

Positive Mental Health Mediates the Relationship Between Facebook Addiction Disorder and Suicide-Related Outcomes: A Longitudinal Approach

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Abstract

Suicide-related outcomes increased among young adults in the last decade. Excessive use of social media was hypothesized to contribute to this development. This longitudinal study aimed to investigate whether Facebook Addiction Disorder (FAD) predicts suicide-related outcomes, and whether Positive Mental Health (PMH) buffers this effect. Data of 209 German Facebook users [$M_{age}(SD_{age})=23.01(4.45)$] were assessed at two measurement time points over a 1-year period (first measurement=T1 and second measurement=T2) through online surveys. FAD was measured with the Bergen Facebook Addiction Scale, PMH was assessed with the PMH-Scale, and suicide-related outcomes were measured with the Suicidal Behaviors Questionnaire-Revised. The significant positive association between FAD (T1) and suicide-related outcomes (T2) was significantly negatively mediated by PMH (T1). These results demonstrate that addictive Facebook use may enhance the risk of suicide-related outcomes. However, PMH contributes to the reduction of this risk. Therefore, addictive Facebook use and PMH should be taken into account when assessing individuals for suicide of risk.

Keywords: Facebook Addiction Disorder (FAD), Positive Mental Health (PMH) suicide-related outcomes, longitudinal study

Introduction

RECENT RESEARCH DESCRIBED an increase of suicide-related outcomes (suicidal ideation and attempts) among adults aged 18–25 from 2008 to 2017.¹ Excessive social media use was assumed as one of the reasons for this development.¹ Young adults today engage in less face-to-face social interactions with peers than older generations.² Instead, they spend time on social networking sites (SNSs), which may negatively impact well-being: passive use of SNSs (e.g., viewing pictures and status updates posted by other users) often results in feelings of envy and dissatisfaction because other members are judged to be happier than oneself. Such negative feelings undermine well-being.³ Active use of SNSs (e.g., writing messages and posting status updates and pictures) fosters feelings of social connectedness and perceived social support.⁴ However, these positive experiences may contribute to the development of addictive tendencies that negatively impact well-being.⁵ Moreover,

individuals who intensively use SNSs have less time for physical activity (such as jogging and cycling) that protects well-being.^{6,7} In addition, intensive online activity at bedtime negatively impacts the sleep-wake rhythm.⁸ Individuals who spent more than 1 hour daily on online media had lower subjective well-being and higher level of suicide-related outcomes than those who engaged in less media use.⁹

With more than 2.4 billion members, Facebook is the largest SNS.¹⁰ It is often used to escape daily stress. Mood improvement and relief experienced on Facebook foster the development of an emotional bond to the platform linked to a psychological need to stay permanently online.⁵ This need was termed as Facebook Addiction Disorder (FAD)¹¹ and defined by six typical characteristics (salience, tolerance, mood modification, relapse, withdrawal symptoms, and conflict).¹² Previous research reported an increase in the number of individuals with enhanced levels of FAD in the last years.¹³ Patients with diagnosed affective disorders and anxiety disorders showed noticeable high FAD levels.¹⁴

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FAD is positively associated with daily stress, insomnia, depression, and anxiety symptoms, as well as interpersonal problems at home and at work^{5,8,15}—factors that foster the risk of suicide-related outcomes.^{16,17} However, to the best of our knowledge, a direct link between FAD and suicide-related outcomes was not investigated. Therefore, it remains unclear whether the reported positive association between use of social media and suicide-related outcomes may be *inter alia* explained by the development of addictive tendencies.

FAD is negatively related to Positive Mental Health (PMH)⁷—that is high level of emotional, cognitive, and psychological well-being.¹⁸ Earlier research demonstrated PMH to be a resilience factor that predicts remission from anxiety symptoms.^{19,20} Moreover, it contributes to the decrease of suicide-related outcomes in healthy participants and clinical samples.^{21–24} PMH buffers the positive association between cyberbullying, on the one hand, and suicide ideation and suicide behavior, on the other hand.²⁵ It mediates the positive link between depression symptoms and suicide ideation.^{16,24}

If addictive Facebook use contributes to the enhancement of suicide-related outcomes, the investigation of potential mediators that may buffer this relationship would be of great importance. Considering the previously reported protective effect of PMH and its negative link to FAD and suicide-related outcomes, this positive variable might serve as such a buffer. Interventions that foster PMH might contribute to the decrease of suicide-related outcomes in individuals with enhanced levels of FAD.

Based on this background and the fact that for individuals 15–29 years of age suicide is the second leading worldwide cause of death,²⁶ this study aimed to investigate the relationship between FAD, suicide-related outcomes, and PMH with a longitudinal design—two measurement time points (T1 and T2) with a 1-year time interval. We expected suicide-related outcomes (T2) to be positively linked to FAD (T1) (Hypothesis 1a) and negatively to PMH (T1) (Hypothesis 1b). PMH (T1) was assumed to negatively mediate the association between FAD (T1) and suicide-related outcomes (T2) (Hypothesis 2).

Materials and Methods

Procedure and participants

In November 2017, an invitation e-mail, including a link for the first online survey (=T1), was sent to a randomly collected sample of 250 individuals who study/have studied at a large German university in the Ruhr region and who had expressed willingness to be contacted for research investigations. The requirement for participation was a current Facebook membership. In November 2018, the 218 participants who completed the first survey were contacted again by e-mail to complete the second online survey (=T2). In total, 209 persons completed both surveys (72.2 percent women; T1: $M_{age}(SD_{age})=23.01(4.45)$, range: 18–41; occupation: 82.3 percent students and 17.7 percent employees; T2: 66.5 percent students and 33.5 percent employees). The responsible Ethics Committee approved the implementation of this study. All subjects were informed about the study and all provided informed consent. *A priori* conducted power analyses (G*Power program, version 3.1) revealed that the

sample size was sufficient for valid results (power >0.80, $\alpha=0.05$, and effect size $f^2=0.15$).

Measures

Facebook Addiction Disorder. FAD was measured with the brief version of the Bergen Facebook Addiction Scale (BFAS).¹² This instrument consists of six items (e.g., “Felt an urge to use Facebook more and more?”) according to the six characteristics of FAD (salience, tolerance, mood modification, relapse, withdrawal, and conflict) rated on a 5-point Likert scale (1=*very rarely* and 5=*very often*; current internal consistency: Cronbach’s $\alpha_{T1}=0.81$). The higher the total sum score of the six items, the higher the level of FAD. The total score can range from 6 to 30. Even though FAD is a continuous variable, two possible categorization approaches were suggested for problematic BFAS scores¹²: a monothetic (more conservative) scoring scheme (cutoff score: ≥ 3 on all six items) and a polythetic (more liberal) scoring scheme (cutoff score: ≥ 3 on at least four of the six items).

Positive Mental Health. The unidimensional PMH-Scale²⁷ measured PMH with nine items (e.g., “I enjoy my life”) rated on a 4-point Likert scale (0=*do not agree* and 3=*agree*; current internal consistency: $\alpha_{T1}=0.92$). Higher sum scores reflect higher levels of PMH. The overall score can range from zero to 27.

Suicide-related outcomes. Suicide-related outcomes were assessed with Item 1 (“Have you ever thought about or attempted to kill yourself?”) of the Suicidal Behaviors Questionnaire-Revised (SBQ-R)²⁸ rated on a 6-point Likert scale (1=*never* and 6=*I have attempted to kill myself, and really hoped to die*). Usage of this single item for screening purposes was recommended by previous research.^{28,29}

Statistical analyses

Statistical analyses were conducted with SPSS 24 and the macro Process version 2.16.1 (www.processmacro.org/index.html). A hierarchical regression analysis that included age and gender (T1, Step 1), FAD (T1, Step 2), and PMH (T1, Step 3) as independent variables, and suicide-related outcomes (T2) as dependent variable investigated Hypothesis 1. The model was not threatened by multicollinearity (all values of tolerance >0.25 and all variance inflation factor values <5). Hypothesis 2 was investigated by a mediation analysis that included FAD (T1, predictor), PMH (T1, mediator), and suicide-related outcomes (T2, outcome); age and gender (both T1) served as control variables in the mediation model. The basic relationship between FAD (T1) and suicide-related outcomes (T2) was denoted by *c* (the total effect). The path of FAD (T1) to PMH (T1) was denoted by *a* and *b* denoted the path of PMH (T1) to suicide-related outcomes (T2). The indirect effect was presented by the combined effect of path *a* and path *b*. The direct effect of FAD (T1) to suicide-related outcomes (T2) after inclusion of PMH (T1) in the model was denoted by *c'*. The bootstrapping procedure (10,000 samples) that provides accelerated confidence intervals (95 percent CI) assessed the mediation effect. P_M (the ration of indirect effect to total effect) served as the mediation effect measure.³⁰

TABLE 1. REGRESSION ANALYSIS WITH SUICIDE-RELATED OUTCOMES (T2) AS DEPENDENT VARIABLE

	B	β	95 percent CI	T	Adjusted R ²	Changes in R ²
Dependent variable: suicide-related outcomes (T2)						
Step 1, $F(2, 206) = 0.656, p = 0.520$					-0.01	
Age (T1)	0.02	0.06	-0.02 to 0.05	0.88		
Gender (T1)	0.13	0.05	-0.21 to 0.46	0.74		
Step 2, $F(3, 205) = 4.144, p = 0.007$					0.04	0.05
FAD (T1)	0.07	0.23**	0.03 to 0.11	3.33		
Step 3, $F(4, 204) = 16.005, p < 0.001$					0.22	0.18
PMH (T1)	-0.08	-0.44**	-0.11 to -0.06	-6.98		

$n = 209$; in each step, only new included variables are presented.

** $p < 0.01$.

β , standardized beta; B, nonstandardized beta; CI, confidence interval; FAD, Facebook Addiction Disorder; PMH, Positive Mental Health.

Results

Table 1 presents results of the hierarchical regression analysis. FAD [T1, $M(SD) = 8.91 (3.48)$, range: 6–27] and PMH [T1, $M(SD) = 17.98 (5.88)$, range: 0–27] added significant predictive variance to the model that included suicide-related outcomes [T2, $M(SD) = 2.05 (1.10)$, range: 1–6] as dependent variable.

The critical cutoff score of FAD was reached by two (1 percent) participants due to the monothetic scoring, and by nine (4.3 percent) participants due to the polythetic scoring.

Figure 1 shows results of the bootstrapped mediation analysis. The basic relationship between FAD (T1, predictor) and suicide-related outcomes (T2, outcome) was significant (total effect, $c: p = 0.001$). The link between FAD (T1) and PMH (T1, mediator) ($a: p < 0.001$), as well as the relationship between PMH (T1) and suicide-related outcomes (T2) ($b: p < 0.001$) were also significant. In contrast, the relationship between FAD (T1) and suicide-related outcomes (T2) was not significant after the inclusion of PMH (T1) in the model (direct effect, $c': p = 0.073$). The indirect effect (ab) was significant, $b = 0.04$, standard error (SE) = 0.01, 95 percent CI [0.01–0.06]; $P_M: b = 0.50$, SE = 5.90, 95 percent CI [0.16–1.41]. Thus, PMH (T1) significantly negatively mediated the positive relationship between FAD (T1) and suicide-related outcomes (T2).³¹

Discussion

In this longitudinal study, for the first time, addictive Facebook use was found to be positively associated with

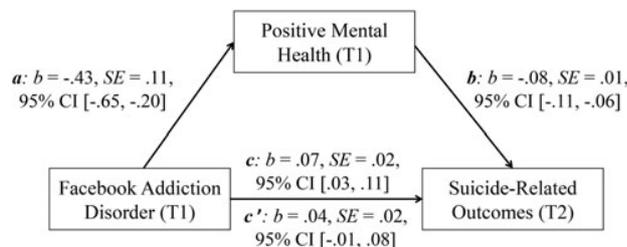


FIG. 1. Mediation model with Facebook Addiction Disorder (T1, predictor), Positive Mental Health (T1, mediator), and suicide-related outcomes (T2, outcome). b , standardized regression coefficient; c , total effect; c' , direct effect; CI, confidence interval; SE, standard error.

suicide-related outcomes 1 year later (confirmation of Hypothesis 1a). In line with earlier research,¹⁶ PMH was positively linked to suicide-related outcomes (confirmation of Hypothesis 1b). Moreover, PMH negatively mediated the association between FAD and suicide-related outcomes (confirmation of Hypothesis 2).

Previous research¹ hypothesized excessive use of social media to foster suicide-related outcomes in the young population. However, mechanisms that underlie this relationship remained unclear. Our findings expand this framework by showing that addictive Facebook use that increased in the last years³² may serve as a predictor of suicide-related outcomes. Note, individuals who experience daily stress often consider Facebook use as a possibility to at least temporarily escape offline problems.³³ In the short term, they find relief and perceive social support from other users on the online platform.⁴ However, the immersion into the online world may contribute to the development of a strong addictive bond to Facebook that is linked to withdrawal symptoms when the SNS cannot be used,³⁴ as well as to depression and anxiety symptoms.^{13,33,35} In this study, this phenomenon known as FAD positively predicted the level of suicide-related outcomes 1 year later.

Previous research described an increase of pathological Facebook use,³² as well as an increase of suicide-related outcomes, particularly in individuals 18–25 years of age, who belong to the largest group of Facebook users.^{1,17} Therefore, it seems to be of great importance to understand which factors may mediate the positive relationship between FAD and suicide-related outcomes. Present results identified PMH as one of such mediators. PMH buffers the impact of FAD on suicide-related outcomes and therefore may protect individuals who immerse into the Facebook world to escape from daily problems, and thereby develop a pathological bond to the SNS. This finding complements earlier empirical results that described PMH to reduce the risk of suicide ideation and suicidal behavior.^{16,24,25} It shows that the protective influence of PMH may also be transferred to problematic social online activity.

In terms of clinical implications, these results underscore that (addictive) Facebook use should be made a subject of discussion when assessing individuals for risk of suicide, and when planning prevention programs against suicide. Presence of PMH that confers resilience against suicide-related¹⁶ outcomes should be taken into account, particularly in individuals with enhanced FAD levels.

This study has some limitations that should be considered. The sample included mostly young female participants, which limits the generalizability of present results. To partly tackle this limitation, age and gender were controlled for in the statistical analyses. Moreover, at T1, more than 80 percent of the participants were students, which also reduces the generalizability of current findings. Suicide-related outcomes were measured with only one item. Even though this approach is common for screening purposes,²⁸ future studies are recommended to replicate our findings using multidimensional instruments. A further limitation of this study is the fact that suicide-related outcomes were assessed only at T2. No information is available about levels of suicide-related outcomes at T1. To consider potential changes of the levels of suicide-related outcomes during the investigation period and to include suicide-related outcomes at T1 as covariate in the statistical analyses, future investigations are advised to assess this variable at all measurement time points. Furthermore, to understand how PMH may buffer the impact of FAD on suicide-related outcomes, we recommend future studies to include potential confounding variables such as depression, anxiety, and stress symptoms that previously were shown to be significantly linked to the main investigated factors.^{8,24,35}

This study demonstrates potential negative effects of excessive use of social media and emphasizes the importance of PMH as a buffer of suicide-related outcomes in the face of addictive Facebook activity.

Author Disclosure Statement

No competing financial interests exist.

Funding Information

No funding was received for this article.

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