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Brendan Wolf

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J. William Fulbright College of Arts and Science

The University of Arkansas

Abstract

Research suggests that suicidal ideation can increase among people who feel that they do not belong (i.e. thwarted belongingness) and who perceive themselves to be a burden on others (i.e. perceived burdensomeness). However, it is not known whether these risk factors for suicidal ideation are moderated by smartphone use and social media use. I hypothesized that the association of thwarted belongingness and perceived burdensomeness would be stronger at higher levels of mobile phone use and social media use. Undergraduate student participants ($N =$ 81) were incentivized via class credit to participate in a two-week longitudinal study. They completed questionnaires about mobile phone use and social media use behaviors, suicidal ideation, and interpersonal suicide risk factors. The hypothesis was tested using linear regression models. Contrary to my hypothesis, I found that thwarted belongingness depended on mobile phone use such that the association of thwarted belongingness with suicidal ideation weakened as mobile phone use increased. I found social media use had a non-significant protective effect against SI as well. These findings are inconsistent with most previous studies which suggest that mobile phone use and social media use have detrimental effects on mental health. The study was limited by the use of an undergraduate student sample. Further research is needed to understand moderators of the effects of social media and smartphone use.

Introduction and Background

Suicide is a leading cause of death in the United States. It is especially detrimental among adolescents and young adults, with suicide being the second leading cause of death among Americans aged 10-14 and 25-34 in 2020 (CDC, 2020). In the last several decades, "ideation-to-action" models have focused on understanding why people die by suicide. (Klonsky et al., 2018). Shared among these models is the idea that suicidal ideation (SI) is the greatest predictor of suicide attempts, but they differ in the factors thought to lead to suicidal ideation and suicide attempts (Bostwick et al., 2016; Druss & Pincus, 2000; Hepple & Quinton, 1997). Definitions of suicidal ideation include time spent thinking about one's own suicide or wishing one were dead (Harmer et al., 2021). More research about SI needs to be done in order to better understand the potential moderators of established risk factors.

The Interpersonal Theory of Suicide (IPTS) is an influential ideation-to-action model (Van Orden et. al, 2005). The IPTS states that the social factors of thwarted belongingness (TB), when the fundamental human need for connectedness is unmet, and perceived burdensomeness to others (PB), the feeling that your existence weighs others down, are associated with suicidal ideation (Van Orden et. al., 2005; Van Orden et al., 2012). Numerous studies over the last 17 years have supported the idea that TB and PB are strong and proximal factors associated with SI (Kleiman et al., 2014; Sommerfeld & Malek, 2019).

Mobile phone use and social media use are behaviors that may affect associations of TB and PB with suicidal ideation. A study of Chinese adolescents found that above median cell phone use is associated with a greater risk for suicide-related behaviors, including suicidal ideation (Chen et. al., 2020). Another study using an undergraduate student sample suggested that mobile phone use was strongly associated with social media addiction, which was associated

with SI (Jasso-Medrano, 2018). A study about the social media use of adolescents showed that high social media use and low in-person social interaction predicted depressive symptoms and greater risk for suicide-related outcomes (Twenge et al., 2019). And another study found that social connectedness through technology was associated with SI in suicidal American military personnel (Chalker & Comtois, 2017). The associations among phone use, social media use, and SI could explain the increased annual rates of adolescent suicide since 2007, aligning with the rise in smartphone use (Curtin, 2020). Thus, there is a need to test whether smartphone and social media use moderates the association of TB and PB with SI.

The current study examined how the associations of thwarted belongingness and perceived burdensomeness with SI depend on excessive phone and social media use. I hypothesized that TB and PB would predict later SI more strongly at higher levels of excessive phone use or excessive social media use. In order to test this hypothesis, I conducted a two-week longitudinal study. Time 1 risk factors, phone use, and social media use were examined as predictors of time 2 (two weeks after time 1) suicidal ideaion.

Methods

Participants

The sample consisted of 81 undergraduate students enrolled in entry-level psychology courses at the University of Arkansas. These students fulfilled a psychological study participation requirement through Sona Systems in order to receive course credit. 179 students completed the time 1 questionnaire but not the time 2 questionnaire. Participant demographics are reported in Table 1.

Table 1. Participant Demographics

Characteristic	*n*	%
Racial Identity		
Spanish, Hispanic, or Latino	15	19
White	68	84
Black or African American	3	4
American Indian or Alaska Native	2	3
Asian	5	6
Native Hawaiian or Pacific Islander	0	0
Other	4	5
Sex		
Male	14	17
Female	67	83

Note. Participants were on average 19.1 years old (SD = 1.6).

Measures

The Interpersonal Needs Questionnaire (INQ; Van Orden et al, 2012) is the premier

measure of TB and PB and has shown strong internal consistency across multiple studies (Hill et

al., 2015; Marty et al., 2012). The INQ consists of fifteen items that assess unmet interpersonal

needs thought to motivate a desire to die. The response scale for each item ranges from 1 (not at

all true for me) to 7 (very true for me) with higher scores indicating higher levels of TB and PB.

Six items are reverse-coded. The INQ has two subscales. The thwarted belongingness scale

consists of nine items (e.g., These days, the people in my life would be happier without me). The

perceived burdensomeness subscale consists of six items (e.g., These days, I think I am a burden

on society). Internal consistency was good in past studies for both the TB ($\alpha = = .85$) and the PB ($\alpha = .89$) subscales (Van Orden et al., 2012). In the current study, internal consistency was acceptable for TB, $\alpha = .79$, and PB, $\alpha = .77$.

The DSI-SS is a subscale of the Hopelessness Depression Symptom Questionnaire (Joiner et al., 2002), that is designed to measure frequency and intensity of suicidal ideation in adolescents (Capron et al., 2013). This subscale has an excellent internal consistency ($\alpha = 0.90$; Joiner et. al., 2002).For this study, we found the internal consistency to be $\alpha = 0.91$. The DSI-SS was distributed as a four-item questionnaire with a four-point Likert scale of 0 (I am not exhibiting a suicidal behavior) to 3 (I am always exhibiting a suicidal behavior).

The MPIQ was designed to assess participants' cognitive-behavioral relationship to their smartphone (Walsh et al., 2010). These measures include addictive behaviors associated with smartphone use and have a good internal consistency ($\alpha = 0.89$; Argumosa‑Villar et. al., 2017; Harwood et al., 2014; Walsh et al., 2010). The internal consistency for this study was $\alpha = 0.83$. It is an 8-item measure with a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

The SMAQ was designed to measure symptoms of social media addiction in the wake of rising social media popularity (Hawi & Samaha, 2017). It is a modified version of the Facebook intrusion questionnaire with high internal consistency ($\alpha = .87$; Hawi & Samaha, 2017). Our study found the internal consistency to be $\alpha = 0.88$. Previous studies using this questionnaire have suggested that social media addiction can lead to psychological distress and that social media addiction is associated with poor academic performance and poor mental health (Herrero et al., 2019; Hou et al., 2019). The SMAQ is an 8-item measure with a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Procedure

The questionnaires were formatted and distributed through Qualtrics. The participants completed the measures a second time after two weeks.

Analytic Plan

Hierarchical regression was used to test the hypothesis that the associations of TB and PB with later SI is stronger at higher levels of mobile phone use. In model 1 of the regression, time 1 TB and PB and their interaction were modeled as predictors of time 2 SI. In model 2, mobile phone use and its interactions with TB, PB were entered as predictors in addition to those that were included in model 1. Change in R-squared and the beta coefficient for the interaction terms involving mobile phone use were evaluated to test the moderation hypothesis. The analyses were repeated with social media use in place of mobile phone use. The Johnson-Neyman procedure was used to understand interactions by calculating 95% confidence intervals around the effect of TB or PB on SI at different scores of the moderator (Johnson, et. al., 1950).

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Results

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Mobile Phone Use.

Model 1 was significant, $F =$ of 13.451, $p < 0.001$, $R^2 = 0.344$; however, TB, PB, and the interaction of TBxPB did not yield any significant effects.

Model 2 was significant, $F = 10.577$, $p < 0.001$, $R^2 = 0.462$ (see Table 2). The addition of mobile phone use and its interactions with PB and TB explained 11.8% more variance in SI compared to model 1. Mobile phone use was negatively associated with later SI. Moreover, there was a negative association with the interaction of TB and mobile phone use and SI at time 2. Follow-up analysis suggested that TB was a stronger predictor of SI at low levels of mobile

phone use and that the association between TB and SI was not significant above MPIQ scores above 34.

Table 2. TP, PB, and Smartphone Use as Predictors of Suicidal Idation

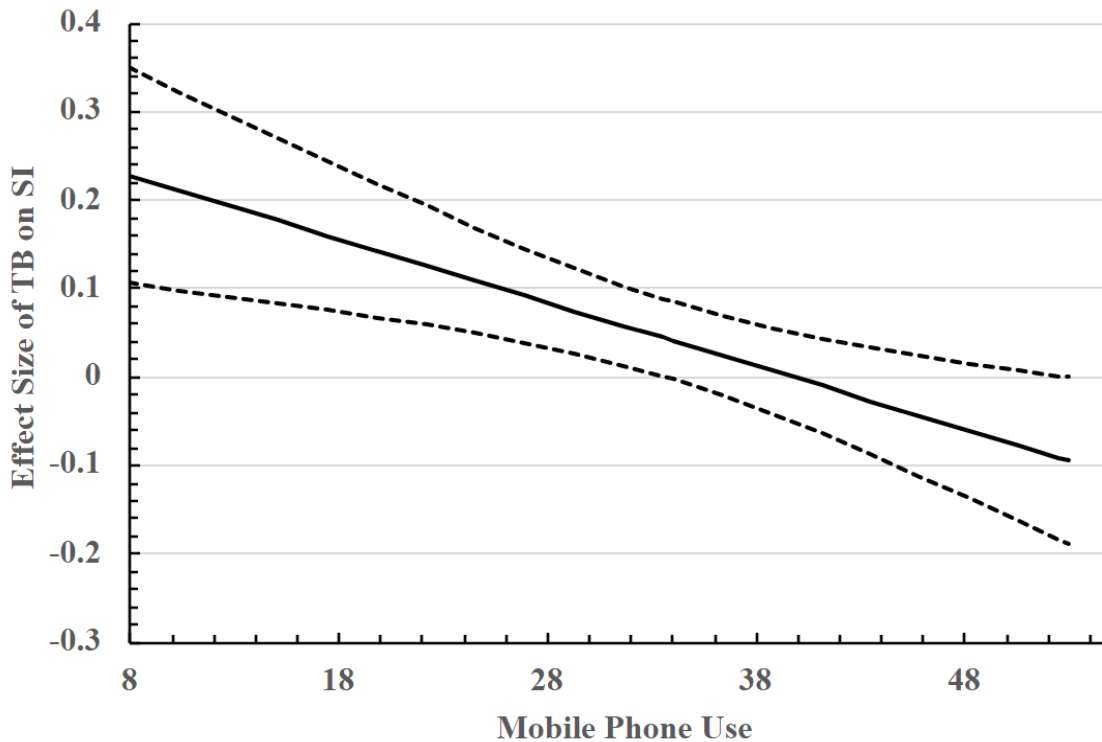| Effect	Standardized Coefficients Beta	t-value	Sig.
Model 1	Time 1: PB	.225	.955	.343
	Time 1: TB	.224	1.772	.080
	Time 1: PBxTB	.239	1.185	.240
Model 2	Time 1: PB	.401	1.601	.114
	Time 1: TB	.221	1.811	.074
	Time 1: PBxTB	.367	1.903	.061
	Time 1: mobile phone use	-.207	-2.213	.030
	Time 1: PBxmobile phone use	-.198	-1.331	.187
	Time 1: TBxmobile phone use	-.231	-2.090	.040

Figure 1: Johnson Neyman Figure

Social Media Use.

Model 2 was significant, $F = 8.307$, $p < 0.001$, $R^2 = 0.402$ (see Table 3). The addition of social media use and its interactions with TB and PB explained 5.8% more variance in SI compared to model 1. Social media use was not associated with SI at time 2. No coefficients yielded any significant effects.

Table 3. TP, PB, and Social Media Use as Predictors of Suicidal Idation

Effect		Standardized Coefficients β	t	p
Model 1	Time 1: PB	.225	.955	.343
	Time 1: TB	.224	1.772	.080
	Time 1: PBxTB	.239	1.185	.240
Model 2	Time 1: PB	.365	1.379	.172
	Time 1: TB	.197	1.477	.144
	Time 1: PBxTB	.273	1.359	.178
	Time 1: Social Media Use	-.180	-1.898	.062
	Time 1: PBxSocial Media Use	-.153	-.953	.344
	Time 1: TBxSocial Media Use	-.124	-.962	.339

Discussion

Contrary to the hypothesis, mobile phone use was associated with less SI. Moreover, thwarted belongingness, a well-established predictor of suicidal ideation, was less strongly related to suicidal ideation at higher levels of mobile phone use. Mobile phone use and the interaction of mobile phone use with TB were protective against SI. There was marginally significant evidence that social media use was protective against SI. It is not clear why mobile phone use and social media use were protective. One might speculate that they can provide a sense of belongingness for those who do not feel belongingness in their social context. The protective effects of mobile phone and social media use is contrary to much of the established

literature. In the case of Chalker & Comtois, 2017, their sample consisted only of participants who were suicidal, but studies similar to mine with relatively younger participants had opposite effects (Chen et. al., 2020, Twenge et al., 2019). Further, most prior studies have examined adolescents or were conducted prior to the COVID-19 pandemic. More research will be needed to understand what determines the effects of mobile phone and social media use on suicide risk factors.

Using the Johnson-Neyman analysis, I found that TB predicts SI less strongly with high levels of mobile phone use. For individuals with MPIQ scores above 34, TB was not related to SI. This could be for several reasons. In the wake of the Covid-19 pandemic, there have been revolutions in mental telehealth that are accessible especially to mobile phone users. Mental health hotlines and mobile phone applications for counseling, therapy, and meditation are among these telehealth advancements. Much social media is also community-driven, such as via facebook groups. These groups likely provide belongingness to those who are unable to find belongingness in their own non-virtual communities. In any case, I have advanced understanding of interpersonal suicide risk factors by showing TB predicts SI less strongly at high levels of mobile phone use.

Limitations

The participants for this study were all undergraduate students who were overwhelmingly white and female. This sample is not generalizable to a clinical population. I did not compare SI from time I to time 2 as it changed with mobile phone use and social media use behaviors. The two-week time window may not have been long enough to capture fluctuations in study variables as well. I cannot determine causation from any results as this was an observational study.

Recommendations for Future Research

It's not understood why mobile phone use may convey resilience to SI. Future research should study this connection more closely. Considering there was nearly a significant effect for social media use, future research should probe its relationship with SI further. I did not study other mental health effects of mobile phone use or social media use either. Even though these factors may in some way be protective against SI, they may still lead to adverse mental health outcomes such as weaker executive function or anxiety.

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