

Winter, B.L. et al.: Problematic online dating app use and its association with mental and sexual health outcomes in a sample of Men-having-Sex-with-Men

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Supplementary Table S1. German version of the PODAUS.

Items
1. Meine Gedanken kreisen ständig um Online Dating Apps.
2. Online Dating Apps sind für mich eine Möglichkeit, meine Probleme zu vergessen.
3. Ich verbringe mehr Zeit auf Online Dating Apps, als ich eigentlich vorhatte.
4. Wenn ich längere Zeit keine Online Dating Apps verwenden kann (aus technischen, beruflichen oder sozialen Gründen), werde ich unruhig und nervös.
5. Ich habe andere Hobbies oder Freizeitaktivitäten aufgegeben oder stark eingeschränkt, um mehr Zeit auf Online Dating Apps verbringen zu können.
6. Ich habe bereits versucht, Online Dating Apps weniger zu benutzen, habe es aber nicht geschafft.

Supplementary Table S2. Descriptive statistics and English translation of German PODAUS (N=226).

Component	Item	<i>M</i>	<i>SD</i>	Skew-ness	Kurto-sis	Item discr.
Salience	My thoughts are constantly revolving around dating apps.	1.41	0.59	1.26	1.25	0.53
Mood modification	Dating apps are a way for me to forget my problems.	1.79	0.85	0.54	-1.06	0.51
Tolerance	I spend more time on dating apps than I intended to.	2.66	0.94	-0.53	-0.62	0.57
Withdrawal	If I can't use dating apps for a long time (for technical, professional, or social reasons), I become restless and nervous.	1.65	0.76	0.92	0.12	0.49
Conflict	I have given up or greatly reduced other hobbies or leisure activities to spend more time on dating apps.	1.52	0.70	1.29	1.44	0.61
Relapse	I have tried to cut down my dating app use but have not succeeded.	1.89	0.83	0.49	-0.66	0.60
Total score		10.93	3.31	0.46		

***Note.** *M*=Mean; *SD*=Standard deviation; Item discr=item discrimination

Supplementary Table S3. Distribution of response percentages for each PODAUS item

Items	1 (do not agree at all)	2 (do not agree)	3 (agree)	4 (agree completely)
Saliency	63.7	31.9	4.0	.4
Mood modification	47.4	27.4	23.9	1.3
Tolerance	17.3	14.0	51.8	15.9
Withdrawal	50.4	35.4	12.4	1.8
Conflict	58.0	33.6	6.6	1.8
Relapse	37.6	38.5	21.2	2.7

Supplementary Material S4: Item Development PODAUS

Instrument development and validation were grounded on the framework by Boateng et al., 2018 and encompassed item development, scale development, and scale evaluation. Item development and formulation were based on (a) deductive systematic literature search, identifying pre-existing evidence from similar areas of research (such as the Facebook Addiction Questionnaire (Andreassen et al., 2012), the Problematic Tinder Usage Scale (Orosz et al., 2016), the Internet Gaming Disorder scale (Rehbein et al., 2015); criteria for gaming, gambling addiction as well as substance use disorder (DSM-V; ICD-11; (Castro-Calvo et al., 2021), as well as the DSM-V criteria for substance use disorder; and (b) inductive focus group interviews from five MSM including SwissPrEPared participants and health care personnel from the Checkpoint Zurich.

Scale development included item reduction, prioritizing brevity, and non-redundancy while emphasizing clinical applicability for primary care settings without requiring specialized training. Content validity was confirmed through consensus by a multidisciplinary team comprising psychologists, clinicians, sociologists, addiction specialists, public health researchers, and representatives from the target population.

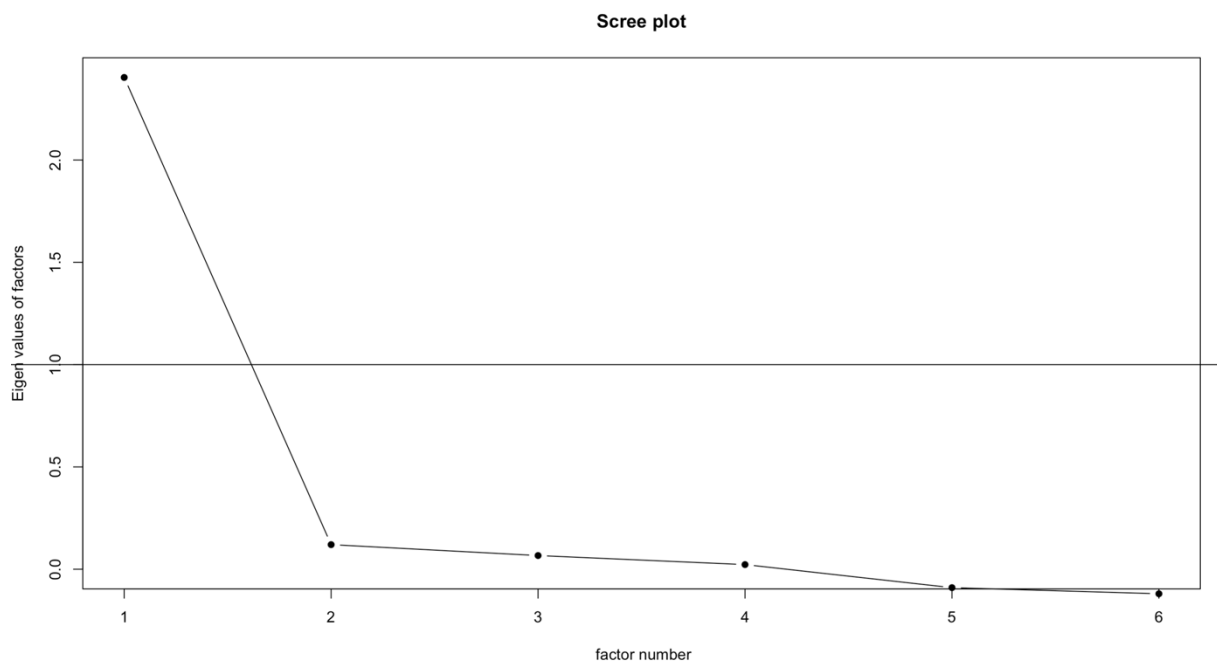
The final 20-item scale underwent pretesting (N=10), refinement based on participant feedback, and piloting to evaluate feasibility and clinical utility (N=29). An EFA on the developed 20-item PODAUS initially failed to yield a clear factor structure due to inadequate factor loadings, model fit, and lack of interpretability. Subsequent confirmatory factor analysis (CFA) of the same original 20-item scale confirmed poor fit, necessitating scale revision of PODAUS into a unidimensional 6-item scale, guided by Griffiths' (2005) biopsychosocial model of addiction.

Supplementary Table S5. Evaluations of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analyses (CFA) with geomin (oblique) rotation and MLR estimator ($N=226$).

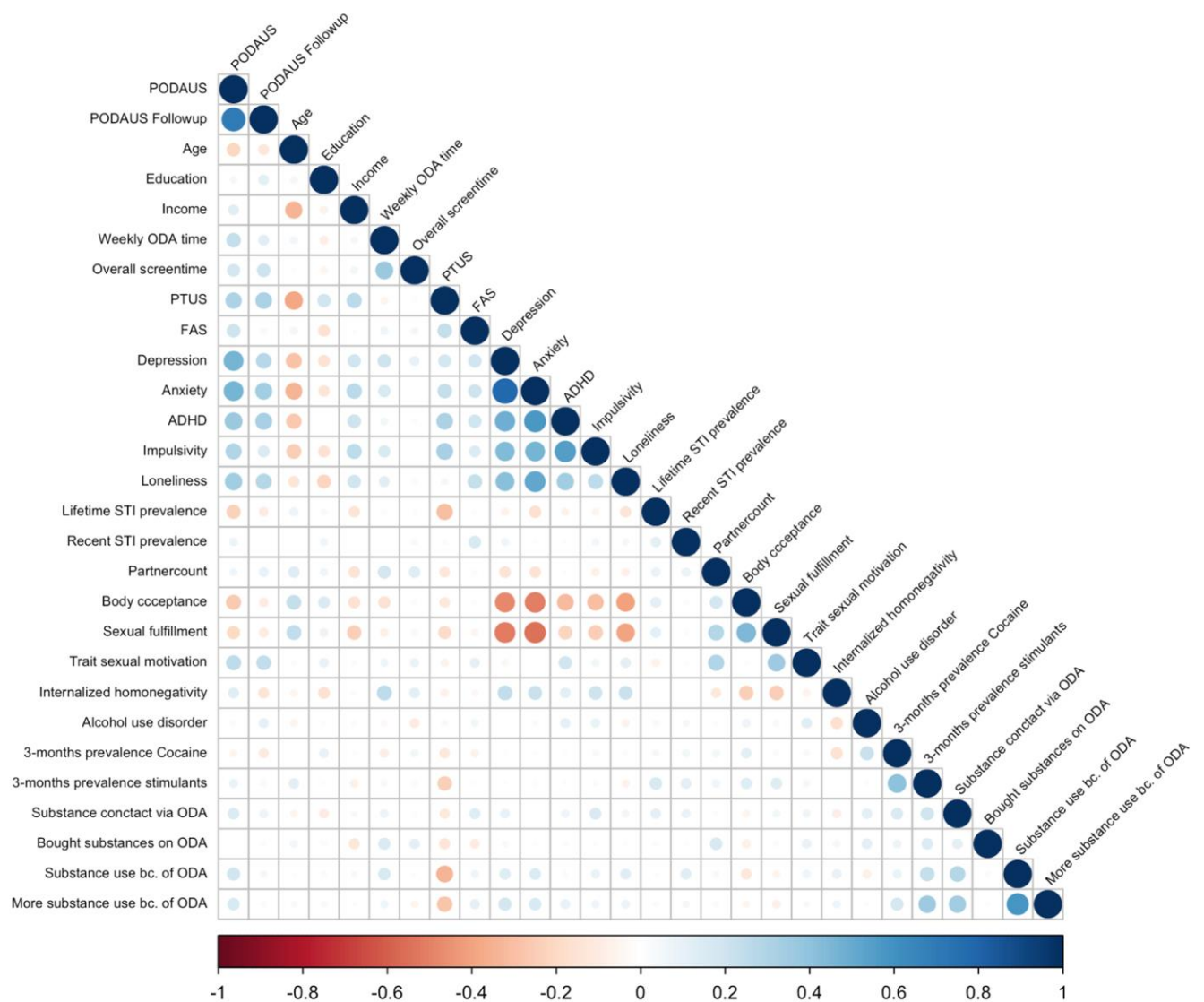
Model	χ^2	df	RMSEA	CFI	TLI	SRMR	CR
			[90% CI]				
M1: EFA 6 items BL	12.66	9	.04 [0.00, 0.92]		.98		
M2: CFA 6 items BL	12.92	9	.04 [0.00, 0.00]	.99	.99	.03	.79

**Note.* BL=Baseline, Df=degrees of freedom, RMSEA=Root Mean Square Error of Approximation, CFI=Comparative Fit Index, TLI=Tucker Lewis Index, SRMR=standardized root mean square residual (SRMR), CR=Composite Reliability (Omega). The data's suitability for factor analysis was supported by a KMO value of 0.84 and a statistically significant Bartlett's test ($\chi^2=57.57$, $df=5$, $p<0.001$), meeting the criteria for data appropriateness for EFA as outlined by Mulaik (2009). A unifactorial structure was suggested by Scree-Plot and Eigenvalue analysis (see Supplementary Figure S6.)

Supplementary Figure S6. Scree Plot of PODAUS ($N=226$)



Supplementary Fig. S7. Heatmap of Spearman's Rank Correlation Matrix for Pairwise Complete Observations of PODAUS with All Outcomes ($N=226$)



Supplementary Table S8. Summary of multiple regression results of PODAUS on all outcomes variables.

Outcome	Type	Predictors	B	CI (LL, UL)	R ²	f ²	p
Mental health							
Depression	WLS	(Intercept)	10.96	0.71, 21.22	.24	.32	.036
		PODAUS	1.00	0.70, 1.30			<.001
		Age	-0.07	-0.14, 0.01			.080
		Education	-2.96	-5.34, -0.58			.015
Anxiety	WLS	(Intercept)	45.46	33.15, 57.78	.30	.43	<.001
		PODAUS	1.39	1.01, 1.78			<.001
		Age	-0.22	-0.33, -0.11			<.001
		Education	-3.72	-6.51, -0.94			.009
ADHD	WLS	(Intercept)	7.00	-1.58, 15.57	.17	.21	.109
		PODAUS	0.82	0.52, 1.12			<.001
		Age	-0.11	-0.20, -0.03			.010
		Education	0.10	-1.80, 2.01			.914
Impulsivity	WLS	(Intercept)	29.29	22.97, 35.62	.15	.18	<.001
		PODAUS	0.51	0.30, 0.72			<.001
		Age	-0.08	-0.14, -0.02			.012
		Education	-1.20	-2.61, 0.22			.097
Loneliness	OLS	(Intercept)	3.25	1.50, 5.00	.20	.25	<.001
		PODAUS	0.17	0.11, 0.23			<.001
		Age	-0.00	-0.02, 0.02			.831
		Education	-0.91	-1.30, -0.53			<.001
Substance Use							
Problematic Alcohol Use	WLS	(Intercept)	5.14	0.48, 9.80	.00	.00	.031
		PODAUS	0.05	-0.13, 0.22			.604
		Age	-0.01	-0.06, 0.04			.704
		Education	0.11	-0.92, 1.15			.833
Nicotine Weekly Use	OLS	(Intercept)	13.09	3.77, 22.41	.02	.02	.006
		PODAUS	-0.12	-0.44, 0.19			.447
		Age	-0.02	-0.11, 0.08			.709
		Education	-1.87	-3.93, 0.20			.076
Cannabis Weekly Intake	OLS	(Intercept)	0.80	-0.43, 2.03	.03	.03	.200
		PODAUS	-0.02	-0.06, 0.03			.467
		Age	0.01	-0.00, 0.02			.112
		Education	-0.23	-0.50, 0.04			.094
3-Month Prevalence Cocaine	OLS	(Intercept)	-0.33	-3.01, 2.36	.01	.01	.810
		PODAUS	-0.01	-0.11, 0.08			.745
		Age	-0.01	-0.04, 0.02			.477
		Education	0.44	-0.25, 1.04			.143

Supplementary Table S8. Summary of multiple regression results of PODAUS on all outcomes variables.

Outcome	Type	Predictors	B	CI (LL, UL)		R ²	f ²	p
3-Month Prevalence Non-Cocaine Stimulants	OLS	(Intercept)	-0.07	-4.41,	4.26	.00	.00	.974
		PODAUS	0.06	-0.09,	0.20			.446
		Age	0.01	-0.04,	0.05			.704
		Education	0.00	-0.96,	0.96			.997
3-Month Prevalence GHB	OLS	(Intercept)	-0.08	-2.11,	1.95	.01	.01	.940
		PODAUS	0.07	-0.03,	0.16			.159
		Age	0.01	-0.02,	0.04			.609
		Education	-0.06	-0.26,	0.13			.512
Sexual health								
Lifetime Prevalence STI	LogR	(Intercept)	1.92	0.52,	107.54	.06	6.83 ^a	.152
		PODAUS	-0.15	0.78,	0.94		0.86	.001
		Age	0.01	0.98,	1.03		1.01	.652
		Education	0.06	0.58,	1.88		1.07	.826
6 Months STI Prevalence (N=202)	PLR	(Intercept)	0.00	0.00,	0.35	.02	0.00 ^b	.037
		PODAUS	1.12	0.99,	1.27		1.12	.076
		Age	1.01	0.97,	1.05		1.01	.769
		Education	1.66	0.64,	6.83		1.66	.388
Sex Motivation	OLS	(Intercept)	1.54	0.59,	2.50	.09	.09	.002
		PODAUS	0.07	0.04,	0.11			<.001
		Age	0.01	-0.00,	0.02			.169
		Education	0.07	-0.15,	0.28			.546
DKB: Body Acceptance	OLS	(Intercept)	22.26	15.31,	29.20	.14	.16	<.001
		PODAUS	-0.47	-0.70,	-0.23			<.001
		Age	0.10	0.03,	0.17			.006
		Education	1.76	0.22,	3.30			.025
DKB: Sexual Fulfillment	WLS	(Intercept)	20.34	15.13,	25.55	.10	.11	<.001
		PODAUS	-0.21	-0.38,	-0.05			.010
		Age	0.08	0.03,	0.12			.001
		Education	0.60	-0.57,	1.77			.312

Note. LL=Lower limit, UL=Upper limit, WLS=Weighted least squares, OLS=Ordinary least squares, LogR=Logarithmic regression, PLR=Polynomial Logistic Regression, ^a=Odd's ratio, ^b=Incidence rate ratio.