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FULL-LENGTH REPORT



# The impact of life satisfaction in the treatment of gaming disorder and other internet use disorders: Results from a randomized controlled trial

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## ABSTRACT

**Objective:** According to ICD-11 gaming disorder is currently defined as a behavioral addiction. While our understanding of crucial aspects of this new condition including other subtypes of internet use disorders is growing, less is known about treatment strategies and their effectiveness. Particularly, dimensions of life satisfaction and their meaning for internet use disorders are poorly investigated. The aim of this study was addressing the role of life satisfaction dimensions in a randomized controlled trial. We examined life satisfaction as an additional treatment outcome and investigated in how far life satisfaction is predictive for symptom reduction and related to personality traits. **Methods:** A multicenter randomized controlled trial with three measure points (baseline, post-treatment, 6-month follow-up) was conducted based on  $N = 143$  patients aged 17 and above meeting diagnostic criteria for internet use disorders. A cognitive-behavioral disorder specific intervention was applied in  $n = 72$  and compared to a wait list control ( $n = 71$ ). Endpoints included symptoms of internet use disorders, psychosocial functioning, and life satisfaction. Personality traits were assessed as moderating factors. **Results:** Life satisfaction ( $\eta^2 = 0.106$ ) and health satisfaction ( $\eta^2 = 0.173$ ) significantly increased in the intervention group with large effect sizes. Decreasing symptoms of internet use disorders at follow-up were predicted by life satisfaction at post-treatment ( $\beta = -0.51$ ) with extraversion ( $B = 1.606$ ) and openness ( $B = 2.069$ ) moderating this association. **Conclusion:** Life satisfaction yields additional value as a secondary treatment outcome in internet use disorders and can be therapeutically addressed in order to stabilize treatment effects in the long run. Our study indicates that existing treatment strategies might benefit from explicitly addressing and enhancing psychosocial resources in order to prevent relapses in patients.

## KEYWORDS

gaming disorder, internet use disorders, life satisfaction, randomized controlled trial, personality traits

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## INTRODUCTION

Gaming Disorder (GD) has been recognized as a major health issue during the past decade. Growing understanding of its underlying mechanisms and its harmful mental health effects



has encouraged the World Health Organization (WHO, 2019) to include it as a new diagnosis in the upcoming ICD-11. Under the term “internet use disorders” (IUD) other types of excessive and poorly controlled online activities have been discussed, including disordered use of social networks or online-pornography (Brand et al., 2020). These subtypes have not explicitly been recognized in ICD-11 but can be coded in a residual category (“other specified disorders due to addictive behaviors”; WHO, 2019).

A growing body of literature has pointed out that GD and other forms of IUD have adverse effects on mental and physical health. Its negative repercussions on different areas of life have been documented as well, encompassing social isolation, decreasing academic or job related performance, social conflicts, perceived stress, and a negative self-concept (Cheng & Li, 2014; Dreier et al., 2017; Leménager et al., 2013). Heightened psychopathological symptoms and an increased risk for comorbid mental and physical disorders (Carli et al., 2013; Ko, Yen, Yen, Chen, & Chen, 2012; Müller, Beutel, & Wölfling, 2019) are further characteristics of IUD.

Likewise, there is growing evidence that especially GD is sharing core characteristics with substance use disorders in terms of shared symptoms and neurobiological features (Brand et al., 2019; Fauth-Bühler & Mann, 2017). Thus, GD and IUD have also been referred to as internet and computer game addiction (Kuss, Shorter, van Rooij, Griffiths, & Schoenmakers, 2014; Wölfling et al., 2019).

Up to now, empirically based and theory-driven treatment strategies and their effectiveness GD and IUD are understood to a lesser extent. A meta-analysis (Winkler, Dörsing, Rief, Shen, & Glombiewski, 2013) demonstrated that cognitive-behavioral interventions (CBT) had good effects on the symptoms of IUD but a systematic review (King et al., 2017) emphasized that most treatment studies suffer from severe methodological limitations. In a recent, randomized controlled trial, Wölfling et al. (2019) confirmed that a specific CBT-program yielded high effects in the treatment of IUD and associated symptoms like anxiety and psychosocial functioning.

One point still missing regards the investigation of additional predictors of recovery and symptom reduction in patients suffering from IUD. As has been depicted above, clinical trials have demonstrated that IUD patients display improvement in psychopathological symptoms but to our knowledge, changes in positive outcomes caused by treatment effects have not yet been investigated. This is puzzling since positive outcomes, like for example psychological wellbeing have been shown to independently impact mental health and even recovery from mental disorders (Fava & Sonino, 2000).

Psychological wellbeing represents a combination of experiencing positive affective states and the subjective perception of being capable to perform well in different areas of life. Life satisfaction is thought to be one crucial part of wellbeing, representing its cognitive component (Deci & Ryan, 2008). For both constructs, first empirical data are available for IUD. Results of a meta-analysis revealed that

decreased life satisfaction was significantly related to higher IUD prevalence worldwide (Cheng & Li, 2014). Yet, research on life satisfaction and IUD is scarce and mainly based on cross-sectional studies. This leaves clinically relevant questions unresolved. For example, there is some evidence that explicitly addressing wellbeing in the treatment of substance-use disorders can endorse positive effects on the maintenance of abstinence (DeLucia et al., 2016; McGaffin, Deane, Kelly, & Ciarrochi, 2015). Consequently, enhancing wellbeing has been called for as an integral part of psychotherapy (Fava & Sonino, 2000; SAMHSA, 2021).

In Gambling Disorder first insights on the changes of wellbeing and its effects on recovery have been reported as well (Müller, Dreier, et al., 2017; Müller, Naab, et al., 2017). Results indicate that changes in wellbeing act as independent outcome variables and that increases in some wellbeing dimensions are associated to higher rates of abstinence one year after treatment.

Lately, the impact of personality traits on treatment outcomes has gained growing attention by clinicians (Bucher, Suzuki, & Samuel, 2019). Traits are influencing the way we behave and perceive our environment. Thus, it has been argued that these traits are activated during treatment by either fostering or impairing the treatment process. Indeed, a recent meta-analysis has demonstrated that for instance high extraversion and conscientiousness were related to responding better towards psychotherapy in terms of decreased psychopathological symptoms and abstinence from substance use (Bucher et al., 2019). However, research on the specific pathways on how personality traits are influencing treatment outcome are largely missing.

Our research questions addressed the role of various dimensions of life satisfaction in the treatment of IUD. We aimed to evaluate, if life satisfaction is increased by a standardized treatment program for IUD (STICA; Short-term treatment for Internet and Computer game Addiction; Wölfling et al., 2019; Wölfling, Müller, Dreier, & Beutel, 2020) and thus can be recognized as an additional indicator of treatment efficacy. Secondly, we were interested if life satisfaction is indicative for remission of IUD symptoms six months after treatment. Thirdly, we aim to investigate the role of personality traits on treatment outcomes by investigating their potential moderating effect on the relationship between life satisfaction and IUD symptoms. Such moderating effects have been discussed before (Eklund, Bäckström, & Hansson, 2003).

## AIMS OF THE STUDY

Given the lack of previous studies, our research questions are of exploratory nature. However, treatment studies on substance related and other mental disorders have shown that life satisfaction can be enhanced by psychological interventions and affect treatment outcomes (DeLucia et al., 2016; Müller, Dreier, et al., 2017; Müller, Naab, et al., 2017). Thus, we expect to find increases in life satisfaction in the intervention group compared to the control group.



We further expect to find positive relationships between increases in life satisfaction and decreasing symptoms in IUD patients. Lastly, personality traits, especially high extraversion, have been found to be positively related to life satisfaction (DeNeve & Cooper, 1998; Ruini et al., 2003). Therefore we hypothesize that high extraversion acts as a moderator on the associations between life satisfaction at post-treatment and IUD symptoms six month later. Moreover, we included conscientiousness and openness as additional personality traits in our analyses. It has repeatedly been demonstrated that decreased conscientiousness is a robust correlate of IUD (Akbari et al., 2021; Kayış et al., 2016). Yet, its specific trajectories on the disorder are not fully understood. Thus, we were interested in investigating potential effects of this trait as a moderating variable between life satisfaction and treatment outcome. We also decided to analyze the effects of openness. Openness is generally predictive of being curious and prepared to try out new things (e.g. activities or experiences). Enhancing alternative activities in patients with IUD is one crucial aspect of the treatment program STICA. Thus, we hypothesized that higher openness might act as a catalyzer for a more positive treatment response.

## MATERIALS AND METHODS

### Study participants and data collection

Data analyses were based on the clinical population enrolled in the clinical trial STICA (Short-term Treatment for Internet and Computer game Addiction; Jäger et al., 2012; Wölfling et al., 2019). This multicenter trial encompassed a total of  $n = 143$  male patients aged 17 years or older with diagnosed IUD as the primary mental disorder (for details of the study protocol cf. Jäger et al., 2012). Recruitment and treatment took place at specialized outpatient clinics at the university medical centers of Mainz, Tübingen, Mannheim, and Vienna. The majority of patients reported addictive use of online computer games (62.9%), online-pornography (16.5%), and undifferentiated IUD (20.9%). Patients who met inclusion criteria were cluster randomized to either an experimental group where they received the standardized treatment program immediately (STICA) or to a wait list control (WLC). Different primary, secondary, and moderating factors were assessed at different time points (baseline ( $t_0$ ), mid-treatment ( $t_1$ ), post-treatment ( $t_2$ ), and six-month-follow-up ( $t_3$ )). For baseline the group sizes amounted to  $n = 72$  (STICA) and  $n = 71$  (WLC), for post-treatment:  $n = 46$  (STICA) and  $n = 53$  (WLC), and follow-up that was only performed for STICA-group  $n = 36$ . Table 1 displays sociodemographic measures and baseline scores for both groups.

The clinical trial was registered (NCT01434589) and all participants provided written informed consent. The study was approved by the ethics committees (Ref. No. 837.316.11 (7858)) and was in accordance with the Declaration of Helsinki. According to a standardized protocol,

Table 1. Sociodemographic and baseline variables in the population of treatment seekers

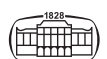
Demographics and baseline variables	STICA ( $n = 72$ )	WLC ( $n = 71$ )	Statistical comparison
Age; $M$ ( $SD$ )	26.2 (8.66)	26.2 (6.94)	ns
Education; $n$ (%)			
At school	7 (9.7)	3 (4.2)	ns
9th grade	9 (12.5)	4 (5.6)	
10th grade	10 (13.9)	21 (29.6)	
>10th grade	44 (61.1)	42 (59.2)	
No graduation	1 (1.4)	0 (0.0)	
Occupational status; $n$ (%)			
Full/part time	22 (30.6)	27 (36.0)	ns
Unemployed	14 (19.4)	13 (18.3)	
Traineeship	18 (25.0)	14 (19.7)	
School/university	17 (23.6)	17 (23.9)	
Retired	1 (1.4)	0 (0.0)	
Marital status; $n$ (%)			
Single	65 (90.3)	63 (88.7)	ns
Married	5 (6.9)	7 (9.9)	
Divorced/separated	2 (2.8)	1 (1.4)	
Baseline measures; $M$ ( $SD$ )			
AICA-S	13.1 (3.8)	12.7 (4.1)	ns
GAF	69.3 (10.0)	69.5 (9.5)	ns
BDI-II	13.9 (9.5)	15.4 (8.7)	ns
FLZM: Health Satisfaction	27.8 (5.43)	25.9 (5.14)	$t(141) = 2.15$ , $P = 0.033$
FLZM: Health Importance	30.4 (4.56)	30.1 (5.21)	ns
FLZM: Life Satisfaction	23.5 (6.19)	22.4 (5.01)	ns
FLZM: Life Importance	27.8 (4.48)	27.6 (5.11)	ns
NEO-FFI: Extraversion	1.9 (0.54)	1.9 (0.43)	ns
NEO-FFI: Openness	2.4 (0.50)	2.6 (0.60)	ns
NEO-FFI: Conscientiousness	1.9 (0.54)	1.9 (0.61)	ns

Note.  $N = 143$ ;  $M$  = mean;  $SD$  = standard deviation; ns = not significant ( $P > 0.05$ ); STICA = treatment; WLC = wait list control group; AICA-S = Scale for the Assessment of Internet and Computer game Addiction; GAF = Global Assessment of Functioning; BDI-II = Beck Depression Inventory II; FLZM = Life Satisfaction Questionnaire; NEO-FFI = NEO-Five-Factor-Inventory;  $t(df) = t$ -value and degrees of freedom;  $P$  = level of significance.

serious adverse events were reported within 24 h to the Interdisciplinary Center for Clinical Trials (IZKS) that was also responsible to assure patient safety and took care of the data monitoring.

### Experimental conditions

Participants meeting inclusion criteria were cluster randomized to one of two groups, either STICA or WLC. STICA represents a standardized and manualized treatment program specifically developed for treating GD and other types of IUD



(Wölfling et al., 2020). This cognitive-behavioral program encompasses 15 weekly group sessions centered on a specific topic with relevance for IUD. Examples for those topics are “motivational interventions”, “definition of individual goals”, “social skill trainings”, “behavioral analyses”, “development of individualized models of IUD”, “relapse prevention” etc. Group sessions are accompanied by eight individual sessions. Participants of the WLC also received STICA treatment after a waiting period of 15 weeks.

## Measurements

The classification of IUD was based on AICA-S (Scale for the Assessment of Internet and Computer game Addiction; Wölfling et al., 2020). This self-report covers core criteria of IUD according to the DSM-5 and has been validated in previous studies (cf. King et al., 2020).

The self-report FLZM (Life Satisfaction Questionnaire; Henrich & Herschbach, 2000) assesses general quality of life (regarding eight different aspects, e.g. friends, health, employment) and health-related quality of life. For both aspects, the subscales importance and subjective satisfaction are addressed separately in 8 items (on 5-point Likert scales). It is a widely used instrument in Germany and its psychometric properties and validity have been evaluated (Daig et al., 2011; Henrich & Herschbach, 2000).

The BDI-II (Beck Depression Inventory-II; Beck, Steer, & Brown, 1996) was used for assessing depressive symptoms that are assessed by 21-items on 4-point Likert scales.

From the Five-Factor-Model of Personality, the traits extraversion, openness, and conscientiousness were included in this study. These were assessed using the NEO-FFI (NEO-Five-Factor-Inventory; Costa & McCrae, 1992). Each factor is operationalized with 12 items that are answered on a 5-point-Likert scale. NEO-FFI is a commonly used self-report with sound psychometric properties (Murray, Rawlings, Allen, & Trinder, 2003).

To assess psychosocial functioning, the Global Assessment of Functioning (GAF; APA, 2000) was applied. This expert rating ranges from 0 to 100 and allows for a reliable evaluation of the degree of impairment in psychological, social, and occupational aspects (Söderberg, Tungström, & Armelius, 2005).

## Statistical analyses

Simple group differences (STICA vs. WLC) were analyzed using *t*-tests for independent samples. Within STICA, changes of criteria variables through the course of the intervention (baseline, post-treatment, follow-up) were determined using repeated ANOVAs. For evaluating the influence of different variables on the criterion variable, we used stepwise multiple linear regression analyses. In order to also test the moderating influence of personality traits, moderated regression models were performed with Johnson-Neyman-Test of significant regions as a follow-up-measure. Missing data at post-treatment were modelled according to

the method last-observation-carried-forward, while at follow-up only complete cases were used without replacing missing data.

## Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. The Institutional Review Board of the local ethics committees approved the study (Ref. No. 837.316.11 (7858)). All subjects were informed about the study and all provided informed consent. Additional parental consent was sought for those younger than 18 years of age.

## RESULTS

### Life satisfaction as a treatment outcome

In order to allow for a direct comparison of STICA vs. WLC, *t*-tests were performed for the increment (post-treatment – baseline) of each life satisfaction dimension. Higher increments in STICA were found for life satisfaction ( $t(97) = 2.05, P = 0.043; d = 0.396$ ) and health satisfaction ( $t(97) = 2.18, P = 0.032; d = 0.430$ ).

Next, we analyzed within-subjects changes of life satisfaction dimensions through the course of treatment. Table 2 displays the results of repeated measure ANOVAs (baseline, post-treatment, follow-up) for the STICA-group and results from *t*-tests (baseline vs. post-treatment) for the WLC.

For each dimension, significant increases with medium ( $\eta^2 = 0.06$ – $0.13$ ) to large ( $\eta^2 > 0.13$ ) effect sizes were found over the course of treatment. Significant changes took place only between baseline and post-treatment. In contrast, no changes occurred for the WLC except for health satisfaction that showed a small increase.

### Predictors of increased life satisfaction

We were further interested in investigating factors influencing increases of life satisfaction after treatment (STICA-group only). To that purpose, we modelled multiple stepwise regression analyses to predict life satisfaction dimensions at post-treatment. As predictors, age was entered in step 1, personality traits in step 2, level of functioning and depressive symptoms in step 3.

For life satisfaction importance step 3 of the model was significant ( $F(6) = 3.89, P = 0.002, R^2 = 0.196$ ) with extraversion as the only significant predictor ( $B = 3.25, SE B = 0.96, \beta = 0.399$ ). For life satisfaction step 2 ( $F(4) = 3.86, P = 0.007, R^2 = 0.139$ ) and step 3 ( $F(6) = 4.25, P = 0.001, R^2 = 0.216; \Delta R^2 = 0.095, P = 0.018$ ) yielded significant models with extraversion ( $B = 3.40, SE B = 1.48, \beta = 0.279; P = 0.025$ ) and BDI-score ( $B = -0.207, SE B = 0.08, \beta = -0.296; P = 0.008$ ) as significant predictors.

A further significant model was found for health satisfaction (step 2:  $F(4) = 4.93, P = 0.002, R^2 = 0.181$ ; step 3:  $B = 4.44, SE B = 1.18, \beta = 0.438; R^2 = 0.393; \Delta R^2 = 0.217; P = 0.001$ ). Again extraversion ( $B = 3.24, SE B = 1.08,$



Table 2. Within-subjects comparison of changes in life satisfaction dimensions over the course of treatment for internet use disorders

Life Satisfaction dimensions and group	Measure point (time)			Repeated ANOVA/ <i>t</i> -test
	<i>t</i> 0 M (SD)	<i>t</i> 2 M (SD)	<i>t</i> 3 M (SD)	
<i>Life Satisfaction</i>				
STICA	23.5 <sup>a</sup> (6.19)	24.9 <sup>b</sup> (6.62)	25.0 <sup>b</sup> (6.70)	$F(2,121) = 8.40, P = 0.001, \eta^2 = 0.106$
WLC	22.4 (5.01)	22.8 (5.89)	n.a.	<i>ns</i>
<i>Life Satisfaction (Importance)</i>				
STICA	27.8 <sup>a</sup> (4.48)	29.0 <sup>b</sup> (4.41)	29.0 <sup>b</sup> (4.82)	$F(2,113) = 6.91, P = 0.003, \eta^2 = 0.089$
WLC	27.6 (5.11)	27.6 (5.11)	n.a.	<i>ns</i>
<i>Health Satisfaction</i>				
STICA	27.8 <sup>a</sup> (5.43)	29.7 <sup>b</sup> (5.50)	30.1 <sup>b</sup> (5.82)	$F(2,127) = 14.82, P = 0.001, \eta^2 = 0.173$
WLC	25.9 (5.14)	26.8 (5.41)	n.a.	$t(70) = 2.31; P = 0.024, d = 0.171$
<i>Health Satisfaction (Importance)</i>				
STICA	30.4 <sup>a</sup> (4.56)	31.4 <sup>b</sup> (4.59)	31.3 (4.77) <sup>b</sup>	$F(2,127) = 4.77, P = 0.013, \eta^2 = 0.063$
WLC	30.1 (5.21)	30.5 (4.85)	n.a.	<i>ns</i>

Note. *t*0 = baseline; *t*2 = post-treatment; *t*3 = follow-up; M = mean; SD = standard deviation; F = F-value (ANOVA) with degrees of freedom in brackets; P = P-value (level of significance);  $\eta^2$  = partial eta-square (effect size); *t* = *t*-value; *d* = effect size (Cohen's *d*); different superscripts indicate significant post-hoc-tests ( $P \leq 0.05$ ); STICA = intervention group ( $n = 72$ ); WLC = wait list control ( $n = 71$ ); n.a. = not applicable (*t*3 was not assessed for wait list control).

$\beta = 0.320; P = 0.004$ ) and BDI-score ( $B = -0.249, SE B = 0.06, \beta = -0.430; P = 0.001$ ) as well as GAF ( $B = -0.109, SE B = 0.05, \beta = -0.197; P = 0.050$ ) were significant predictors.

**Life satisfaction as a predictor of decreasing symptoms of internet use disorders**

We were not only interested in life satisfaction as a treatment outcome but also in its role as a predictor of reduced IUD symptoms. Thus, we conducted multiple linear regression analyses in order to predict the degree of IUD symptoms at post-treatment and follow-up (STICA-group only). In the model the four dimensions of life satisfaction at baseline and post-treatment, respectively, entered as predictors along with personality traits. For both approaches, only step 1 yielded significant effects (cf. Tables 3 and 4).

Table 3. Life satisfaction dimensions and personality traits as predictors of symptoms of internet use disorders according to AICA-S at post-treatment

	B	SE B	$\beta$	P
LS-Importance ( <i>t</i> 0)	0.10	0.16	0.13	0.532
LS-Satisfaction ( <i>t</i> 0)	-0.07	0.11	-0.12	0.549
H-Importance ( <i>t</i> 0)	-0.02	0.14	-0.03	0.881
H-Satisfaction ( <i>t</i> 0)	-0.30	0.12	-0.48	0.015
Conscientiousness ( <i>t</i> 0)	-0.77	0.87	-0.12	0.381
Extraversion ( <i>t</i> 0)	-0.77	0.97	-0.13	0.430
Openness ( <i>t</i> 0)	0.57	0.96	0.09	0.560

Comments: N = 72; B = regression coefficient; SE B = standard error of B;  $\beta$  = standardized beta coefficients;  $R^2$  = Explained variance (corrected); P = level of significance; LS = life satisfaction dimension; H = health dimension; *t*0 = baseline; AICA-S = Scale for the Assessment of Internet and Computer game Addiction (criterion).

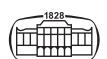
For IUD symptoms at post-treatment a significant model was found with health satisfaction as the only significant predictor ( $F(7) = 4.07, P = 0.002, R^2 = 0.318$ ). In contrast, IUD symptoms at follow-up were exclusively predicted by life satisfaction ( $F(7) = 3.76, P = 0.006, R^2 = 0.362$ ).

In order to further elucidate relationships between life satisfaction at post-treatment and IUD symptoms at follow-up, moderated regression analyses were performed determining potential moderating effects of personality traits (STICA-group only). For extraversion a significant effect was found ( $B = 1.606; SE B = 0.35, P = 0.001; \Delta R^2 = 0.237$ ; Johnson-Neyman-Test:  $P < 0.05$ ). A similar effect was found for openness ( $B = 2.069; SE B = 0.61, P = 0.020; \Delta R^2 = 0.165$ ) with Johnson-Neyman-Test showing a significant ( $P < 0.05$ ) influence of openness on the relation between life satisfaction and IUD symptoms. No effects were found for conscientiousness.

Table 4. Life satisfaction dimensions and personality traits as predictors of symptoms of internet use disorders according to AICA-S at follow-up

	B	SE B	$\beta$	P
LS-Importance ( <i>t</i> 2)	-0.20	0.25	-0.18	0.429
LS-Satisfaction ( <i>t</i> 2)	-0.33	0.15	-0.51	0.033
H-Importance ( <i>t</i> 2)	0.30	0.20	0.32	0.144
H-Satisfaction ( <i>t</i> 2)	-0.03	0.17	-0.04	0.876
Conscientiousness ( <i>t</i> 0)	-1.51	1.37	-0.20	0.281
Extraversion ( <i>t</i> 0)	-0.05	1.57	-0.01	0.977
Openness ( <i>t</i> 0)	-1.00	1.39	-0.14	0.476

Comments: N = 36; B = regression coefficient; SE B = standard error of B;  $\beta$  = standardized beta coefficients;  $R^2$  = Explained variance (corrected); P = level of significance; LS = life satisfaction dimension; H = health dimension; *t*0 = baseline; *t*2 = post-treatment; AICA-S = Scale for the Assessment of Internet and Computer game Addiction.



## DISCUSSION

While research on gaming disorder and other internet use disorders has been proceeding, less is known about factors influencing treatment outcomes in patients. Life satisfaction is a construct of positive psychology that has been demonstrated to be predictive of mental health and also acting as a resilience factor against relapse in addictive disorders (McGaffin et al., 2015; Müller, Dreier, et al., 2017; Müller, Naab, et al., 2017). So far, cross-sectional studies have shown that life satisfaction is decreased among individuals meeting criteria for IUD (Cheng & Li, 2014). Yet, the nature of these relationships is unclear. In this study we took a closer look at different dimensions of life satisfaction and their effects in patients receiving a disorder-specific treatment program for IUD. Firstly, we were interested in assessing, if life satisfaction is increasing during treatment. Secondly, we investigated, if life satisfaction is predictive of remission of IUD symptoms at follow-up and again might be influenced by personality traits.

First of all, we found that among the intervention group dimensions of life satisfaction were increasing through the course of treatment. This was particularly the case for health satisfaction and life satisfaction that yielded large effect sizes. Interestingly, increases were only found immediately after terminating treatment; they afterwards remained stable over the next six months. There was also an increase in health satisfaction among patients of the wait list yet the effect size was negligible. Consequently, increases in life satisfaction and health satisfaction were stronger among patients of the intervention condition.

Not surprisingly, moderate negative effects were found for depressive symptoms on life and health satisfaction at post-treatment. This finding stresses the need for taking comorbid disorders in IUD into consideration and to separately address depression-specific symptoms in IUD treatment in general. This is especially relevant, since depressive disorders are one of the most frequently associated mental disorders in IUD (Carli et al., 2013).

The increase of life satisfaction over treatment is of particular importance since we also found a negative relationship to IUD symptoms at follow-up. Higher life satisfaction immediately after treatment was predictive for decreased IUD symptom severity six months later. One can conclude that successfully addressing life satisfaction as a part of treatment corresponds to benefits in the longer run. Thus, higher life satisfaction can be perceived as a protective factor against recurrence of IUD symptoms with a total of 36% of explained variance. This is consistent with findings on alcohol dependence and gambling disorder (McGaffin et al., 2015; Müller, Dreier, et al., 2017; Müller, Naab, et al., 2017). A potential explanation for this might be seen in the stress-buffering effects of wellbeing and life satisfaction. Generally, it has been argued that high life satisfaction is associated with an optimized biopsychological functioning with wellbeing modulating psychoneuroimmunological responsiveness towards stressful events (Ryff, Singer, & Dienberg Love, 2004).

Vulnerability to stress is one key risk factor for relapse in addictive disorders (Lin, Fried, & Eaton, 2020) and perceived stress has been reported to be increased in IUD (Dreier et al., 2017; Ko et al., 2012). More specifically, high life satisfaction is related to social functioning (e.g. regarding the quality and perceived meaningfulness of social relationships). In many IUD patients, the lack of meaningful (real life) social relationships represents an important theme and social isolation as well as deficits in social skills have repeatedly been documented as correlates of IUD (Festl, Scharkow, & Quandt, 2013; Müller, Dreier, et al., 2017; Müller, Naab, et al., 2017). In some etiological models for IUD, like the Integrative Process Model of Internet Addiction (InPrIA; Wölfling et al., 2019) or the Interaction of Person-Affect-Cognition-Execution model (I-PACE; Brand et al., 2019), difficulties in social contexts are perceived as a maintaining factor for the disorder. Addressing these deficits by established psychotherapeutic methods (e.g. social skills trainings; identification and modification of dysfunctional attachment styles) can be one promising way. Another approach could be applying strategies of enhancing life satisfaction, e.g. by cognitive restructuring or instructed re-evaluation of social relationships.

A second interesting finding regarded the role of health satisfaction. Patients with greater health satisfaction before entering the treatment program showed an improved treatment outcome. This might mean that these patients displayed more favorable resources at the beginning. These resources could serve as positive prognostic factors in profiting from intervention steps. One could also argue that health satisfaction could be a useful variable for treatment indication. Patients with a poorer (subjective and objective) health status might be more in need of a higher treatment intensity. Either in terms of receiving a higher frequency of inpatient contacts or by receiving inpatient treatment.

Finally, we found a moderating effect of extraversion and openness in the relationship between life satisfaction and IUD symptoms at follow-up. For both traits analyses confirmed that negative scores were significantly influencing this association in terms of e.g. low extraversion lowering the buffering effect of life satisfaction on IUD symptoms. Associations between extraversion and life satisfaction have been documented before (Bucher et al., 2019; DeNeve & Cooper, 1998; Ruini et al., 2003). However, empirical insights explaining the more complex interplay as found here are missing. Generally, low extraversion has been discussed as a risk factor for IUD (Kayaş et al., 2016). Extraversion represents a somewhat heterogeneous factor covering facets like assertiveness, optimism but also gregariousness and social dominance. In terms of the social aspects of life satisfaction one could argue that low extraversion might complicate social interactions because individuals are lacking social confidence and trust (Costa & McCrae, 1992). In those IUD patients, the subjective conviction might prevail that - in contrast to virtual social contacts - offline relationships are less appealing or unreliable. This in turn might negatively influence the connection between life satisfaction and treatment outcome. The finding that higher life satisfaction at post-treatment was predicted by high



extraversion is supporting that idea. Similarly low openness is related to rather avoid than actively seek for new experiences. Such experiences can also include establishing new social contacts or novel (social) activities. In that respect, low openness might also impair the beneficial effects of life satisfaction on IUD symptoms.

Our study has some limitations that should be noted. The sample size is small and there was an additional number of patients dropping out from treatment or getting lost to follow up. Thus, the follow-up analyses were based on a reduced sample size of  $n = 36$  which is limiting the interpretation and generalization of the findings. However, we tried to reduce the confounding effect of this circumstance. We analyzed systematic differences in crucial study variables between patients completing treatment and follow-up versus and dropping out or getting lost to follow-up and found no significant differences. Secondly, life satisfaction was assessed by self-reports; an additional external rating of this construct possibly would have yielded additional validity. Lastly, our analyses were restricted to males, which is a general issue in investigations on IUD. There is growing evidence that IUD are related to gender-specific mechanisms in phenomenology and underlying clinical and sub-clinical correlates, i.e. psychopathological symptoms, comorbid disorders, and personality traits (Scherer et al., 2022; Shen et al., 2021; Su, Han, Yu, Wu, & Potenza, 2020). Thus, gender-specific clinical research is needed.

We recommend evaluating our findings in terms of gender-sensitive analyses. Further, a significant difference in health satisfaction was reported regarding the STICA and WLC group at  $t_0$ . Nonetheless, this can be neglected since the development over the course of the treatment process and beyond was focus of this study. Finally, GAF was included as the single indicator of psychosocial functioning. In the DSM-5, GAF has been eliminated and future studies should rather refer to more recently developed indices. Yet, it should be noted that GAF still represents a widely used instrument for the assessment of psychosocial functioning.

As a future research direction, we recommend also investigating the influence of neuroticism and agreeableness on treatment outcomes. We did not include these two traits because we decided in mainly focusing on primary treatment variables. Since we were concerned that having to many questionnaires included in our trial might impair patients in entering the treatment.

Yet, our study has methodological strengths (e.g. randomized controlled design, external data monitoring, clinical diagnostics etc.) and provided novel and relevant insights into causal relationships between predisposing factors and changes in IUD symptoms. Most importantly, we found that life satisfaction is a needful concept to be addressed in psychotherapeutic treatment of IUD. It can serve as an independent treatment goal and is also predictive of the later IUD status. In life satisfaction we can assume a potential resilience factor against relapse in IUD. For future treatment concepts it might be useful to adapt elements of third wave CBT strategies related to wellbeing and life satisfaction. One example for this is the so-called Wellbeing Therapy

(Fava, Rafanelli, Cazzaro, Conti, & Grandi, 1998) that is centered on the patient's awareness of positive life changes and that has proven first promising effects in the treatment of mental disorders (Moeenizadeh & Salagame, 2010). Another example of the benefits of improving life satisfaction was shown in adolescents treated for depression. Raj et al. (2019) applied a mindfulness-based CBT that effectively enhanced psychological functioning and reduced depressive symptoms. Thus, mindfulness-based approaches might also be valuable amendments to existing treatment strategies for IUD.

As a future research direction we recommend investigating the effects of such intervention strategies. In the past years, clinical research on IUD has improved a lot and a growing number of intervention concepts, for instance covering adolescence-specific CBT-programs (Szász-Janocha, Vonderlin, & Lindenberg, 2021) or family-based interventions (Nielsen et al., 2021) have been developed and even been evaluated in pilot trials (Goslar, Leibetseder, Muench, Hofmann, & Laireiter, 2020). This is a positive development and should be extended to further optimize help services for patients suffering from IUD.

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## REFERENCES

- Akbari, M., Seydavi, M., Spada, M. M., Mohammadkhani, S., Jamshidi, S., Jamaloo, A., & Ayatmehr, F. (2021). The big five personality traits and online gaming: A systematic review and meta-analysis. *Journal of Behavioral Addictions*, 10(3), 611–625. <https://doi.org/10.1556/2006.2021.00050>.
- American Psychiatric Association (APA) (2000). *Diagnostic and statistical manual of mental disorders, Fourth Edition, Text Revision (DSM-IV-TR)*. Washington: American Psychiatric Association. <https://doi.org/10.1176/appi.books.9780890420249.dsm-iv-tr>.



- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck depression inventory-II (BDI-II)*. Toronto: The Psychological Corporation, Harcourt Brace. <https://doi.org/10.1037/t00742-000>.
- Brand, M., Rumpf, H. J., Demetrovics, Z., Müller, A., Stark, R., King, D. L., ... Potenza, M. N. (2020). Which conditions should be considered as disorders in the International Classification of Diseases (ICD-11) designation of “other specified disorders due to addictive behaviors”. *Journal of Behavioral Addictions*, 11(2), 150–159. <https://doi.org/10.1556/2006.2020.00035>.
- Brand, M., Wegmann, E., Stark, R., Müller, A., Wölfling, K., Robbins, T. W., & Potenza, M. N. (2019). The Interaction of Person-Affect-Cognition-Execution (I-PACE) model for addictive behaviors: Update, generalization to addictive behaviors beyond internet-use disorders, and specification of the process character of addictive behaviors. *Neuroscience and Biobehavioral Reviews*, 104, 1–10. <https://doi.org/10.1016/j.neubiorev.2019.06.032>.
- Bucher, M. A., Suzuki, T., & Samuel, D. B. (2019). A meta-analytic review of personality traits and their associations with mental health treatment outcomes. *Clinical Psychology Review*, 70, 51–63. <https://doi.org/10.1016/j.cpr.2019.04.002>.
- Carli, V., Durkee, T., Wasserman, D., Hadlaczky, G., Despalins, R., Kramarz, E., et al. (2013). The association between pathological internet use and comorbid psychopathology: A systematic review. *Psychopathology*, 46(1), 1–13. <https://doi.org/10.1159/000337971>.
- Cheng, C., & Li, A. Y. L. (2014). Internet addiction prevalence and quality of (real) life: A meta-analysis of 31 nations across seven world regions. *Cyberpsychology, Behavior, and Social Networking*, 17(12), 755–760. <https://doi.org/10.1089/cyber.2014.0317>.
- Costa, P. T., & McCrae, R. R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment*, 4(1), 5–13. <https://doi.org/10.1037/1040-3590.4.1.5>.
- Daig, I., Spangenberg, L., Henrich, G., Herschbach, P., Kienast, T., & Brähler, E. (2011). Alters- und geschlechtsspezifische Neu-normierung der Fragen zur Lebenszufriedenheit (FLZM) für die Altersspanne von 14 bis 64 Jahre. [Age and gender specific new normative data for the Questions on Life Satisfaction Questionnaire for 14–64 years olds]. *Zeitschrift für Klinische Psychologie und Psychotherapie*, 40(3), 172. <https://doi.org/10.1026/1616-3443/a000099>.
- Deci, E. L., & Ryan, R. M. (2008). Hedonia, eudaimonia, and well-being: An introduction. *Journal of Happiness Studies*, 9(1), 1–11. <https://doi.org/10.1007/s10902-006-9018-1>.
- DeLucia, C., Bergman, B. G., Beitra, D., Howrey, H. L., Seibert, S., Ellis, A. E., & Mizrachi, J. (2016). Beyond abstinence: An examination of psychological well-being in members of Narcotics Anonymous. *Journal of Happiness Studies*, 17(2), 817–832. <https://doi.org/10.1007/s10902-014-9609-1>.
- DeNeve, K. M., & Cooper, H. (1998). The happy personality: A meta-analysis of 137 personality traits and subjective well-being. *Psychological Bulletin*, 124(2), 197. <https://doi.org/10.1037/0033-2909.124.2.197>.
- Dreier, M., Wölfling, K., Duven, E., Giralt, S., Beutel, M. E., & Müller, K. W. (2017). Free-to-play: About addicted whales, at risk dolphins and healthy minnows. Monetization design and internet gaming disorder. *Addictive Behaviors*, 64, 328–333. <https://doi.org/10.1016/j.addbeh.2016.03.008>.
- Eklund, M., Bäckström, M., & Hansson, L. (2003). Personality and self-variables: Important determinants of subjective quality of life in schizophrenia out-patients. *Acta Psychiatrica Scandinavica*, 108(2), 134–143. <https://doi.org/10.1034/j.1600-0447.2003.00103.x>.
- Fauth-Bühler, M., & Mann, K. (2017). Neurobiological correlates of internet gaming disorder: Similarities to pathological gambling. *Addictive Behaviors*, 64, 349–356. <https://doi.org/10.1016/j.addbeh.2015.11.004>.
- Fava, G. A., Rafanelli, C., Cazzaro, M., Conti, S., & Grandi, S. (1998). Well-being therapy. A novel psychotherapeutic approach for residual symptoms of affective disorders. *Psychological Medicine*, 28(2), 475–480. <https://doi.org/10.1017/S0033291797006363>.
- Fava, G. A., & Sonino, N. (2000). Psychosomatic medicine: Emerging trends and perspectives. *Psychotherapy and Psychosomatics*, 69(4), 184–197. <https://doi.org/10.1159/000012393>.
- Festl, R., Scharnow, M., & Quandt, T. (2013). Problematic computer game use among adolescents, younger and older adults. *Addiction*, 108(3), 592–599. <https://doi.org/10.1111/add.12016>.
- Goslar, M., Leibetseder, M., Muench, H. M., Hofmann, S. G., & Laireiter, A. R. (2020). Treatments for internet addiction, sex addiction and compulsive buying: A meta-analysis. *Journal of Behavioral Addictions*, 9(1), 14–43. <https://doi.org/10.1556/2006.2020.00005>.
- Henrich, G., & Herschbach, P. (2000). Questions on life satisfaction (FLZM): A short questionnaire for assessing subjective quality of life. *European Journal of Psychological Assessment*, 16(3), 150. <https://doi.org/10.1027/1015-5759.16.3.150>.
- Jäger, S., Müller, K. W., Ruckes, C., Wittig, T., Batra, A., Musalek, M., ... Beutel, M. E. (2012). Effects of a manualized short-term treatment of internet and computer game addiction (STICA): Study protocol for a prospective randomised controlled multicentre trial. *Trials*, 13(43). <https://doi.org/10.1186/1745-6215-13-43>.
- Kayış, A. R., Satici, S. A., Yılmaz, M. F., Şimşek, D., Ceyhan, E., & Bakioglu, F. (2016). Big five-personality trait and internet addiction: A meta-analytic review. *Computers in Human Behavior*, 63, 35–40. <https://doi.org/10.1016/j.chb.2016.05.012>.
- King, D. L., Chamberlain, S., Carragher, N., Billieux, J., Stein, D., Müller, K., ... Delfabbro, P. H. (2020). Screening and assessment tools for gaming disorder: A comprehensive systematic review. *Clinical Psychology Review*. <https://doi.org/10.1016/j.cpr.2020.101831>.
- King, D. L., Delfabbro, P. H., Wu, A. M., Doh, Y. Y., Kuss, D. J., Pallesen, S., et al. (2017). Treatment of Internet gaming disorder: An international systematic review and CONSORT evaluation. *Clinical Psychology Review*, 54, 123–133. <https://doi.org/10.1016/j.cpr.2017.04.002>.
- Ko, C. H., Yen, J. Y., Yen, C. F., Chen, C. S., & Chen, C. C. (2012). The association between internet addiction and psychiatric disorder: A review of the literature. *European Psychiatry*, 27(1), 1–8. <https://doi.org/10.1016/j.eurpsy.2010.04.011>.
- Kuss, D. J., Shorter, G. W., van Rooij, A. J., Griffiths, M. D., & Schoenmakers, T. M. (2014). Assessing internet addiction using the parsimonious internet addiction components model—a preliminary study. *International Journal of Mental Health and Addiction*, 12(3), 351–366. <https://doi.org/10.1007/s11469-013-9459-9>.
- Leménager, T., Gwodz, A., Richter, A., Reinhard, I., Kämmerer, N., Sell, M., & Mann, K. (2013). Self-concept deficits in massively





- multiplayer online role-playing games addiction. *European Addiction Research*, 19(5), 227–234. <https://doi.org/10.1159/000345458>.
- Lin, S. Y., Fried, E. I., & Eaton, N. R. (2020). The association of life stress with substance use symptoms: A network analysis and replication. *Journal of Abnormal Psychology*, 129(2), 204. <https://doi.org/10.1037/abn0000485>.
- McGaffin, B. J., Deane, F. P., Kelly, P. J., & Ciarrochi, J. (2015). Flourishing, languishing and moderate mental health: Prevalence and change in mental health during recovery from drug and alcohol problems. *Addiction Research & Theory*, 23(5), 351–360. <https://doi.org/10.3109/16066359.2015.1019346>.
- Moeenizadeh, M., & Salagame, K. K. K. (2010). The impact of well-being therapy on symptoms of depression. *International Journal of Psychological Studies*, 2(2), 223. <https://doi.org/10.5539/ijps.v2n2p223>.
- Müller, K. W., Beutel, M. E., & Wölfling, K. (2019). Decreased occupational functioning and increased physical health complaints in treatment seekers with internet-related disorders: Compared to patients with gambling disorder. *European Addiction Research*, 25(5), 229–237. <https://doi.org/10.1159/000500543>.
- Müller, K. W., Dreier, M., Duven, E., Giralt, S., Beutel, M. E., & Wölfling, K. (2017). Adding clinical validity to the statistical power of large-scale epidemiological surveys on internet addiction in adolescence: A combined approach to investigate psychopathology and development-specific personality traits associated with internet addiction. *Journal of Clinical Psychiatry*, 78(3), 244–251. <https://doi.org/10.4088/JCP.15m10447>.
- Müller, K. W., Naab, L., Wölfling, K., Beutel, M. E., Dickenhorst, U., & Koch, A. (2017). Psychological well-being as an additional outcome parameter in the treatment of patients with gambling disorder: Results from a clinical multicenter follow-up study. *Journal of Happiness Studies*, 18(4), 1045–1059. <https://doi.org/10.1007/s10902-016-9766-5>.
- Murray, G., Rawlings, D., Allen, N. B., & Trinder, J. (2003). NEO Five-Factor Inventory scores: Psychometric properties in a community sample. *Measurement and Evaluation in Counseling and Development*, 36(3), 140–149. <https://doi.org/10.1080/07481756.2003.11909738>.
- Nielsen, P., Christensen, M., Henderson, C., Liddle, H. A., Croquette-Krokar, M., Favez, N., & Rigter, H. (2021). Multi-dimensional family therapy reduces problematic gaming in adolescents: A randomised controlled trial. *Journal of Behavioral Addictions*, 10(2), 234–243. <https://doi.org/10.1556/2006.2021.00022>.
- Raj, S., Sachdeva, S. A., Jha, R., Sharad, S., Singh, T., Arya, Y. K., & Verma, S. K. (2019). Effectiveness of mindfulness based cognitive behavior therapy on life satisfaction, and life orientation of adolescents with depression and suicidal ideation. *Asian Journal of Psychiatry*, 39, 58–62. <https://doi.org/10.1016/j.ajp.2018.12.001>.
- Ruini, C., Ottolini, F., Rafanelli, C., Tossani, E., Ryff, C. D., & Fava, G. A. (2003). The relationship of psychological well-being to distress and personality. *Psychotherapy and Psychosomatics*, 72(5), 268–275. <https://doi.org/10.1159/000071898>.
- Ryff, C. D., Singer, B. H., & Dienberg Love, G. (2004). Positive health: Connecting well-being with biology. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, 359(1449), 1383–1394. <https://doi.org/10.1098/rstb.2004.1521>.
- Scherer, L., Mader, L., Wölfling, K., Beutel, M. E., Egloff, B., & Müller, K. W. (2022). Nosological characteristics in women with social media disorder: The role of social functional impairment and agreeableness. *International Journal of Environmental Research and Public Health*, 19(22), 15016. <https://doi.org/10.3390/ijerph192215016>.
- Shen, Y., Wang, L., Huang, C., Guo, J., De Leon, S. A., Lu, J., ... Zhang, X. Y. (2021). Sex differences in prevalence, risk factors and clinical correlates of internet addiction among Chinese college students. *Journal of Affective Disorders*, 279, 680–686. <https://doi.org/10.1016/j.jad.2020.10.054>.
- Söderberg, P., Tungström, S., & Armelius, B. Å. (2005). Special section on the GAF: Reliability of global assessment of functioning ratings made by clinical psychiatric staff. *Psychiatric Services*, 56(4), 434–438. <https://doi.org/10.1176/appi.ps.56.4.434>.
- Substance Abuse & Mental Health Services Administration (SAMHSA) (2011). SAMHSA announces a working definition of “recovery” from mental disorders and substance use disorders. <https://www.samhsa.gov/find-help/recovery> [Accessed November, 2022].
- Su, W., Han, X., Yu, H., Wu, Y., & Potenza, M. N. (2020). Do men become addicted to internet gaming and women to social media? A meta-analysis examining gender-related differences in specific internet addiction. *Computers in Human Behavior*, 113, 106480. <https://doi.org/10.1016/j.chb.2020.106480>.
- Szász-Janoch, C., Vonderlin, E., & Lindenberg, K. (2021). Treatment outcomes of a CBT-based group intervention for adolescents with Internet use disorders. *Journal of Behavioral Addictions*, 9(4), 978–989. <https://doi.org/10.1556/2006.2020.00089>.
- Winkler, A., Dörsing, B., Rief, W., Shen, Y., & Glombiewski, J. A. (2013). Treatment of internet addiction: A meta-analysis. *Clinical Psychology Review*, 33(2), 317–329. <https://doi.org/10.1016/j.cpr.2012.12.005>.
- Wölfling, K., Müller, K. W., Dreier, M., & Beutel, M. E. (2020). Internet addiction and internet gaming disorder - a cognitive-behavioral psychotherapeutic approach. In M. N. Potenza, K. Faust, & D. Faust (Eds.), *The oxford handbook of digital technologies and mental health* (pp. 468–479). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780190218058.013.39>.
- Wölfling, K., Müller, K. W., Dreier, M., Ruckes, C., Deuster, O., Batra, A., ... Beutel, M. E. (2019). Efficacy of short-term treatment of internet and computer game addiction (STICA): A multicenter randomized controlled trial. *JAMA Psychiatry*, 76(10), 1018–1025. <https://doi.org/10.1001/jamapsychiatry.2019.1676>.
- World Health Organization (WHO) (2019). 6C51 Gaming disorder. <https://icd.who.int/browse11/l-m/en#/http://id.who.int/icd/entity/1448597234> [Accessed November, 2022].

