: separate collection of information regarding "**Versuchspersonenstunden**" collection **or raffle** participation

Average completion time: *MW* = 30,95 min (*SD* = 51,81, Min = 6,47 ; Max = 398,92)

- After checking the plausibility of statements with a very short completion time, **all fully completed questionnaires were included in the sample.**

Data editing and analysis

- Descriptive analysis and reliability analysis

- Examination of the prerequisites for parametric methods:

    - Normal distribution testing using Kolmogorov-Smirnov tests, Shapiro-Wilk tests and visual histogram examination

    - Test of variance equality of behavioral levels using Levene tests (because of different sized groups)

- If both are given: Parametric testing with ANOVA (UV: behavioral level (1-4);
  AV 1: Evaluation of risk features Apps; AV 2: Problem awareness, AV 3: Observation)

- If at least one of the two requirements is not met: Nonparametric tests with Kruskal-Wallis-Test (post-hoc: Wilcoxon Rank sum tests for individual behavioral levels)

https://iconmonstr.com/file-32-png/

Demographics

Gender: 103 female (71%), 41 male (28%), 1 divers (1%)

Age: *MW* = 28,85 (*SD* = 12.77; Min = 18; Max = 82)

Highest level of education:

1.) Gymnasium/Abitur (58%),
2.) University degree (30%),
3.) Completed vocational education (8%)

Current employment:

1.) Students (72%),

2.) Employees (19%),
3.) Retirees (4%)

Compared to the German population, the sample is more

female, **younger**, has a **higher level of education** and is studying.

Smartphone usage

Operating system:
Android (60%)   iOS (39%)   Other (1%)

Average time spent using apps (self-assessed):
MW = 171,80 min   (*SD* = 92,45; Min = 3; Max = 480)

Number of installed apps (estimated):
MW = 14,00   (*SD* = 9,80; Min = 2; Max = 60)

Current frequently used apps (two answers required):
WhatsApp (67%)   Instagram (41%)

With regard to these criteria, the sample is **representative of smartphone users in Germany**.

https://iconmonstr.com/smartphone-7-png/

Behavioral levels ([1], [2])

N = 145 Experimental subjects
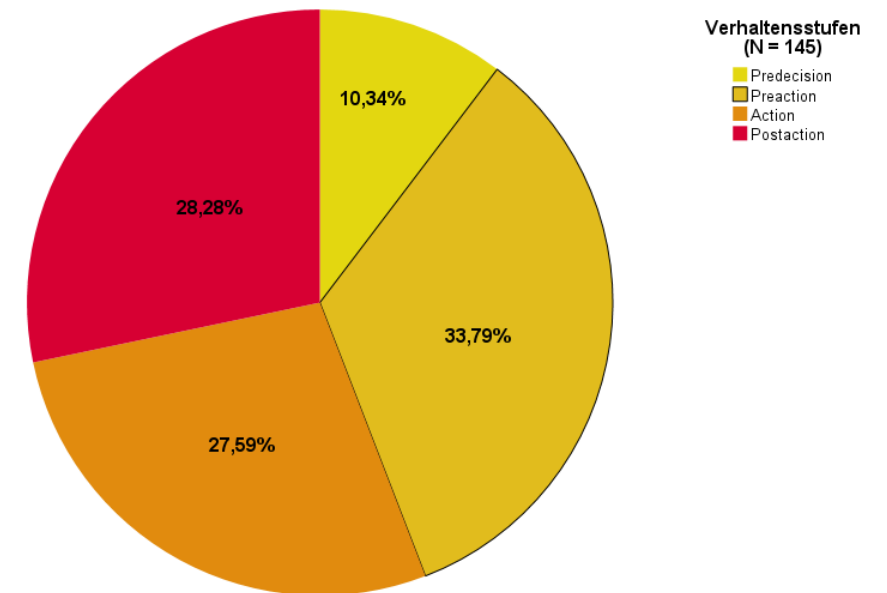
Preaction (34%)

Postaction (28%)

Action   (28%)

Predecision   (10%)

Only a **few people** say they do **not take any measures** to protect their data when using mobile apps.

Verhaltensstufen
(N = 145)
- Predecision
- Preaction
- Action
- Postaction

10,34%
33,79%
27,59%
28,28%

[1] Bamberg, S. (2013a); [2] Bamberg, S. (2013b)

Recap: sample

Our typical survey participant...

…has 14 apps installed on the smartphone.

…uses smartphone apps for under 3 h a day, most frequently WhatsApp.

… has an Android powered smartphone.

… is female and 28 years old and is studying.

… assigns herself to the Preaction behavioral level, i.e. she does not currently take any measures to protect her data when using smartphone apps, but is thinking about doing so, but does not yet know how.
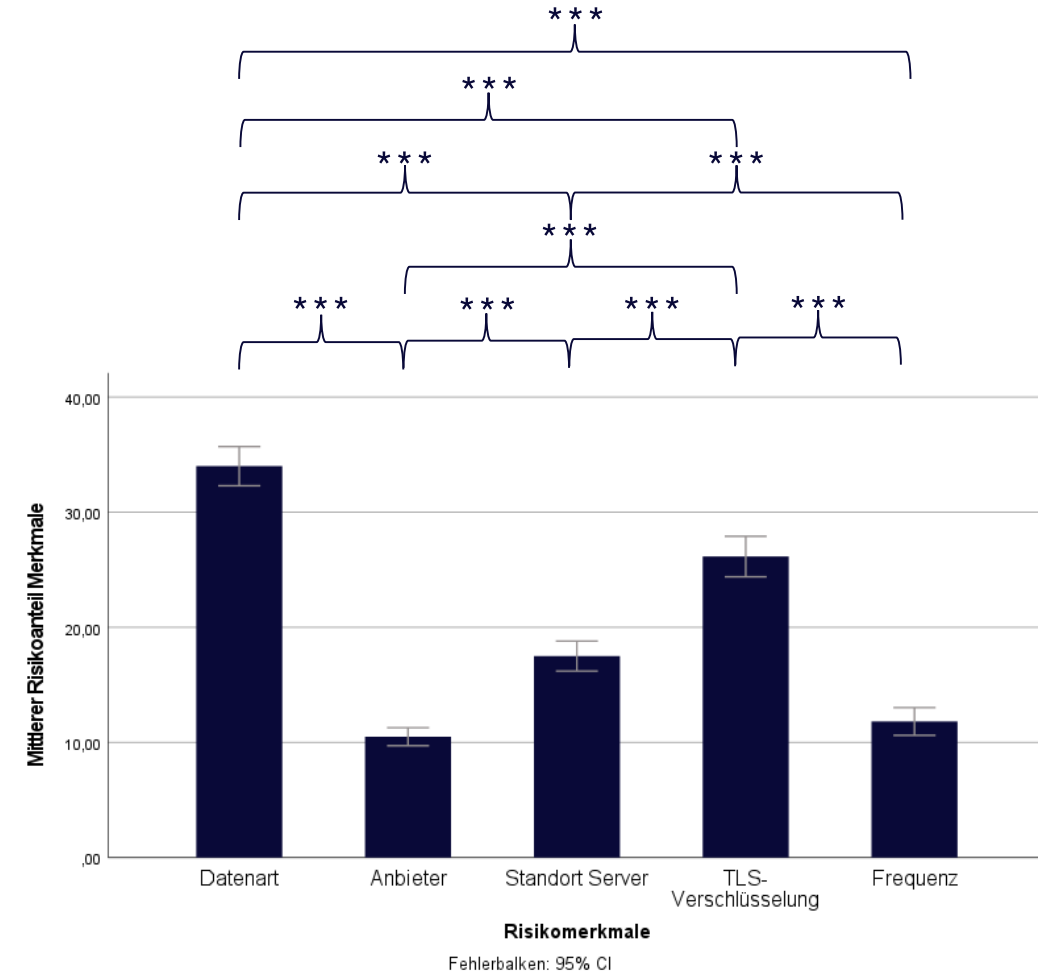
Evaluation risk features

1. **Data type** assessed as most risky
2. **Encrypted transmission**
3. **Server location**

These **risk ratings of the features differed significantly** from each other. (Exception: Provider vs. frequency)
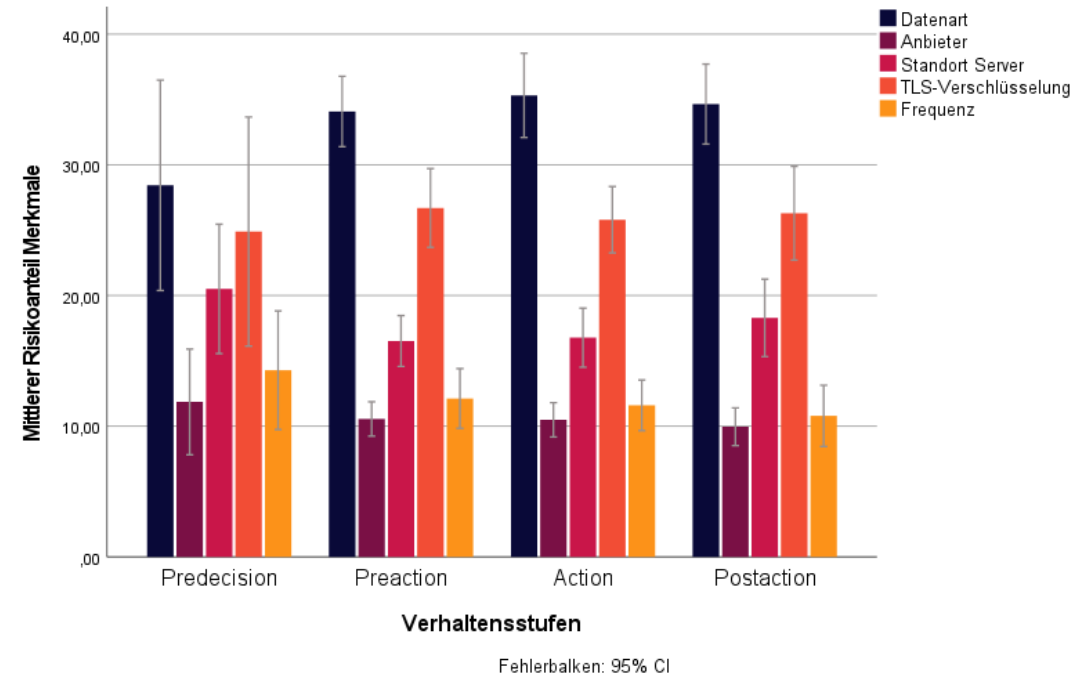
$F(3,00;431,73) = 159,47$; $p < 0,001$; $\eta^2 = 0,53$
(= large Effect; [8])

[8] Cohan, J. (1988)

Evaluation risk features

Consistently, no significant differences were found between individuals of **different behavioral levels** regarding risk assessment of the features.
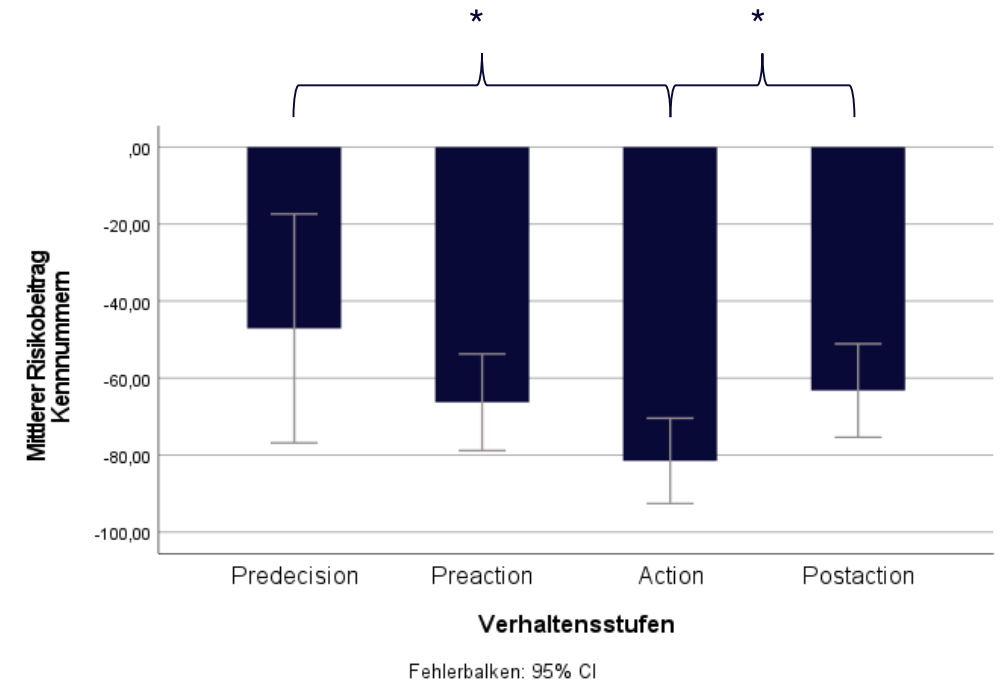
Evaluation Expression of risk feature characteristics

For the most part, no significant differences were found between individuals of different behavioral levels regarding the risk ratings of the trait characteristics.

Except for identification numbers

χ^2 = 8,24; p < 0,05; f = 0,20 (= small effect; [8])

[8] Cohan, J. (1988)

Problem awareness

	Total	Predecision	Preaction	Action	Postaction
Problem awareness	MW = 2,38 SD = 0,24	MW = 2,27 SD = 0,25	MW = 2,40 SD = 0,23	MW = 2,39 SD = 0,22	MW = 2,39 SD = 0,25

= „*I reject*"

The overall mean is significantly smaller than the scale mean 2,5.

$t(144)$ = -5,96; $p < 0,001$; d = 0,49 (= medium effect; [8])

No significant difference could be found (χ^2 = 5,17; $p > 0,1$)

of problem awareness on the topic of data protection and privacy between persons of different behavioral levels.

[8] Cohan, J. (1988) https://iconmonstr.com/school-16-png/

Mindfulness facet observation

	Total	Predecision	Preaction	Action	Postaction
Observation	MW = 3,74 SD = 0,63	MW = 3,67 SD = 0,64	MW = 3,74 SD = 0,63	MW = 3,70 SD = 0,52	MW = 3,81 SD = 0,73

= „*often applies*"

The value is significantly higher compared to the norm sample(MW = 3,49; [5]).

t(144) = 4,81; p < 0,001; d = 0,40 (= medium effect; [8])

Again, no significant difference could be found (χ^2 = 1,03; p > 0,1)

of the mindfulness facet observation between persons of different behavioral levels could be detected.

Summary

Evaluation Risk Features & characteristics

- **Ratings** of risk features and characteristics are **nearly identical across behavioral levels** → Hypothesis H1 is rejected

- **Features** are assessed with **different degrees of riskiness**

- As expected, **the more "critical" the characteristics** of the individual risk features are, **the greater the risk is assessed** → weight accordingly

- **No individualized risk presentation necessary**

- Recommendation to individualize **options for action** according to behavioral level (e.g. at level 1 show options for action and describe them in detail, at level 4 only remind of these options for action)

Summary

Problem awareness

- Problem awareness **equally pronounced** across the behavioral stages
  → Hypothesis H2 is rejected.

- Participants **were more likely** to **reject** statements about problem awareness

- Construct of problem awareness from environmental protection behavior **not readily transferable to the context of data protection and privacy** based on this study

- Used **scale shows clear methodological deficiencies** (reliability low)

Mindfulness facet observation

- Mindfulness facet observation **equally pronounced** across behavioral levels
  → Hypothesis H3 is rejected.

- Participants rated themselves as **rather mindful** (facet observation)
  → significantly higher compared to values of the norm sample [5]

- Mindfulness facet observation is **not transferable to the context of data protection and privacy** in this online study

Thank you for your attention!

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