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Problematic internet use in adolescents and implementation of a social media hygiene protocol



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ABSTRACT

Purpose: This quality improvement project aimed to evaluate whether a social media hygiene education intervention designed for adolescents with problematic internet use (PIU) receiving treatment at a pediatric outpatient mental health clinic reduced PIU and/or improved mental health outcomes in adolescents.

Methods: Participants were 28 adolescents (71.4% females, mean age = 14.2 years) with PIU seeking outpatient mental health treatment. The most common associated diagnoses were anxiety (42.9%) and attention-deficit activity disorder (28.6%). A within-adolescent pre-post design was used to evaluate changes in PIU severity measured by the Generalized Problematic Internet Use Scale-2 (GPIUS-2), depression and anxiety severity was assessed by the Patient Health Questionnaire Anxiety and Depression Scale (PHQ-ADS), and screen time defined as the average hours/day during past 7-days recorded of the adolescent's smartphone. The practice change was an ad hoc social media hygiene education intervention conducted by their provider over five, once-a-week, one-hour telehealth sessions.

Results: A significant reduction in screen time (paired $t = 10.14$, $df = 27$, $p < 0.001$), severity of PIU (paired $t = 12.07$, $df = 27$, $p < 0.001$), and severity of depression and/or anxiety symptoms (paired $t = 8.3$, $df = 27$, $p < 0.001$) was demonstrated. Large effect sizes were observed (Cohen $d = 1.6$ to 2.3). Attendance for each session was 100% for Weeks 1, 2 and 5, 93% for Week 3 and 89% for Week 4.

Conclusion: The findings suggest administration of a social-media hygiene protocol conducted via telehealth may reduce the severity of PIU and improve mental health outcomes in adolescents seeking outpatient mental health treatment.

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Introduction

Social media use has become an integral part of adolescent networking and communication, with up to 95% of adolescents in the United States having access to a smartphone (Abi-Jaoude et al., 2020; Anderson & Jiang, 2018; International Telecommunications Unit, 2017). Adolescents are often the first to acclimate to the usage and evolution of mobile devices, with smartphones often viewed as an extra appendage and participation in online social interaction a seemingly inescapable social norm (Abi-Jaoude et al., 2020). While there are population-specific benefits to social media use such as building interpersonal relationships, creating a personal identity and learning about the world, if used in excess, social media use can become addictive, leading to problematic internet use (PIU).

The prevalence of PIU among adolescents is greater than 26%, associated primarily with the characteristics of their developmental period (Öztürk & Özmen, 2016). Adolescent development is marked by the need to create an independent personal identity and build interpersonal relationships with peers, enabled by social media (Öztürk & Özmen, 2016). Social media can serve as a limitless source of social reinforcement and validation. Societal influences featured on social media play a huge role in influencing adolescent behaviors as they feel pressure to conform (Singh et al., 2020; Telzer et al., 2018).

The epidemiology of PIU has been widely studied, but currently a DSM-V diagnosis does not exist. PIU is categorized as an impulse control disorder, occurring when internet use consumes large portions of individual's social, academic and professional life, depleting their relationships and relationship-building resources (Machimbarrena et al., 2019). PIU is a significant health condition among teens, often leading to altered sleep patterns, physical inactivity and/or a sedentary lifestyle, impaired decision-making, self-destructive behavior and school burnout (Mahdizadeh et al., 2017; Salmela-Aro et al., 2017). PIU is also

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associated with higher levels of mental health conditions including anxiety, depression, suicidal thoughts, conduct problems, and symptoms of attention-deficit hyperactivity disorder (ADHD) (Durkee et al., 2016; Ioannidis et al., 2016). In addition, the chronic sensory stimulation linked to excessive screen time has significant neurodevelopmental implications, showing alterations in the resting-state electroencephalograms (EEGs) of children and adolescents who have engaged in screen time for more than 2 h per day (Christakis et al., 2018; Hutton et al., 2020). Changes in cortical thickness and reduced white matter integrity have been observed in the corpus callosum of the brain in individuals who engage in excessive social media use (He et al., 2018). Adolescents with internet addiction show structural and functional changes in their brain, including decreased inter-hemispheric functional connectivity and prefrontal cortex dysfunction (Bi et al., 2015).

PIU may be identified using the Generalized Problematic Internet Use Scale-2 (GPIUS-2) screening tool, a 16-item self-report of symptoms using a likert scale, 1–6. Scores of greater than 52 indicate risk of PIU.²³ This cutoff score has been used in past studies to identify PIU, for it is indicative of maladaptive cognitions and behaviors related to internet use.²² There is currently no established diagnostic criteria for PIU however, Young¹⁶ suggests modeling the diagnostic criteria for PIU on the DSM-IVs definition of substance use disorder (Young, 1998). PIU resembles substance use disorder and other addictive disorders, as both lead to the release of neurochemicals like dopamine and activate the “pleasure pathway” in the brain (M. Liu & Luo, 2015). The more this pathway is activated, the more the associated receptors become tolerant, requiring subsequent increases in the pattern of behaviors to occur in order to feel the same pleasurable sensation (M. Liu & Luo, 2015). Much like any other addictions, abrupt discontinuation of the stimulus (internet use) causes symptoms of emotional distress and breakdown (J. Liu et al., 2017). The most effective treatment for youths with addictions include cognitive-behavioral approaches, a method supported by robust literature (J. Liu et al., 2017).

Cognitive-behavior therapy (CBT) can disrupt personal patterns of problematic behaviors and reduce symptoms of PIU, as demonstrated in a 2018 study of adolescents ($n = 17$) aged 12–17 (Kim et al., 2018). Findings from the study indicate that adolescents have an improved ability to function in offline relationships and control their compulsive computer use post-intervention. Impressively, participants sustain these positive outcomes, with similar results recorded at their one-month follow-up assessment. One of the first studies demonstrating effective treatment of PIU in adolescents using a cognitive-behavioral approach showed reduction of depression, anxiety, compulsiveness symptoms, self-blame, and illusion among participants (Li & Dai, 2009).

Implementing therapeutic programs such as one-on-one and group therapy with a trusted, established provider has positive influence on adolescent behavior and has the potential to reduce PIU and social media overuse (Vondráčková & Gabrhelík, 2016). Peer-group therapy has been studied in youth demonstrating positive outcomes, including improved self-regulation, avoidance of high risk behaviors and improved resiliency, which has implications for PIU treatment.²¹ Additionally, implementing therapeutic programs with peer input about behavioral addictions such as PIU has shown to have a positive influence on adolescent behavior (Vondráčková & Gabrhelík, 2016). Other interventions for prevention and treatment of PIU that have been studied include restricting screen time,³⁴ enhanced family engagement which includes no phones/social media at meal time, and established social media use in homes, including a central docking station for all mobile devices and limiting social media before bedtime. For adolescents, family-based interventions that improve communication and teach family monitoring of internet use are beneficial, as parents play an invaluable role in helping to decrease the risk of internet addiction and social media overuse (Vondráčková & Gabrhelík, 2016). Most current recommendations for treating internet addiction focus on and involve the parents of the children and adolescents at risk (Lam, 2015; Vondráčková & Gabrhelík, 2016).

The purpose of this quality improvement (QI) project was to implement a social media hygiene intervention designed for adolescents with PIU receiving outpatient mental health treatment. The project specifically aimed to evaluate social media use and mental health symptoms among teens with PIU following the intervention.

Methods

Design

A within-adolescent pre-post design was used to evaluate changes in social media usage and mental health outcomes among adolescents with PIU seeking outpatient mental health care who received an ad hoc social media hygiene education intervention administered by their provider over five, once-a-week sessions. PIU was assessed using the Generalized Problematic Internet Use Scale-2 (GPIUS-2), mental health status was assessed using the Patient Health Questionnaire Anxiety and Depression Scale (PHQ-ADS). Outcomes were measured at the participant's initial clinical visit immediately preceding (pre-intervention) and immediately following completion of intervention (post-intervention). Recruitment occurred during March and April 2020. This QI project was deemed exempt from Institutional Review Board review.

Setting

The setting for implementation was a nurse practitioner owned and fully staffed, pediatric outpatient behavioral health clinic in North Carolina. The clinic provides assessment and treatment for an average of 70–80 patients (aged 2–21 years) with mental and behavioral health conditions per week. Nearly half of the patients (46%) are adolescents between the age of 12–18. The practice accepts most private insurances and NC Medicaid, which makes up around 65% of the patient population for the clinic.

Participants

Participants were adolescents identified and recruited for volunteer participation in the intervention during the routine care (counseling and/or medication management) at the clinic. Inclusion criteria were: (1) adolescent, age of 12 to 19 years; (2) new or established patients seeking outpatient behavioral health care; and (3) a positive screening for PIU according to the screening assessment on the GPIUS-2, defined as total score of 52 or greater. A diagnosis of an intellectual disability as defined by the DSM-5 was an exclusion.

Intervention

The intervention entailed a patient-centered education protocol using current screen time recommendations from the American Academy of Pediatrics as well as visual materials from internet blogs that focused on reducing internet-use and increasing social media awareness. The intervention for each participant was comprised of five, one-hour telehealth sessions completed over the course of five weeks. The sessions included 1) an initial teen-family session, 2) three peer group sessions, and 3) a final individualized session. During recruitment period, participants were divided into two cohorts based on the recruitment month: 16 participants in the first cohort (March) and 12 in the second (April). Each cohort was split into evenly distributed smaller peer groups (8/group in first cohort and 6/group in second) to ensure management of the group facilitation by the provider/facilitator during the sessions.

The intervention involved a two-phase implementation process. In the first phase, all staff in the practice, including two pediatric nurse practitioners, counselor(s), receptionist(s), medical assistant, and nursing student(s) were educated on the project aims and procedures. A staff meeting was held to discuss anticipated needs or questions related

to the project, and the screening tools were described and prepared for administration.

The second phase of the intervention was the implementation of the hygiene/education protocol and targeted PIU therapy, conducted via telehealth (Zoom video platform) due to office closure for SARS-COVID-19 precautions. This mode of care delivery allowed participants to access the groups on their mobile devices and communicate with provider easily throughout the intervention, and allowed for increased group participation in weekly sessions by removing the potential barrier of travel.

The social media hygiene education was carried out over the course of the five consecutive weekly sessions in which the participants' progress was addressed. Each session was conducted in an iterative fashion; all included talking points (Table 1) focused on social media hygiene education. Information from the education protocol was shared with all participants on-screen during the Zoom sessions and served as a guide for the session discussion topics. These educational talking points were then emailed to participants at the conclusion of the session. Historically, distributing an educational tool has a positive effect on knowledge retention and enables dissemination of health-related information in a short time (Schipper et al., 2016).

The first weekly session was a standardized telehealth visit which included the provider, participant, and family (at least one parent), and involved a discussion of the consequences of PIU. Scores designated on the baseline GPIUS-2 and PHQ-ADS assessments were reviewed. At this visit, strategies to limit total screen time as a family unit were discussed, and included: 1) setting time limits on social media apps; allowing access for 30 min a day; 2) no screens at least 1 h before

bedtime, and 3) central docking (charging all devices in the same location at night) for all family devices.

Sessions 2–4 involved online peer group meetings facilitated by the provider. These sessions included a brief check in with one another, then group-centered discussion. Each session ended with participants identifying a positive, self-affirming statement about themselves, write it in their provided diary/internet use log, and read it daily. The second peer-group session highlighted healthy internet and social media use, and applications that are risky versus safe. The final online peer-group reiterated information from the previous sessions and served to monitor adherence.

The fifth and final session was an individual session with participants to review areas of strength and difficulty, reinforce daily self-affirmations and reduced social media use and complete GPIUS-2 and PHQ-ADS assessments.

Measures

The participant's total screen time was assessed pre- and post-intervention. To measure total screen time, participants were asked to take and share a "screenshot" of their smartphone's battery use, a figure that is automatically recorded by the operating systems in most smartphones (Gower & Moreno, 2018). The figure is recorded in hours and minutes, showing total screen time and usage of individual apps. The information for the past 24-h and the average in hours/day over a 7-day period were available. Participants shared their 7-day average, recorded in hours per day. Total screen hours were recorded and documented in the participant's EHR during the initial session. This approach has been used to obtain objective measure for screen time and avoid the systematic and confounding biases (Gower & Moreno, 2018) to which self-reporting is vulnerable.

Permission for use in this project was granted by original author of the GPIUS-2, Dr. Scott Caplan. The GPIUS-2 at the pre-assessment was used to identify and assess the current severity of PIU. Those with a GPIUS-2 total score 52 or greater were offered the intervention. Post-intervention GPIUS-2 scores were obtained during the final session. The GPIUS-2, one of the few theory-based measures of internet addiction, has been validated worldwide (Caplan, 2002). The instrument consisted of 15 statements organized into five subscales: 1) preference for online social interaction, 2) mood regulation, 3) cognitive preoccupation, 4) compulsive internet use and 5) negative outcomes, all related to internet use (Caplan, 2002). Each statement was scored using a Likert-scale format, with self-reported ratings ranging from 1 "strongly disagree" to 7 "strongly agree." For the five subscales, Cronbach's alpha internal consistency scores have ranged from 0.62 (cognitive preoccupation) to 0.82 (mood regulation) (Barke et al., 2014). Subscale scores were calculated by summing the items comprising the scale. A GPIUS-2 total score was derived by summing the five subscale scores, with higher total score indicating greater severity of PIU. The primary outcome of interest was the GPIUS-2 total score.

Mental health was assessed using the Patient Health Questionnaire and Anxiety and Depression Scale (PHQ-ADS) at the pre- and post-intervention assessments. The PHQ-ADS is a 16-item screening instrument that assesses symptoms over the past 2 weeks, and combines the Patient Health Questionnaire (PHQ-9) and Generalized Anxiety Disorder Scale (GAD-7). The latter two instruments are commonly used screening tools for depression and anxiety in patients aged 12 years and older, and the combined PHQ-ADS has demonstrated high internal reliability with a Cronbach's alpha of 0.80 to 0.90 (Kroenke et al., 2016). Both the PHQ-9 and the GAD-7 use a Likert-scale format asking participants to score their DSM-V symptoms of depression and anxiety from "0=not at all," to "3=nearly every day." Depression total scores on the PHQ-9 range from 0 to 27, with higher scores indicating more severe depression. Similarly, the GAD-7 anxiety total scores range from 0 to 21, with higher scores indicating more severe anxiety. The PHQ-ADS combines the 16 items to derive a depression and anxiety total score, ranging from 0 to 48. Total scores from the PHQ-ADS are often used to

Table 1

Intervention talking points.

What leads to social media "addiction"?

Instant gratification. When you are looking for attention or reward, all you have to do is open up Instagram or send a Snap and your brain interprets as having acted, thus releasing feelings of pleasure as a reward.

Versus incomplete gratification. Never fully satisfied, feel compelled to keep going back to check on status of post.

Stimuli, followed by anticipation and then conditioning. Notifications (which pop up randomly) and alerts trigger dopamine response. Your brain begins to anticipate dopamine-triggering stimuli (notifications/alerts) before they happen. Can cause "social media withdrawal" – a compulsive need to check social media if you've gone too long without any dopamine triggers. Compulsion to post new content for likes, feedback.¹⁸

Discussion of negative side of social media.

False reality. People selectively post what they want others to see. Filtered content, curated.

Time-suck! Hours can go by without awareness of anything outside social media.

Potential privacy invasion. Is your profile private? Who do you "accept" as a friend or send requests to?

Strategies to reduce use reviewed.

Mindfulness

- Go somewhere and leave your phone at home
- Spend time in nature – take a walk around your neighborhood or to the park
- Schedule a video chat with friends of family
- Engage in an offline activity – crafts, reading a book, cooking, creating art
- Write in a journal about something other than social media! Ideas: Gratitude
- Learn a new skill or hobby – what have you always wanted to try?
- Involve family in game night, family meals²¹

Journaling. Log your use of social media. What compelled you to use it? How long did you stay on? What did you get out of the experience, emotionally and relationally?

Detox challenge!

Turn off all notifications – no pop ups! Inhibits the dopamine-trigger.

Unfollow accounts that do not lift you up, or make you feel negative.

Deactivate accounts, or take it a step further - uninstall social media apps.

When you're tempted to open an app to scroll, it won't be there!

Additional recommendations:

Alarm clock instead of phone for alarm³⁴

Central docking – charge phone anywhere but bedroom, no screens 2 h before bed and only after you finish your morning routine

When with family or friends, challenge yourself not to check your phone

No scrolling at mealtimes²¹

categorize severity of depression and anxiety symptoms as minimal (0–9), mild (10–19), moderate (20–29) or severe (30–48) (Kroenke et al., 2016).

Patient adherence to the intervention was evaluated through the providers' recording of weekly attendance. Attendance was documented at the start of each session.

Data collection

Staff administered the GPIUS-2 and PHQ-ADS to all adolescents aged 12–17 prior to meeting with the provider with their routine check-in paperwork. The forms were briefly explained to the adolescents by intake nursing staff and further discussed during the visit with their provider, who then scored the GPIUS-2 and PHQ-ADS and entered the scores into the patient's EHR. At this same visit, patients who screened positive for PIU on their pre-assessment GPIUS-2 also completed a pre-assessment PHQ-ADS. After scoring, the provider discussed the results of the screenings with the patient and parent. If the individual screened positive for PIU, the voluntary education intervention was recommended as part of their plan of care.

Data analysis

Descriptive statistics were used to summarize the sample characteristics, participant adherence, and pre-and-post intervention outcomes. Non-directional statistical tests were conducted with the level of significance set 0.05 for all tests. Paired t-tests were used to test for significant changes in severity of PIU and mental health outcomes. Effect sizes and their 95% confidence intervals (CIs) were used to address clinical significance.

Results

A total of 125 adolescents age of 12 to 19 years seeking outpatient behavioral health care were invited to complete the GPIUS-2 during the three-month recruitment period, January through March 2020. Among the 125 approached, 75 completed the pre-intervention assessment. None of the 125 had an intellectual disability diagnosis. The GPIUS-2 total scores ranged from 26 to 122, and 50 of the 75 adolescents had a positive PIU screen as indicated by a total score of ≥52. Of the 50 who met the eligibility criteria, 22 did not receive the intervention due to scheduling conflicts. Therefore, the analysis sample included 28 adolescents with PIU. All 28 completed the pre- and post-intervention assessments.

The mean age of the 28 participants was 14.2 (SD = 1.9, range 12 to 17) years, consisting of primarily females (71.4%). The most common DSM-V mental health diagnoses among participants were anxiety (42.8%), depression (17.8%), ADHD (28.5%), and adjustment disorder with mixed emotions (10.7%).

Table 2 summarizes in the PIU and mental health results at the pre- and post-assessments as well the pre-minus-post difference scores. A significant improvement (reduction) was demonstrated for screen time as measured by average hours per day in the past 7-days ($t = 10.14, df = 27, p < 0.001$), severity of PIU as measured by the GPIUS-2 total scores ($t = 12.07, df = 27, p < 0.001$), and severity of depression and/or anxiety as indicated by the PHQ-ADS total scores ($t = 8.3, df = 27, p < 0.001$). For each outcome, large effect sizes were observed

(Cohen $d = 1.6$ to 2.3). Given the large effect sizes, the sample size of 28 provided 99% statistical power for each paired t-test.

Participants reporting 10 or more hours of screen time per day dropped from 21.4% ($n = 6$) during the pre-assessment to 7.1% ($n = 2$) during the post-assessment. Although a significant reduction in severity of PIU was found, only 3.6% ($n = 1$) of the adolescents had a GPIUS-2 total score less than 52 during the post-assessment. Prior to the intervention, the percent of adolescents with moderate to severe depression and/or anxiety was 71.4% ($n = 20$) during to pre-assessment compared to 60.7% ($n = 17$), with moderate-severe defined as a PHQ-ADS total score of 20 or greater.

Weekly attendance fluctuated over the course of the 5-week intervention period (see Fig. 1). All participants attended Weeks 1, 2 and 5; whereas, the attendance was 93% for Weeks 3 and 89% for Week 4.

The participants reported that the most meaningful recommendation reviewed with participants during the intervention were: 1) family docking station centrally located, 2) turning off all social media during family meal times, 3) encouraging outdoor activity without the mobile device and 4) using an alarm clock that was NOT the mobile device.

Discussion

The use of social media in the adolescent population increases annually, and with it, the prevalence of PIU and related behavioral and cognitive maladaptions (Hutton et al., 2020; Durkee et al., 2016; Singh et al., 2020). Use of interventions which prevent PIU and effectively treat the condition are critically important to pediatric and adolescent healthcare providers. Findings from this project align with prior studies, demonstrating education, family support and peer-mentoring may be effective strategies to reduce problematic social media and internet use. The ad hoc social media hygiene intervention showed a reduction in participant symptoms of PIU, depression and/or anxiety and in total screen hours.

This project highlights the clinical value of offering social media hygiene education for the treatment of PIU, in opportune settings such as virtual or telehealth, particularly for the adolescent population who are accustomed to online communication. While this approach may seem counterintuitive in reducing social media use, the telehealth application provided the opportunity for participants to engage in peer-group activities which may have been more difficult to schedule or attend in-person. Healthcare appointment "no show" rates are historically high among youth. The virtual setting allowed for more flexibility in scheduling and proved very effective in the adolescent population, helping to address the concern for participation adherence. The findings indicate that clinicians can address the unprecedented but inevitable use of social media during adolescence and treat PIU in a therapeutic, effective way.

Limitations

One limitation to be considered is the small sample size of 28. Because of large effect sizes, the sample size provided at least 80% power to detect significant change at the 0.05 significance level. A larger sample size with greater heterogeneity of mental health diagnoses would have been beneficial increased the external validity of the findings.

Table 2
Pre- and post-intervention piu and mental health outcomes (N = 28).

Outcome	Pre Mean ± SD (min, max)	Post Mean ± SD (min, max)	Pre-Post Difference Mean ± SD (min, max)	Paired t-test P-value	Cohen d (95% CI)
Screen time, in hours per day	7.2 ± 3.7 (2.0, 16.0)	4.0 ± 2.8 (0.5, 11.0)	3.2 ± 1.7 (0.0, 7.0)	<0.001	1.9 (1.3, 2.5)
GPIUS-2 total score	86.5 ± 15.1 (57.0, 122.0)	70.3 ± 14.8 (49.0, 99.0)	16.3 ± 7.1 (5.0, 29.0)	<0.001	2.3 (1.6, 3.0)
PHQ-ADS total score	27.5 ± 9.2 (12.0, 42.0)	21.4 ± 8.7 (4.0, 38.0)	6.1 ± 3.9 (0.0, 15.0)	<0.001	1.6 (1.0, 2.1)

SD=Standard Deviation; CI=Confidence Interval; Screen time = average hours per day during the past 7-days; GPIUS-2 total score = severity of PIU; PHQ-ADS total score = severity of depression and/or anxiety; Pre- and post-intervention score: Higher scores indicate greater severity; Pre-Post Difference: Greater positive difference scores indicate greater improvement (greater reduction in total scores). Pre-Post difference skewness scores were less than 0.20; Cohen d effect size cutoffs: 0.20 = small, 0.50 = medium, 0.80 = large effects.

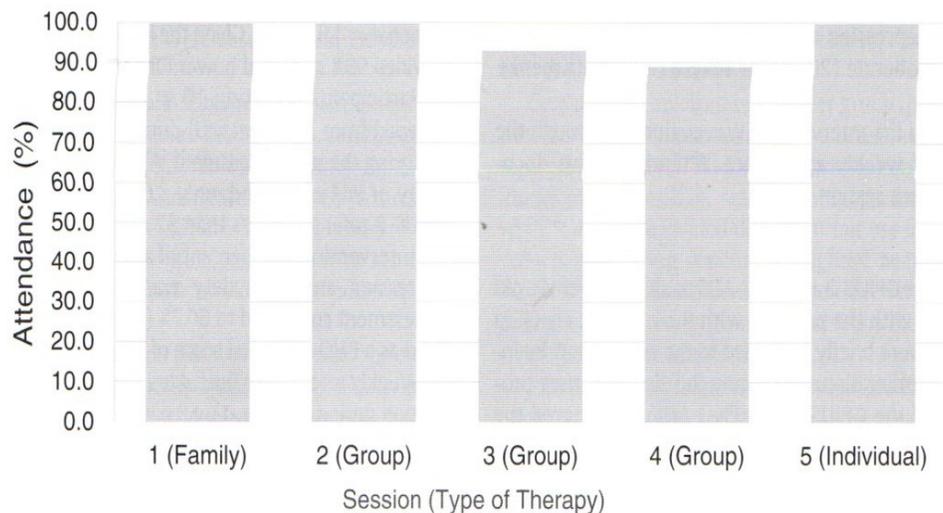


Fig. 1. Weekly intervention attendance.

Additionally, the intervention began in the initial months of the SARS-COVID-19 pandemic. Part of the social media hygiene intervention emphasized the benefits of offline, face-to-face social communication and engaging in outdoor activities with peers, two recommendations that were restricted by pandemic precautions. While the peer-group intervention was adaptable and easily modified to telehealth, more flexibility in offline activities may have resulted in even greater improvements in mental health outcomes and would be worth exploring in a post-pandemic environment. Lastly, only one participant scored <52 on their post-intervention GPIUS assessment, while all remaining participants had scores that continued to indicate PIU. Given the reduction in total GPIUS and PHQ-ADS scores following the intervention, continuing the social media hygiene protocol for a longer period of time could prove beneficial and help further reduce GPIUS and PHQ-ADS scores.

Future directions

It is likely PIU screening could be expanded to younger, pre-adolescent patients so that PIU prevention strategies are intergrated in the clinical setting. Equally as important is assessing the sustainability of the PIU and mental health outcomes over time using periodic GPIUS and PHQ-ADS measurements, and incorporating the knowledge gained from this project in routine patient education for those with PIU and those at risk as a method of health promotion and prevention. Further, carrying out the intervention in a face-to-face format and offering the education bundle as in-person group therapy sessions would be an important modification as the practice continues to promote the mental health benefits of offline social interaction.

Conclusions

Results from this project support the use of a social-media hygiene protocol as part of a treatment plan to effectively reduce PIU and improve mental health outcomes in adolescents seeking behavioral and mental health treatment.

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Declaration of Competing Interest

All authors report no potential conflicts of interest, real or perceived.

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