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ABSTRACT

Introduction: Frequent social media use (SMU) is associated with elevated depressive symptoms (DS) for youth, but the relationship over time is unclear.
Method: LGBTQ youth ages 12–18 ($N = 214$) were surveyed before and after attending a social media-free summer camp.
Results: Pre-camp, SMU was not associated with DS. However, the relationship between pre- and post-camp DS was moderated by pre-camp SMU ($b = -.03$, $p = .02$). For youth with lower SMU, pre-camp DS more strongly predicted post-camp DS.
Conclusion: Findings highlight the influence of a "social media break" in an affirming environment on LGBTQ youth mental health.

Social media use is ubiquitous for adolescents today. On average, teenagers spend nearly two hours per day using social media (i.e., social networking applications such as Instagram, Twitter, and Facebook (Rideout, 2018; Twenge et al., 2019). Most youth (81%) believe their social media use does not affect their psychological well-being, including whether they feel depressed (Rideout & Robb, 2018). However, meta-analytic research has found a significant, weak correlation ($r = -0.07$) between time spent on social networking sites and psychological well-being (Huang, 2017). A causal relationship has not been established, though longitudinal research has found increasing social media use does not predict rising depressive symptoms over time for youth in general (Coyne et al., 2020).

For LGBTQ youth (i.e., lesbian, gay, bisexual, transgender, queer, and other related identities), online communities and resources may play a special role in identity development, providing LGBTQ-related information and support not available in the home environment. Elevated rates of online engagement have been found among LGB (i.e., lesbian, gay, and bisexual) youth, compared to their peers (Hillier et al., 2012; Seidenberg

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et al., 2017). Yet, the longitudinal relationship between social media use and depressive symptoms for LGBTQ youth has not been fully examined.

Theoretical framework

This study draws from two complementary hypotheses that may elucidate how social media use relates to and affects depressive symptoms: the *displacement hypothesis* and the *self-medication hypothesis*. The *displacement hypothesis* focuses on outcomes of social media use, framing daily activity as a zero-sum game in which social media takes time away from activities more beneficial for adolescent well-being. Alternatively, the *self-medication hypothesis* seeks to explain individual's motivations for online engagement, arguing it serves a coping function for psychologically distressed individuals.

Displacement hypothesis

According to the *displacement hypothesis*, online engagement may reduce – or displace – the time people spend on in-person, face-to-face interactions (Lin, 1993). Youth self-report data suggest online engagement may in fact have this effect, as almost half of youth (42%) say social media has taken away from in-person, face-to-face time with friends (Twenge et al., 2019). However, studies examining the impact of social media use on youth social interactions and psychological well-being have had mixed results, with some finding support for the hypothesis (e.g., Nie, 2001; Weiser, 2001) and others not (e.g., Valkenburg & Peter, 2007). A likely cause of these mixed results is the differential impact of social media on youth well-being, based on the nature of the content youth encounter and the interactions they have in social media spaces.

The displacement hypothesis assumes negative effects from online communication. This assumption is supported by evidence that highly curated, unrealistic portrayals – or so-called highlight reels (Kerman, 2020; Shensa et al., 2016) – are prevalent on social media, as platforms encourage users to consider the "likes," comments, and other forms of affirmation their content may generate. Exposure to curated presentations can prompt feelings of social exclusion – a phenomenon widespread enough to cause the term FOMO (i.e., "fear of missing out") to emerge in the popular lexicon with the proliferation of social media (Barker, 2016). Further, social media platforms are engineered to keep users engaged (Bowles, 2018), leading to problematic usage patterns for some (Lam et al., 2009; Schou Andreassen & Pallesen, 2014; van den Eijnden et al., 2016). Social media use poses special risks for youth, who are in an important stage of identity development:

the *identity-versus-confusion stage* in which youth (ages 12 to 18) establish a sense of self and role in society (Erikson, 1968). Social media use may foster a positive sense of self and a perception of being valued in a society or community, or it may do the opposite, subsequently affecting adolescents' psychological well-being.

While social media use has drawbacks, numerous benefits are also apparent, as is evidenced by the widespread popularity of social media platforms among young people today. Social media benefits include the building and maintenance of quality friendships and relationships, particularly through direct messaging (Valkenburg & Peter, 2007). Social media use may enhance users' perceived connectedness to others (Lenhart, 2015). For example, teens with lower socio-emotional well-being may prefer interactions with others in more indirect formats, such as those afforded by social media (Barry et al., 2017).

Emerging digital technology use research has asked *what happens when youth cease using screen-based technologies?* Uhls et al. (2014) examined the effects of youth foregoing screen-based technologies in the summer camp context, finding youth experienced an increased ability to read social cues. As social media use is dependent upon use of screen-based technology, the findings of this prior work hint at the potential positive effects of youth taking "social media breaks" (i.e., ceasing use of social media for an extended time). Just as social media use may displace beneficial interactions and activities, as suggested by the displacement hypothesis, high usage may be caused by underlying problems.

Self-medication hypothesis

Hsieh et al. (2016a, 2016b) proposed the *self-medication hypothesis of Internet addiction,* which highlights risk-facing individuals who use the Internet to cope with psychological distress: the development of problematic – perhaps addictive – Internet use patterns. Specifically, the hypothesis argues that high Internet use can be "a maladaptive form of avoidance coping strategies and a self-medicating behavior" (Hsieh et al., 2016a, p. 212). In the youth context, this suggests that youth with elevated negative emotional or psychological symptoms are at higher risk than their peers of developing problematic online engagement patterns in their attempt to ease psychological distress (Hsieh et al., 2018). Cross-sectional survey research testing this hypothesis found that Taiwanese children experiencing abuse (psychological or physical neglect, paternal physical violence, sexual violence) were at increased risk for Internet addiction (Hsieh et al., 2016a).

While Internet addiction has multiple facets, one key component is excessive frequency/duration of use, such that one's quality of life is

negatively affected. Evidence for a relationship between social media use and adolescent psychological well-being – as well as documented elevated use among LGBTQ individuals – raises questions about the role of social media use in LGBTQ youth mental health over time.

A social media-free summer camp

This study is a longitudinal examination of depressive symptoms among youth participating in a social media-free summer camp for LGBTQ youth. Summer camp is a major institution in the USA, with an estimated 8,400 resident (overnight) camps and 5,600 day camps operating nationwide (American Camp Association, 2017). Research has shown camp programing can improve the psychological well-being of people from a variety of social groups, who may experience health- or identity-related challenges (e.g., Kirschman et al., 2010; Thurber et al., 2007).

In 2014, the nonprofit organization Brave Trails was founded to bolster camp opportunities for LGBTQ youth, becoming the first leadership summer camp for LGBTQ youth in the Western United States (Gillig et al., 2019). The annual Camp Brave Trails youth summer program features identity-affirming activities, such as drag class and workshops (e.g., Queering Sex Ed). Staff members generally identify as LGBTQ, serving as role models for campers. All camp housing and facilities are gender-inclusive. Prior to campers arriving at the campground, staff members cover any single-sex bathroom labels with signage designating them "gender-free," or other similar terms, and campers are assigned to cabins based on age rather than gender identity or birth sex. Additionally, the camp is social media-free.

At camp check-in, Brave Trails campers are required to relinquish their smartphones and other screen-based/digital technology (e.g., laptops, iPods), excluding non-smartphone digital cameras. Relinquished devices are stored in a locked location until the last day of camp. Banning personal electronic devices is a common practice at youth summer camps (University of Michigan, 2018). Brave Trails' directors implemented the policy to prevent camper distraction from the people and programing in their immediate camp surroundings (personal communication, 2017). Although personal electronic devices are not allowed at camp, some programing involves use of screen-based technology (e.g., workshop facilitators may show PowerPoint presentations using projectors or computer monitors). Thus, camp is not an entirely screen-free setting but is social media-free. Finally, to participate in the camp program, youth or their parents/ guardians must pay an enrollment fee. In summer 2018, when data was

collected, 21% of campers qualified for and received a scholarship to offset the cost of their participation (personal communication, 2020).

Prior research with Brave Trails yielded (1) the first known published evaluation of the effects of LGBTQ youth summer camp programing in the USA (Gillig et al., 2019) and (2) an examination of the role of gender-inclusive housing in youth friendship network patterns (Gillig & Bighash, 2019). These prior studies examined the impact of various programing features on campers' psychological well-being and friendships, but not the effect of the "social media break" aspect of camp on depressive symptoms. This study represents collection of new longitudinal data to examine the relationship between youth's social media use prior to camp and changes in their depressive symptoms during the program.

Based on the self-medication hypothesis and research finding a relationship between social media use and depressive symptoms, the following hypothesis is posited:

> **H1:** *Pre-camp social media use will be positively associated with campers' pre-camp depressive symptoms.*

Further, taking both the displacement and self-medication hypotheses into account, we expect that by removing social media use – an activity that may be taking time away from more psychologically beneficial interactions and potentially exacerbating negative experiences, as an ineffective coping mechanism – and providing supportive communication, youth may experience differential changes in depressive symptoms during camp, based on their pre-camp social media use. Thus, we pose a second hypothesis:

> **H2:** *Pre-camp social media use will moderate the relationship between youth's depressive symptoms before attending a social media-free camp program and their depressive symptoms at the end of camp, such that less pre-camp social media use will correspond with a stronger relationship between pre- and post-camp depressive symptoms.*

Method

Procedure

Two months prior to camp, on April 30, 2018, all Brave Trails 2018 registered campers and their parents were contacted through a secure, online camp administration portal, informing them of the opportunity for research participation and providing consent information and a link to the pre-camp questionnaire. Youth were assured that their choice regarding study participation would not affect their role at camp. Research participants could enter a drawing for a $100 Visa gift card. Both youth assent and parental permission were obtained online.

For consenting youth, questionnaires were administered online prior to and on the last day of the camp program, which lasted one week or two weeks, depending on the session. The pretest opened when youth and parents were informed of the research two months before camp started, closing on the first day of camp. The researcher administered the posttest on-site, and participants used Samsung tablets to complete the post-camp questionnaire in a location where other youth and staff would not see their responses. Four camp sessions occurred, and the research procedure was identical for each. Youth participating in multiple sessions were invited to take the posttest during their final session.

To match participants across waves of data collection, they were asked to write their names with their responses. Those entering the gift card drawing were asked to provide an email address. Youth completing both survey waves were eligible for the drawing. The research procedure was implemented in conjunction with camp staff certified by the Collaborative Institutional Training Initiative (CITI) for human subjects research. The process was approved by the University of Southern California's Institutional Review Board.

Measures

Participants completed online survey items including depressive symptoms, social media use, and demographic data, described in the following. Demographics and social media habits were assessed at pretest, and depressive symptoms were measured pre- and post-camp.

In the pretest, participants were asked their gender identity (male, female, transgender male, transgender female, intersex, gender nonconforming, or other, please specify), race/ethnicity (White (non-Hispanic), Latino/a/x, Black, Asian, Pacific Islander, Middle Eastern, Native American, Other, please specify – these were recoded to white, Latinx, black, multi-racial, and other), age (typed as a digit), religion (Protestant, Catholic, Jewish, Muslim, Buddhist, Hindu, agnostic, atheist, unsure, and other, please specify – recoded to Christian, Jewish, agnostic, atheist, unsure/questioning, and other), sexual orientation (gay, lesbian, bisexual, pansexual, queer, questioning/unsure, straight/heterosexual, and other, please specify), and education (student, not a student, and other, please specify).

Social media use

Social media use was measured at pretest through the item, "*In the past week, how many hours each day did you typically spend using the following social media platforms/apps? Select all that apply.*" Participants were prompted to select each platform used, from the following options:

Instagram, Snapchat, Facebook, and *Other, Please name the platform or app.* Then, they were asked to type the number of hours as a digit. Responses for each platform were summed to create an overall social media use score.

Depressive symptoms

At both waves of data collection, depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale Short Form (CES-D-4) (Lewinsohn et al., 1997; Melchior et al., 1993), which has been used in prior research with LGBTQ youth (Rhoades et al., 2018). Participants selected on how many days during the past week they experienced each of four emotions or behaviors, including sadness. Principal components analysis showed items loaded on one factor. Removing one item (i.e., experiencing crying spells) yielded the highest reliability (Cronbach's $\alpha = .86$), perhaps due to crying being caused by non-depressive experiences in the camp context. The remaining three items were averaged to create one depressive symptoms score for each participant.

Covariates

Participants to select which camp session(s) they were attending (Sessions 1–4). Campers attending one session were coded with the number corresponding with their session. Those attending multiple sessions $(n = 7)$ were coded as 5. Campers' participation in the relevant camp during prior summers was coded as $1 =$ Prior experience, $0 =$ No prior experience.

Data analysis

Of 218 youth-attending camp, 190 completed both pre- and posttests. Little's Missing at Random Test (Little, 1988) was used to assess the nature of missing social media use and pre-post depressive symptoms data. Results were non-significant ($\chi^2 = 3.73$, $p = .71$), indicating data were missing at random. Multiple imputations were conducted using the Markov chain Monte Carlo Method in SPSS v25 (IBM Corp. Armonk, NY). Pooled estimates were used for preliminary analyses and hypothesis testing, with multivariate outliers with Mahalanobis distance scores above 13.8 removed $(n = 2)$.

A preliminary repeated-measures ANOVA conducted using in SPSS v25 showed a main effect of time on depressive symptoms ($F(1, 211) = 105.62$, $p < .001$), such that symptoms decreased from 2.71 days per week pre-camp ($SD = 1.99$) to 1.35 post-camp ($SD = 1.22$).

Table 1. Sociodemographic characteristics and outcomes ($N = 214$).

Age	15.3 (1.74)
Gender identity	
Male (cisgender)	8.5%
Female (cisgender)	20.4%
Transgender male	29.4%
Transgender female	4.7%
Gender nonconforming	15.6%
Unsure	9.0%
Other	12.3%
Sexual orientation	
Straight/heterosexual	2.8%
Gay/lesbian	28.8%
Bisexual/pansexual	35.2%
Queer	15.1%
Unsure	5.7%
Other	12.3%
Race/ethnicity	
White	72.5%
Latinx	7.1%
Asian	3.6%
Black	1.9%
Multiracial	11.8%
Other	3.3%
Education	
Student	97.5%
Not a student	2.0%
Other	0.5%
Session	
1 (2 weeks)	25.7%
2 (1 week)	30.7%
3 (2 weeks)	22.9%
4 (1 week)	17.4%
Multiple	3.2%
Prior camp experience	
No	69.3%
Yes	30.7%
Social media use	3.89 (3.18)
Depressive symptoms – Baseline	2.71 (1.99)
Depressive symptoms – Follow-up	1.35 (1.22)

Results

A total of 214 cases were included in the analyses. Participant average age was 15.3 years, and the most prevalent gender identities were transgender male (29.4%), female (20.4%), and gender nonconforming (15.6%). The most prevalent sexual/romantic orientations were bisexual/pansexual (35.2%), gay/lesbian (28.8%), and queer (15.1%). Most participants were White (72.5%), then multiracial (11.8%) and Latinx (7.1%). Almost all participants (97.5%) were students. The average number of hours participants spent using social media each day was approaching four (3.89). Depressive symptoms were moderate at pretest (2.71 days/week of symptoms) and low at posttest (1.35 days/week). Note percentages provided above do not sum to 100, as they represent the most prevalent categories corresponding to the demographics assessed. The complete descriptives are in Table 1.
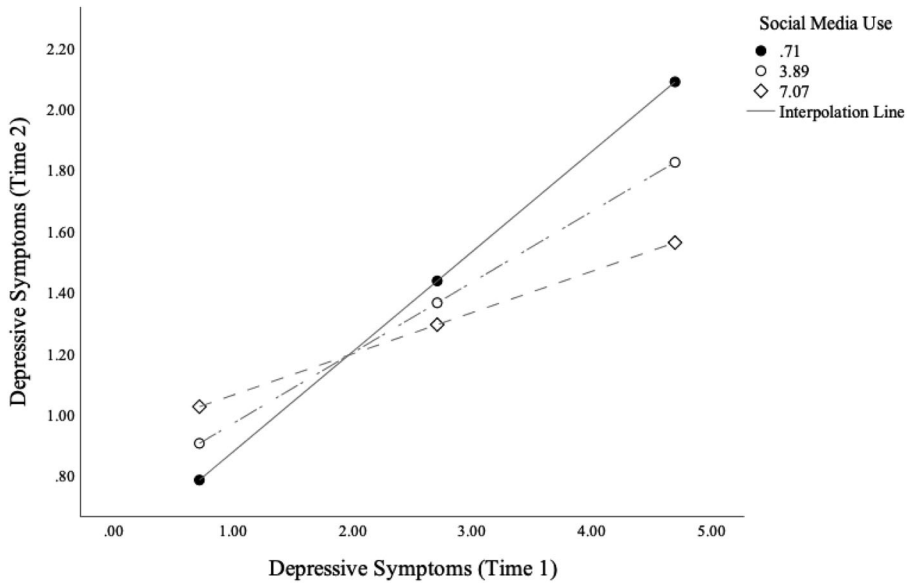
Figure 1. Moderation model depicting the influence of pre-camp social media use (SMU) (hours/day) on the relationship between pre-camp (Time 1) and post-camp (Time 2) depressive symptoms (days/week) at mean SMU (3.89) and at one standard deviation above (7.07) and below (.71) mean SMU.

To test the first hypothesis (H1), a Pearson correlation of pre-camp social media use and depressive symptoms was conducted. Results did not support H1. Social media use and pre-camp depressive symptoms were not significantly associated ($r = .03$, $p = .71$).

To test the second hypothesis (H2), a moderation analysis was conducted using the PROCESS macro (v3.4) (Hayes, 2013) in SPSS v26. The moderating effect of social media use on the relationship between pre- and post-camp depressive symptoms was assessed. Results showed a significant interaction between depressive symptoms and social media use ($b = -.03$, $SE = .01$, $p = .02$, 95% CI = [$-.05$, $-.004$]), such that pre-camp depressive symptoms were a stronger predictor of post-camp depressive symptoms for participants with less pre-camp social media use ($b = .31$, $SE = .05$, $p < .001$, 95% CI = [.21, .41]), compared to among youth with more pre-camp social media use ($b = .14$, $SE = .05$, $p = .01$, 95% CI = [.04, .25]). The covariates camp session ($b = -.02$, $SE = .07$, $p = .82$, 95% CI = [$-.16$, .13]), prior camp experience ($b = -.11$, $SE = .18$, $p = .54$, 95% CI = [$-.47$, .25]), gender identity ($b = .02$, $SE = .05$, $p = .58$, 95% CI = [$-.06$, .11]), and sexual orientation ($b = -.06$, $SE = .06$, $p = .36$, 95% CI = [$-.19$, .07]) did not have significant effects. See Figure 1, which depicts the influence of pre-camp social media use (continuous variable, zero to 24 hours per day) on the relationship between pre- and post-camp depressive symptoms.

Discussion

Pre-camp social media use was not significantly associated with pre-camp depressive symptoms in our sample of LGBTQ youth. This result aligns with prior research finding no significant relationship between frequency of social media use and depressive symptoms (see Seabrook et al. (2016) for a review), but not with findings from meta-analytic work indicating a weak relationship between time spent on social media and psychological well-being (Huang, 2017). The result of this study's cross-sectional analysis of pre-camp social media use and depressive symptoms suggests social media use may have no significant, overarching effect on LGBTQ youth, but that its impact may be influenced by factors such as youth's motivations for use, their behavioral patterns, and the quality of their experiences and interactions within various social media spaces.

In examining the role of social media use in changes in depressive symptoms over time, significant findings emerged. Pre-camp social media use moderated the relationship between youth's depressive symptoms before and after camp, such that pre-camp depressive symptoms more strongly predicted subsequent depressive symptoms for youth using social media at lower levels prior to camp, compared with youth reporting more pre-camp social media use. Youth with the highest levels of pre-camp social media use tended to experience a more "across the board" reduction in depressive symptoms. That is, regardless of pre-camp depressive symptoms, these participants tended to experience low levels of depressive symptoms by the end of camp. These findings suggest that while social media use may not have had a significant impact (negative or positive) on youth's depressive symptoms prior to camp, the time youth spent using social media may have been better spent engaging in positive face-to-face communication, particularly for youth reporting above-average social media use. Youth engaging online at the highest rates prior to camp may have been particularly inclined to seek social connection and, when reporting depressive symptoms, may have been experiencing them as a "state" (i.e., a transitory psychological experience due to a precipitating event, negative environment) rather than a "trait" (i.e., a dispositional feature or personal quality or characteristic). Thus, the social, affirming camp setting may have filled a critical need for the high-volume social media users.

These findings have practical implications. While many youth today report not valuing face-to-face communication with friends as much as in the past – and they perceive social media use to have no significant effect on whether they feel depressed (Rideout & Robb, 2018) – youth may be unaware of the psychological benefits they could experience by trading social media time for face-to-face interactions in supportive contexts. Thus, efforts by parents, educators, and others to help adolescents identify ways

to engage in such interactions have the potential to improve youth's psychological well-being. For LGBTQ adolescents in particular, who may not have access to supportive contacts within their local community, affirming programing that brings together LGBTQ youth for in-person relationship development shows promise to improve youth mental health trajectories.

This study extends the literature examining the role of social media use in the lives of adolescents and its influence on psychological well-being; however, several limitations should be mentioned. First, participants primarily self-selected into a summer camp program for LGBTQ youth and may not be representative of the general LGBTQ youth population. The study relies on self-reported social media use. The measure captured the quantity of participants' social media use and not perceived quality. Participants' specific social media activities (e.g., social interaction, content consumption) were not assessed. Additionally, participants' potential simultaneous use of social media platforms and applications was not directly assessed. A more direct assessment of social media use (e.g., log data) may be more accurate. However, most empirical studies on online communication and media use rely on self-report measures, and research has shown that asking survey participants to report use of specific online and video-sharing platforms (as was done for this study) is one of the more accurate approaches for measuring duration of online activity (Scharkow, 2016). Likewise, participants' depressive symptoms were not assessed at a third time. Thus, this study does not provide evidence that the reduced depressive symptoms lasted beyond the camp context. Additionally, the depressive symptoms measure assessed participants' depressive symptoms by days in the past week, which may not differentiate between brief symptoms lasting for shorter than 24 hours (which participants may have reported as "1 day") and true full-day symptoms. However, in assessing a range of depressive symptoms over a one-week period, the measure seeks to capture the persistence of depressive symptoms over time and has been used successfully in recent research with LGBTQ youth (Rhoades et al., 2018). Items capturing social support from family, friends, and trusted adults were posed, but data for these were missing not at random, and thus were not used in the final analyses. It is possible that a decrease in conflict and stressors at home, school, and other sites factored into the reduction in depressive symptoms, and the current data did not allow for assessing the impact of such factors.

Promising directions for future work are apparent. Additional longitudinal and experimental studies are needed to test for a causal and/or reinforcing relationship between social media use and psychological distress and to determining the "how, when, and why of" social media's impact on LGBTQ youth mental health. Testing the study's hypotheses with samples

of LGBTQ youth from beyond the current camp sample, with a comparable control group, would further clarify the relative impact of the social media break aspect of camp on participants' psychological well-being, compared to other aspects of the program. This would help practitioners make informed recommendations to distressed LGBTQ youth and their parents as to whether the youth may benefit from simply unplugging from social media or from unplugging in the context of LGBTQ-affirming programing. Access to such programing requires more resources and may not be accessible to all LGBTQ youth who would benefit from it, though numerous LGBTQ youth camps exist nationwide. Given the increasing time adolescents are spending on social media and the potential for it to not resolve psychological distress, scholarly work untangling the effects of LGBTQ adolescents' motivations, identities, and specific social media behaviors on their mental health may be a public health necessity.

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Data availability statement

The data that support the findings of this study are available from the corresponding author, [name and email redacted], upon reasonable request.

Disclosure statement

The authors have no conflicts of interest to report.

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