

ECREA 2024 Communication & social (dis)order

**The Reciprocal Associations between
Adolescents' mHealth App Use, Body
Dissatisfaction and Physical Self-Worth:
A Three-Wave Longitudinal Study**

Hayriye Gulec, Michal Muzik, David Smahel, Lenka Dedkova

Background

- mHealth apps facilitate the self-tracking of personal health data (Lupton, 2013)
- Adolescents commonly use mHealth apps for lifestyle behaviors (e.g. physical activity, nutrition, and weight) (Rideout et al., 2021, Gulec & Smahel 2022)
- **Association between mHealth app use and attitudes toward one's body:**
 - Based mostly on cross-sectional study designs (De Cock et al., 2017)
 - Mostly on adult samples (Honary et al., 2018, Simpson et al., 2017)
 - Longitudinal research is scarce (Hahn et al., 2022)

Aims

- **Longitudinal bi-directional associations between adolescents' attitudes toward their bodies and mHealth app use:**
- **Distinguished within-person effects from between-person effects:**
 - Do within-person changes in using apps for an adolescent correspond with fluctuations in the same adolescent's attitudes toward his/her body six months later?
 - Do within-person fluctuations in an adolescent's attitudes toward his/her body correspond with changes in using apps for the same adolescent six months later?

Aims

- **Body-related attitudes:**

- Physical self-worth: Overall evaluation of physical self, concerned with satisfaction, confidence, and pride in one's physical attributes and capabilities

- Body dissatisfaction: Subjective negative evaluation of one's body against a socio-culturally defined standard for a normative body

- **Gender**: Gender differences in body-related self-perceptions and health-related behaviors, such as dieting and exercise.

Participants

- Nationally representative sample of Czech adolescents
(N =2,500; 50% girls; Mage = 13.43; SD = 1.69)
- Data in three waves with six-month intervals between 2021 and 2022
- 1,654 adolescents at Time 2 (T2) (48.4%; Mage = 13.43)
- 1,102 adolescents at Time 3 (T3) (48.3% girls; Mage = 13.37)

- Final analyses used data from 2,232 adolescents (48.8% girls; Mage = 13.43; SD = 1.69)

Measures

mHealth app usage related to calorie intake and expenditure, weight, and sports activity.

7-point Likert scale
(never – several times a day)
Cronbach's alphas: .87 and .88

Physical Self Inventory-short form for adolescents (Morin et al., 2016)

5-point Likert scale
(Very untrue – very true)
Cronbach's alphas: .91 and .92

Body Dissatisfaction subscale of Eating Disorder Inventory-3 (Garner, 2004)

5-point Likert scale
(Very dissatisfied – very satisfied)
Cronbach's alphas: .91 and .94

Statistical Analyses

- Multi-group structural equation modeling (SEM)
- Random intercept cross-lagged panel model (RI-CLPM) (Hamaker et al., 2015)
- Age and BMI at Time 1, as time-invariant covariates

Results

- Highest correlations between same variables measured in different waves
- Negative correlations between physical self-worth and body dissatisfaction
- Acceptable fit for the RI-CLPM:
 $\chi^2(30) = 40.99$ ($p < .001$), RMSEA = .02 (90% CI [.00; .03], CFI = .99, SRMR = .02.

Girls

Regression path	Time 1 → Time 2		Time 2 → Time 3	
	Estimate [95% CI]	P value	Estimate [95% CI]	P value
App use				
App use	.084 [-.106; .274]	.387	-.021 [-.241; .172]	.830
PSW	.143 [-.012; .299]	.071	.076 [-.118; .269]	.444
BD	-.107 [-.276; .062]	.214	.013 [-.168; .195]	.885
PSW				
App use	.199 [.012; .387]	.037	.161 [-.014; .336]	.071
PSW	.049 [-.165; .264]	.654	.118 [-.095; .332]	.277
BD	.103 [-.091; .297]	.298	-.087 [-.263; .088]	.328
BD				
App use	-.034 [-.216; .148]	.714	.035 [-.149; .218]	.713
PSW	.012 [-.203; .228]	.910	-.214 [-.437; .010]	.061
BD	-.070 [-.322; .183]	.588	-.033 [-.241; .175]	.756

Boys

Regression path	Time 1 → Time 2		Time 2 → Time 3	
	Estimate [95% CI]	P value	Estimate [95% CI]	P value
App use				
App use	.198 [.015; .381]	.034	.251 [.069; .433]	.007
PSW	.075 [-.063; .211]	.272	.024 [-.131; .178]	.763
BD	-.052 [-.197; .119]	.537	-.031 [-.210; .148]	.735
PSW				
App use	.069 [-.051; .189]	.262	.053 [-.083; .190]	.444
PSW	.216 [.053; .378]	.009	.166 [-.039; .372]	.112
BD	-.154 [-.321; .012]	.069	-.228 [-.443; -.012]	.038
BD				
App use	-.121 [-.277; .035]	.128	.028 [-.098; .154]	.660
PSW	-.107 [-.284; .070]	.237	-.307 [-.453; -.161]	<.001
BD	.133 [-.118; .383]	.300	.187 [.000; .353]	.050

Results

- A within-person increase in app use at T1 was associated with a within-person increase in physical self-worth at T2 but only among girls (beta = .199, $p = .037$)
- A within-person change in the frequency of app use was not associated with body dis/satisfaction.
- Physical self-worth or body dissatisfaction were not associated with the frequency of app use at the within-person level.
- Negative reciprocal associations between physical self-worth and body dissatisfaction (beta = $-.228$, $p = .038$; beta = $-.307$, $p < .001$), but only among boys from T2 to T3.

Discussion

- **Within-person effect of app use on girls' physical self-worth (T1 to T2):**
 - First study to show the positive role of apps on physical self-perceptions
 - BCTs that enhance girls' (but not boys') physical self-perceptions upon app utilization
 - Unstable effect of apps

- **Negative reciprocal associations between body dissatisfaction and physical self-worth between the T2 and T3 assessments in boys:**
 - Interventions that address body dissatisfaction might benefit from components that enhance physical self-concept in boys.

Limitations

- **Apps were not examined separately**
- **App usage based on the frequency of use**
 - Functional (health-promoting) versus dysfunctional (unhealthy weight control behaviors)
- **Other attitudes (e.g. body appreciation, body esteem) not examined**
- **Self-report measures and response characteristics**
- **Inadequate validation of measures**

Conclusion

- **First comprehensive study on the long-term associations between adolescents' attitudes toward their bodies and their mHealth app use**
- **Apps are unlikely to harm adolescents' attitudes toward their body appearance and physical self-worth.**
- **Apps may even contribute to enhancing physical self-worth among adolescent girls.**

WITH SUPPORT OF



**NÁRODNÍ
PLÁN OBNOVY**



**Financováno
Evropskou unií**
NextGenerationEU

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