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Pathways of How Fitness Apps Increase Physical Activity

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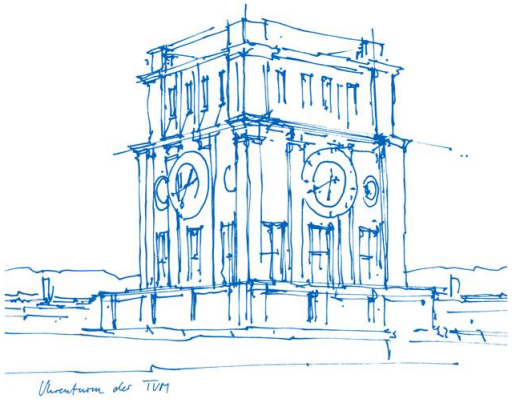

SEP 23, 2020

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1. Background

- There are various health benefits of regular physical activity.

- Health & Fitness Apps:
  - 102,338 in Google Play Store
  - 149,308 in Apple AppStore

- Smartphone apps have the potential to deliver cost-effective interventions to promote physical activity; yet, it remains largely unknown what the mechanisms are that promote physical activity via the usage of apps.

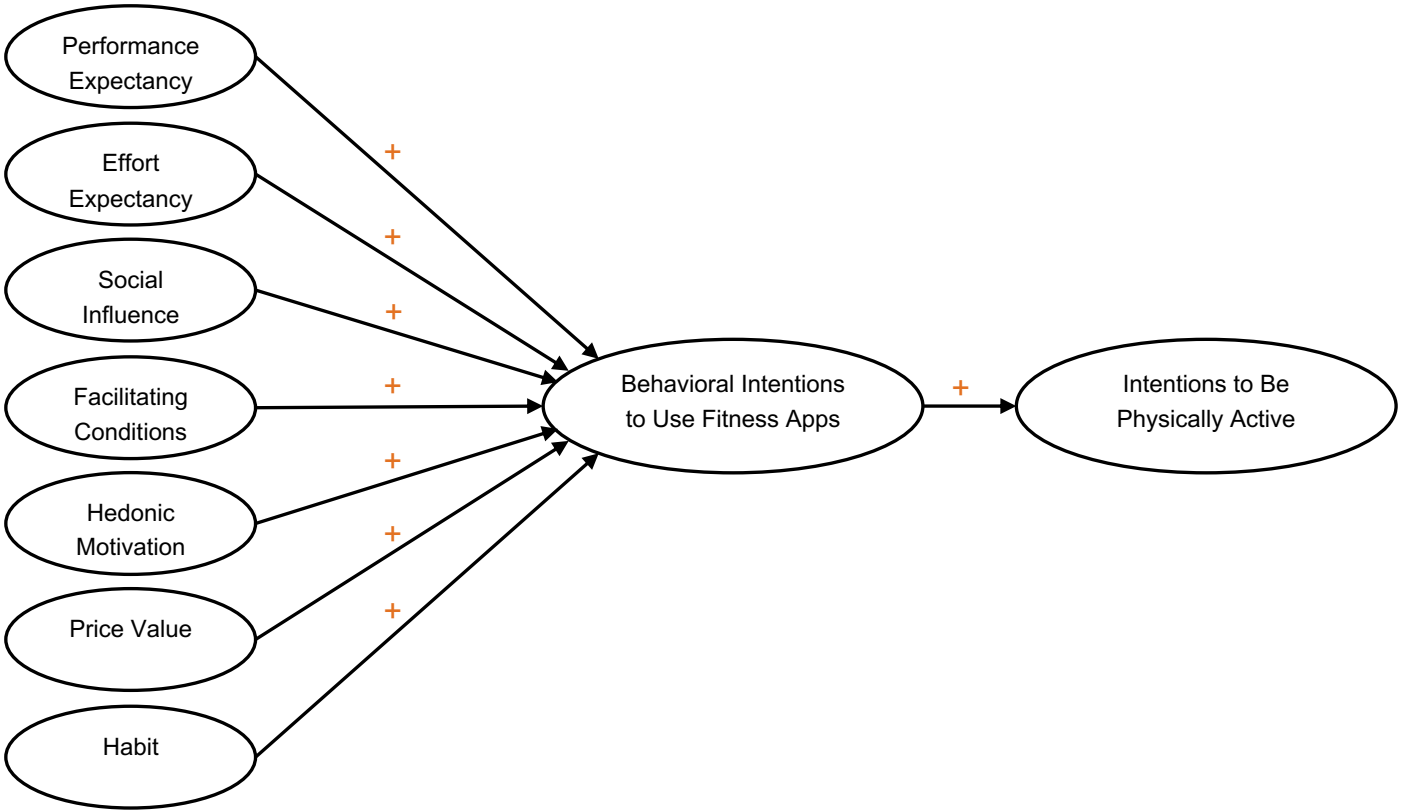
- Previous studies on determinants of intentions to use fitness apps (e.g., TAM, UTAUT2), did not consider downstream effects (e.g., Yuan et al., 2015).

1. Objective

- Theoretical background:
  - The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model (Venkatesh et al., 2012)

- Objective:
  - To examine the relations of the UTAUT2 determinants with individuals' behavioral intentions to use fitness apps;
  - As well as downstream relations of behavioral intentions to be physically active.

1. Hypothesized model



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2. Methods

- Online panel survey via Amazon Mechanical Turk, March 2020.

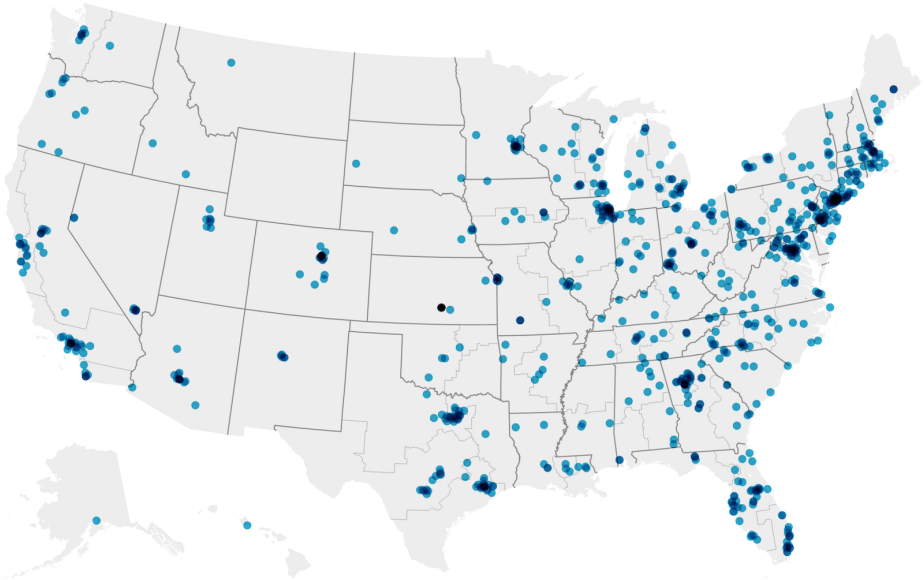
- Inclusion criteria:
  - Healthy individuals (all U.S. residents);
  - Aged 18 and 65 years old;
  - Own a smartphone, having downloaded at least one fitness app.

- Measures:
  - Adaption from Venkatesh et al. (2012): 7 UTAUT2 constructs and behavioral intentions to use fitness apps;
  - Intentions to be physically active were measured by the International Physical Activity Questionnaire (Short Form).

- Statistical analyses:
  - Confirmatory factor analyses; structural equation modelling (bootstrapping mediation);
  - Tool: Rstudio and *lavaan* package, $p < 0.05$ (two-tailed).

2. Methods: Samples (*N* = 867)

- Participants overview at U.S. state-level



Socio-demographics	*N* = 867
Age (years)	36.3 ± 9.3
Gender (F%)	418 (48.2%)
BMI (kg/m^2)	25.5 ± 5.8
Education: Bachelor and above	573 (66.1%)
Marital: Single	336 (39.0%)
Marital: Married	454 (52.0%)
Employed	676 (80.6%)
Ethnicity: White/Caucasian	691 (80.0%)
Income (gross, per year)	
Under $15,000	93 (11.0%)
$15,000-79,999	634 (73.0%)
$80,000 and above	140 (16.0%)

- Participants overview at U.S. state-level

- Priori Power Analysis: by G*Power

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3. Results: Measurement model

- Internal reliability and convergent validity were fulfilled.

	Cronbach's alpha (> 0.7)	Composite Reliability (> 0.7)	AVE (> 0.5)
Performance Expectancy	0.87	0.87	0.70
Effort Expectancy	0.90	0.90	0.68
Social Influence	0.93	0.94	0.83
Facilitating Conditions	0.76	0.77	0.54
Hedonic Motivation	0.91	0.91	0.77
Price Value	0.90	0.90	0.76
Habit	0.80	0.84	0.66
Behavioral Intentions to Use Fitness Apps	0.89	0.89	0.73

AVE: Average Variance Extracted

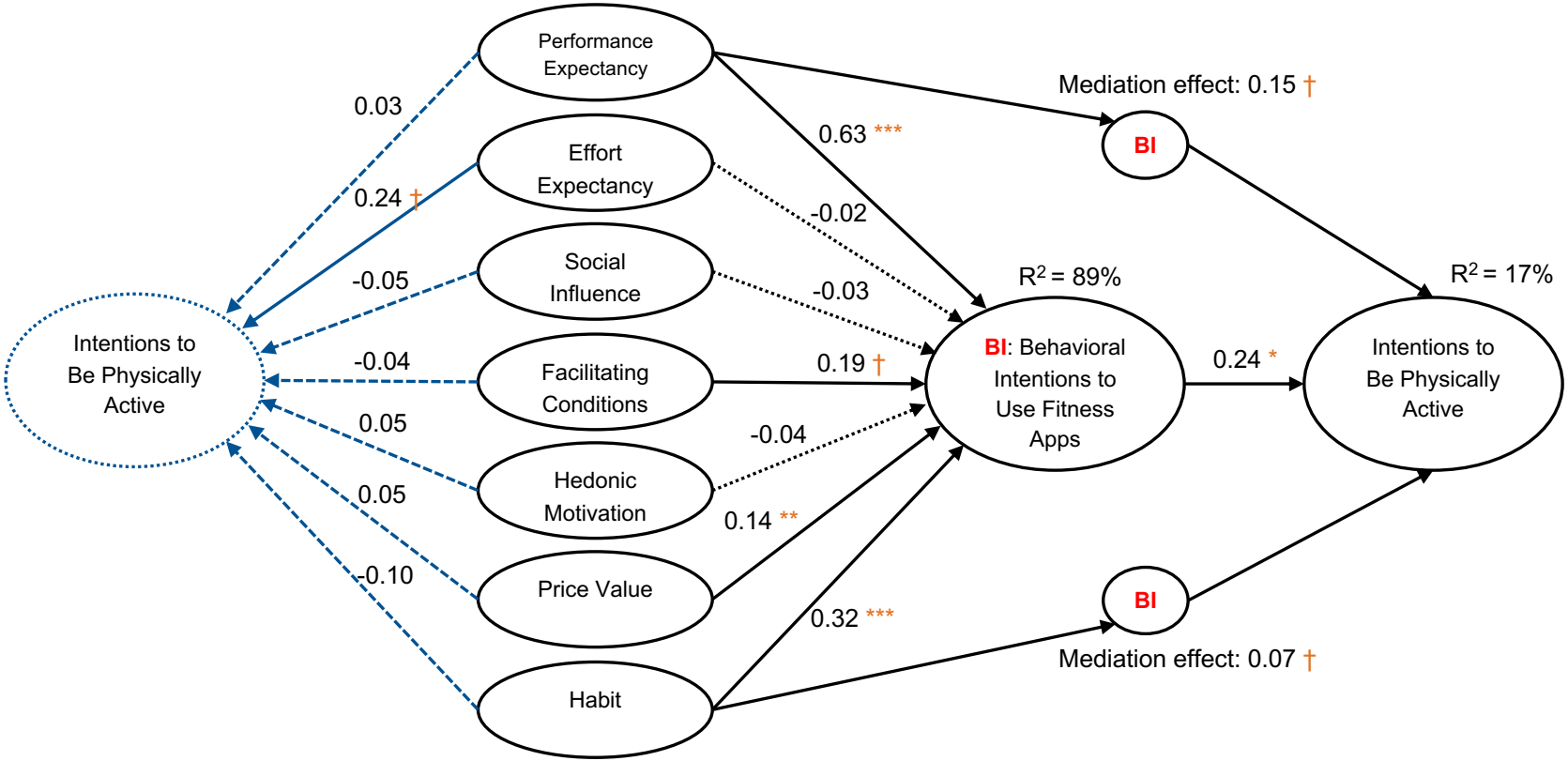
3. Results: Measurement model

- Discriminant validity: the Heterotrait–Monotrait criteria (< 0.85 or < 0.90), fulfilled.

	1	2	3	4	5	6	7	8	9
1. Behavioral Intentions to Use Fitness Apps	-								
2. Intentions to be Physically Active	-	-							
3. Performance Expectancy	0.89	-	-						
4. Effort Expectancy	0.64	-	0.65	-					
5. Social Influence	0.41	-	0.46	0.18	-				
6. Facilitating Conditions	0.68	-	0.68	0.89	0.31	-			
7. Hedonic Motivation	0.61	-	0.67	0.44	0.54	0.55	-		
8. Price Value	0.48	-	0.41	0.63	0.06	0.67	0.26	-	
9. Habit	0.80	-	0.75	0.34	0.62	0.42	0.66	0.18	-

3. Results: Structural model

† p < 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001



Satisfactory model fit (χ2/df = 912.86/264, p < .001, CFI = .976, TLI = .971, SRMR = .064, RMSEA = .053)

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4. Discussion

- Performance expectancy, price value, facilitating conditions, and habit are positive predictors of intentions to use fitness apps.

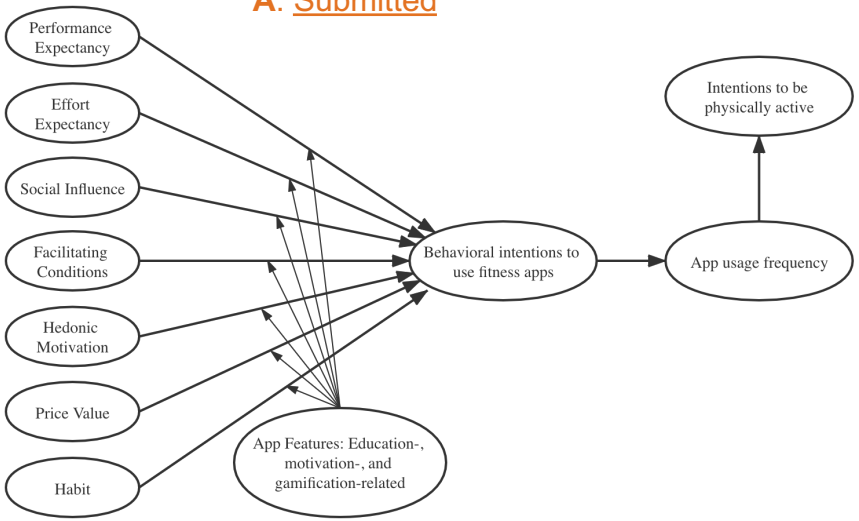
- Intentions to use fitness apps relate positively to the intentions to be physically active, with performance expectancy and habit as marginally significant mediators.

- To conclude: It is crucial that users perceive apps as helpful for achieving their fitness goals, and that users are supported to form routines in using these apps.

- Our further work to assess:
  - Further downstream effects of the reported actual app usage;
  - Moderating effects of app features (i.e., motivation-, education-, and gamification-related features) on intention-behavior relations.

Further work

A: Submitted



B

TBM

ORIGINAL RESEARCH

Determinants of physical activity maintenance during the Covid-19 pandemic: a focus on fitness apps

Yanxiang Yang, Joerg Koenigstorfer

- **A & B**:

Gamification app features are particularly helpful or show strongest effect when interacted with hedonic motivation.

- **Our future study:**

will explore the gamified fitness apps for physical activity.

Selected references

- Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 36(1), 157-178. https://doi.org/10.2307/41410412

- Yang, X., Ma, L., Zhao, X., & Kankanhalli, A. (2020). Factors influencing user's adherence to physical activity applications: A scoping literature review and future directions. *International Journal of Medical Informatics*, 134, 104039. https://doi.org/10.1016/j.ijmedinf.2019.104039

- Yuan, S., Ma, W., Kanthawala, S., & Peng, W. (2015). Keep using my health apps: Discover users' perception of health and fitness apps with the UTAUT2 model. *Telemedicine Journal and e-Health*, 21(9), 735-741. https://doi.org/10.1089/tmj.2014.0148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