An Assessment of Digital Media-related Admissions in Psychiatrically Hospitalized Adolescents

Meredith Gansner¹,*, Erin Belfort¹,², Caroline Leahy¹,⁴, Danielle Mirda¹,⁵ and Nicholas Carson¹,³

¹Department of Psychiatry, Cambridge Health Alliance, Cambridge, MA, 02139, USA; ²Maine Medical Center, Portland, ME, USA; ³Health Equity Research Lab, Cambridge Health Alliance, Cambridge, MA, 02139, USA; ⁴Duke University School of Medicine, Durham, NC, USA; ⁵George Washington University School of Medicine, Washington, D.C., USA

Abstract: Background: Prevalent adolescent digital media use has brought clinical attention to its potential associated risks. While excessive digital media use has been connected to adolescent difficulties with mood and impulsivity, no study has examined digital media’s role in precipitating adolescent psychiatric admissions.

Objective: Our study aims were to identify and characterize digital media-related admissions in a sample of psychiatrically hospitalized adolescents, and to recognize unique patterns of digital media use within this sample. We hypothesized that adolescents with digital media-related admissions would endorse higher amounts of digital media use and problematic online behaviors.

Methods: We administered a cross-sectional survey of psychiatrically hospitalized adolescents between 2012 and 2016. Admissions were considered related to digital media use either by adolescent report or documentation in the medical record. Unadjusted comparisons were used to examine relationships between digital media-related psychiatric admissions, online behaviors and suicide-related risk factors.

Results: 68 of 218 participants (31.2%) had digital media-related admissions. The most frequent cause of digital media-related admission was cyberbullying (31.9%). Teens with digital-media related admissions were significantly more likely to sext, use social media, and be cyberbullied; these adolescents were also at increased risk of suicide planning and hopelessness.

Conclusion: Efforts should be made by mental health clinicians to identify and address online relational conflict, as well as to screen for cyberbullying and sexting. Clinicians should consider that adolescents with digital media-related presentations may be at elevated risk of self-harm, with higher rates of suicide planning and hopelessness compared to hospitalized peers with admissions unrelated to digital media.

Keywords: Adolescent, psychiatric hospitalization, internet, social media, cyberbullying, sexting.

1. INTRODUCTION

Digital media have become a mainstay in the lives of American teenagers, with an estimated 20% of teens viewing screens for more than 10 hours per day (Lenhart, 2015; Rideout, 2015). Co-occurring with this digital media use are new hazards specifically related to its use. For a proportion of teens, problematic Internet use (PIU) or Internet addiction may develop, defined as Internet use that is uncontrollable and markedly distressing, with significant social or occupational consequences.
Digital Media-related Admissions

Adolescent Psychiatry, 2019, Vol. 9, No. 3

221

(Shapira, Goldsmith, Keck, Khosla, & McElroy, 2000). PIU appears to resemble other addictive and impulse control disorders in its neurobiological profile, including an increased nucleus accumbens size and abnormalities within the insula and anterior cingulate cortex (Altbäcker et al., 2015; Ioannidis et al., 2016; Shapira et al., 2000; Zhang et al., 2016; Zhou et al., 2011). Digital media use also exposes teenagers to unique potential dangers including cyberbullying and taking online relationships into real-world unsupervised settings (Gámez-Guadix, Borrajo, & Almendros, 2016). 15\% of teenagers report being exposed to unwanted sexual content online and YouTube videos may glamorize or encourage risky behaviors such as non-suicidal self-injury (Lewis & Seko, 2016; Ybarra, Espelage, & Mitchell, 2007). In addition to these newfound risks, and potentially associated with them, increased Internet and social media use have also been connected to a higher risk of depression, suicidal ideation, and attempting suicide (Durkee et al., 2012; Kross et al., 2013; Twenge, Joiner, Rogers, & Martin, 2017).

Coinciding with the increased prevalence of digital media is a rise in both adolescent psychiatric illness and adolescent inpatient psychiatric admissions (Mojtabai, Olfson, & Han, 2016); some researchers have hypothesized that digital media may be in some part related to these findings (Twenge et al., 2017). However, no data have been published that support the causal link between the use of digital media and inpatient psychiatric admissions. Youth with pre-existing psychiatric illnesses, or who are predisposed to the development of psychiatric disorders, may be at an elevated risk of distress related to digital media (Rideout & Fox, 2018), and psychiatrically hospitalized adolescents with PIU may be at an elevated risk of depression, suicide attempts and planning compared to their hospitalized peers without PIU (Gansner et al., 2018; Muller, Ammerschlager, Freediving, Beutel, & Wolfing, 2012). To our knowledge, no study has described how digital media might be related to adolescent inpatient psychiatric admissions.

Our study’s objective was two-fold: as no prior study has outlined associations between digital media and psychiatric inpatient admissions in an adolescent sample, we first wanted to characterize and describe the sample of admissions that were found related to digital media use in this specific population. Secondly, we wanted to identify unique behavioral patterns of digital media use, and diagnoses associated with digital media use, within this sample. We hypothesized that adolescents with digital media-related admissions would endorse higher rates of both digital media use and problematic online behaviors. Additionally, given prior associations found between depression, suicide-related behaviors and amount of screen time, we hypothesized that adolescents with digital media-related admissions would also be at increased risk of depressive disorders and suicidality compared to peers with admissions unrelated to digital media. Adolescent patients with a history of psychiatric hospitalization represent a complicated and high-risk patient population for most mental health clinicians and pediatric providers, and our findings might help to direct and focus digital media-related screenings within this specific subset.

2. METHODS

We surveyed patients hospitalized on an adolescent psychiatric unit at a hospital in the greater Boston area between February 2012 and June 2016. Participants were between the ages of 12 and 20 years and had either English language capacity or the ability to complete the survey with an in-person interpreter. Exclusion criteria were moderate to severe intellectual disability (as documented by inpatient clinical staff) or emotional distress at the time of attempted administration (as reported by either clinical staff or the adolescent). Subjects completed the surveys independently using pencil and paper.

2.1. Ethical Approval and Informed Consent

Written parental/guardian consent and patient assent were obtained prior to survey administration. The study was approved by the health system’s Institutional Review Board.

2.2. Instruments

The survey assessed both quantitative and qualitative aspects of an adolescent’s digital media use. Multiple choice questions inquired about a participant’s online behaviors (e.g. cyberbullying, sexting, parental monitoring) and asked participants to estimate the extent of digital media use. The survey also included a PIU screening tool based on the Minnesota Impulsive Disorder Inven-
tory (MIDI) that has been used to assess adolescent PIU in prior research, and is well-validated for other impulse control disorders within our target population, with a test-retest reliability of 0.95 (Chamberlain & Grant, 2018; Grant, Levine, Kim, & Potenza, 2005; Grant, Williams, & Potenza, 2007; Liu, Desai, Krishnan-Sarin, Cavallo, & Potenza, 2011). Additionally, this tool is brief and easy to understand, with fewer, less complex questions as compared to validated measures like the PRIUSS scale (Jelenchick et al., 2014). This usability helped accommodate potential cognitive and literacy difficulties frequently experienced by psychiatrically hospitalized adolescents. To score positive, the participant would have to reply in the affirmative to all of the following 3 questions: 1) “Have you ever experienced an irresistible urge or uncontrollable need to use the Internet?” 2) “Have you ever experienced a growing tension or anxiety that can only be relieved by using the Internet?” and 3) “Have you ever tried to cut back on your Internet use?” Adolescents were told to answer questions based on their symptoms and behaviors prior to the psychiatric hospitalization. The survey included the Patient Health Questionnaire 2 (PHQ-2) (Richardson et al., 2010) to screen for depressed mood, where a positive screen was a score of 3 or higher (α = 0.84) (Minnesota Department of Health, 2017). Items from the Youth Risk Behavior Survey (YRBS) (Centers of Disease Control and Prevention, 2017) assessed for hopelessness, suicidal ideation and planning, and number of suicide attempts within the last year: “Did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?”, “Did you ever seriously consider attempting suicide”, “Did you ever make a plan about how you would attempt suicide?”, and “How many times did you actually attempt suicide?” The number of suicide attempts was dichotomized to a “yes” or “no” answer with 0 attempts as “no” and ≥1 attempt as “yes.” We also asked adolescents how many times they had engaged in non-suicidal self-injury (NSSI) within the last year, again dichotomized to a “yes” or “no” answer, with 0 times as “no” and ≥1 time as “yes.” Additionally, electronic health records from these admissions were reviewed for records of suicidal ideation, planning, attempts and non-suicidal self-injury in the year prior to admission.

Determination of digital media-related admissions was through one of two methods: the subject self-identified the admission as related to digital media, or through review of the participant’s electronic health record. The history of presenting illness from the admission note for each of these 218 psychiatric admissions was reviewed by the first author to assess if the admission was related to digital media use: 22 digital media-related search terms (Appendix 1) were searched for in each admission note to screen in a potential digital media-related admission. If one of these terms was identified, the history of presenting illness was then read through comprehensively to determine whether the admission itself was related to digital media use.

Associations between digital media-related admissions and demographic variables, online activities and mood symptoms were tested using unadjusted comparisons (e.g. t-test or chi-square). Digital media-related admissions were categorized into four overall groupings: admissions due to digital media content (e.g. suicidal ideation expressed through digital media), digital media removal (e.g. homicidal ideation after digital media device removal), relational problems through digital media (e.g. cyberbullying), and excessive use of digital media.

Finally, all psychiatric discharge diagnoses were obtained from the participant’s discharge summary that had been completed in the electronic medical record by the treating psychiatrist. For the purpose of analyses, diagnoses were organized into larger diagnostic categories, which can be seen in Supplementary Table 1. Associations between digital media-related admissions and diagnoses were assessed using chi-square tests. Chi-square tests were also used to assess associations between discharge diagnoses and the participant’s engagement in recent sexting and cyberbullying.

3. RESULTS

3.1. Demographic Associations

Demographic information for the sample is presented in Table 1. Consent was sought from 555 patients over 4 years; 218 participants (39.3%) completed the survey questions (62% female, mean age 15.6 years). White non-Hispanic females made up the largest percentage of survey respondents. There were no differences in age, gender or ethnicity between those with and without digital-media related admissions.
3.2. Digital Media-related Admissions and Online Behaviors

Adolescents admitted for digital media-related complaints were more likely to utilize social networking (p<.005), but did not appear to have greater quantitative use of texting or Internet use per day (Table 2). Examining risky online behaviors, those individuals with digital-media related admissions were more likely to have been cyberbullied (p<.005) and engage in sexting (p<.05), but did not appear to have higher rates of PIU (Table 3).

Table 1. Demographic comparisons.

|                          | Admission Related to Digital Media (n=68) | Admission Unrelated to Digital Media (n=150) | $\chi^2/t$-statistic | p-value |
|--------------------------|------------------------------------------|---------------------------------------------|----------------------|---------|
| Age, mean                | 15.3                                     | 15.7                                       | -1.88                | 0.06    |
| Gender (female): % (n)   | 66.2% (45)                               | 60.0% (90)                                 | 0.76                 | 0.38    |
| Ethnicity/Race: % (n)    |                                          |                                             |                      |         |
| Asian                    | 2.9% (2)                                 | 4.0% (6)                                   | 0.15                 | 0.70    |
| Biracial                 | 4.4% (3)                                 | 7.3% (11)                                  | 0.67                 | 0.42    |
| Black                    | 13.2% (9)                                | 12.0% (18)                                 | 0.80                 | 0.07    |
| Latino                   | 26.5% (8)                                | 20.7% (31)                                 | 2.53                 | 0.11    |
| White                    | 67.6% (46)                               | 56.0% (84)                                 | 2.64                 | 0.10    |

Table 2. Comparisons of types and amount of digital media use.

|                          | Admission Related to Digital Media (n=68) | Admission Unrelated to Digital Media (n=150) | $\chi^2$ | p-value |
|--------------------------|------------------------------------------|---------------------------------------------|---------|---------|
| Type of Use: % (n)       |                                          |                                             |         |         |
| Virtual Worlds           | 17.6% (12)                               | 14.0% (21)                                 | 0.48    | 0.49    |
| Gaming                   | 75.0% (51)                               | 67.3% (101)                                | 1.30    | 0.25    |
| Social Networking        | 97.1% (66)                               | 83.3% (125)                                | 8.12    | 0.004   |
| Amount of Use: % (n)     |                                          |                                             |         |         |
| Internet Use > 5 hours/day| 51.5% (35)                               | 46.7% (70)                                 | 0.43    | 0.51    |
| Sends >45 texts/day      | 54.4% (37)                               | 54.0% (81)                                 | 0.00    | 0.96    |

Table 3. Comparisons of risky digital media use.

|                          | Admission Related to Digital Media (n=68) | Admission Unrelated to Digital Media (n=150) | $\chi^2$ | p-value |
|--------------------------|------------------------------------------|---------------------------------------------|---------|---------|
| Type of Use: % (n)       |                                          |                                             |         |         |
| Cyberbullied             | 41.2% (28)                               | 22.0% (33)                                 | 8.54    | 0.003   |
| Sexting                  | 39.7% (27)                               | 24.0% (36)                                 | 5.62    | 0.02    |
| Viewing pornography      | 33.8% (23)                               | 29.3% (44)                                 | 0.44    | 0.51    |
| PIU                      | 17.6% (12)                               | 10.7% (16)                                 | 2.04    | 0.15    |
| No parental monitoring   | 62.1% (41)                               | 60.8% (76)                                 | 0.03    | 0.86    |

Note: PIU = Problematic Internet Use.
3.3. Digital Media-related Admissions and Suicide-related Behaviors

Adolescents with digital-media related admissions were not at increased risk of recent depression; however, in the year prior to their admissions, these adolescents were more likely to have felt hopelessness and planned for suicide (p<.05), despite no apparent increase in self-injurious behavior through non-suicidal self-injury or suicide attempts (Table 4).

3.4. Types of Digital Media-related Admissions

68 of 218 subjects (31.2%) were determined to have psychiatric admissions related to digital media use; however, 7 subjects (10.3%) endorsed having a digital-media related admission but chose not to explain why and did not have an identifiable digital-media related admission in their health record admission note, and 8 subjects (11.8%) had admissions related to multiple digital-media related chief complaints (e.g. cyberbullied and voiced suicidal ideation on social media). Therefore, there was a net total of 69 identifiable digital media-related chief complaints among these 68 admissions.

The most common grouping of digital media-related admission was “relational problems through digital media” present in 38 (55.1%) of 69 chief complaints. A sample of relational problems that contributed to digital media-related admissions can be seen in Table 5 in the form of verbatim explanations provided by survey participants. The most common specific chief complaint within these four groupings was “cyberbullying” that accounted for 22 (31.9%) of all 69 identified chief complaints. The breakdown of specific chief complaints by grouping can be seen in Fig. (1).

3.5. Discharge Diagnoses: Associations with Digital Media-related Admissions, Cyberbullying and Sexting

Discharge diagnoses related to family conflict were significantly associated with digital media-related admissions, cyberbullying, and sexting (p<.05) (Table 6-8). Additionally, adolescents with diagnoses of bipolar disorder were more likely to engage in sexting (p<.05) (Table 7), and adolescents with diagnoses of borderline personality disorder and trauma or stress-related disorders were more likely to have been cyberbullied within the last year (p<.05, p<.005 respectively) (Table 8).
Fig. (1). Category groupings of digital media-related psychiatric admissions.

Table 6. Associations between discharge diagnoses and digital media-related admissions.

| Disorder: % (n)                  | Admission Related to Digital Media (n=68) | Admission Unrelated to Digital Media (n=150) | χ²  | p-value |
|---------------------------------|------------------------------------------|---------------------------------------------|-----|---------|
| Adjustment Disorders            | 5.9% (4)                                 | 2.7% (4)                                    | 1.37| 0.24    |
| Aggressive Disorders            | 2.9% (2)                                 | 1.3% (2)                                    | 0.67| 0.41    |
| Anxiety Disorders               | 38.2% (26)                               | 32.7% (49)                                  | 0.64| 0.42    |
| ADHD                            | 5.9% (4)                                 | 8.0% (12)                                   | 0.31| 0.58    |
| Bipolar Disorders               | 2.9% (2)                                 | 2.7% (4)                                    | 0.01| 0.91    |
| Borderline Personality Disorders| 1.5% (1)                                 | 0.7% (1)                                    | 0.33| 0.56    |
| Depressive Disorders            | 91.2% (62)                               | 87.3% (131)                                 | 0.68| 0.41    |
| Developmental Disorders         | 8.8% (6)                                 | 5.3% (8)                                    | 0.95| 0.33    |
| Eating Disorders                | 1.5% (1)                                 | 2.0% (3)                                    | 0.07| 0.79    |
| Factitious Disorders            | 0.0% (0)                                 | 0.7% (1)                                    | 0.46| 0.50    |
| Family Conflict                 | 2.9% (2)                                 | 0.0% (0)                                    | 4.45| 0.04    |
| Oppositional Defiant Disorder   | 2.9% (2)                                 | 4.0% (6)                                    | 0.15| 0.70    |
| Psychotic Disorders             | 8.8% (6)                                 | 6.7% (10)                                   | 0.32| 0.57    |
| Somatic Symptom Disorder        | 0.0% (0)                                 | 0.7% (1)                                    | 0.46| 0.50    |
| Substance Abuse Disorders       | 13.2% (9)                                | 15.3% (23)                                  | 0.16| 0.69    |
| Tic Disorders                   | 0.0% (0)                                 | 0.7% (1)                                    | 0.46| 0.50    |
| Trauma or Stress Related Disorders| 14.7% (10)|                              | 23.3% (35)                                  | 2.13| 0.14    |

Note. ADHD: Attention Deficit and Hyperactivity Disorder.
Table 7. Associations between discharge diagnoses and sexting.

| Disorder: % (n) | Sexting (n=63) | No Sexting (n=155) | $\chi^2$ | p-value |
|-----------------|----------------|-------------------|---------|---------|
| Adjustment Disorders | 1.6% (1) | 4.5% (7) | 1.09 | 0.30 |
| Aggressive Disorders | 1.6% (1) | 1.9% (3) | 0.03 | 0.86 |
| Anxiety Disorders | 33.3% (21) | 34.8% (54) | 0.04 | 0.83 |
| ADHD | 7.9% (5) | 7.1% (11) | 0.05 | 0.83 |
| Bipolar Disorders | 6.3% (4) | 1.3% (2) | 4.28 | 0.04 |
| Borderline Personality Disorders | 1.6% (1) | 0.6% (1) | 0.44 | 0.51 |
| Depressive Disorders | 92.0% (58) | 87.1% (135) | 1.09 | 0.30 |
| Developmental Disorders | 3.2% (2) | 7.7% (12) | 1.55 | 0.21 |
| Eating Disorders | 1.6% (1) | 1.9% (3) | 0.03 | 0.86 |
| Factitious Disorders | 0.0% (0) | 0.6% (1) | 0.41 | 0.52 |
| Family Conflict | 3.2% (2) | 0.0% (0) | 4.97 | 0.02 |
| Obsessive Compulsive Disorders | 0.0% (0) | 3.2% (5) | 2.08 | 0.15 |
| Oppositional Defiant Disorder | 3.2% (2) | 3.9% (6) | 0.06 | 0.80 |
| Psychotic Disorders | 9.5% (6) | 6.5% (10) | 0.62 | 0.43 |
| Somatic Symptom Disorder | 0.0% (0) | 0.6% (1) | 0.41 | 0.52 |
| Substance Abuse Disorders | 19.0% (12) | 12.9% (20) | 1.35 | 0.25 |
| Tic Disorders | 0.0% (0) | 0.6% (1) | 0.41 | 0.52 |

Note. ADHD: Attention Deficit and Hyperactivity Disorder.

Table 8. Associations between discharge diagnoses and being cyberbullied.

| Disorder: % (n) | Cyberbullied (n=68) | Not Cyberbullied (n=150) | $\chi^2$ | p-value |
|-----------------|---------------------|-------------------------|---------|---------|
| Adjustment Disorders | 6.6% (4) | 2.5% (4) | 2.00 | 0.16 |
| Aggressive Disorders | 1.6% (1) | 1.9% (3) | 0.02 | 0.89 |
| Anxiety Disorders | 32.8% (20) | 35.0% (55) | 0.10 | 0.75 |
| ADHD | 8.2% (5) | 7.0% (11) | 0.09 | 0.75 |
| Bipolar Disorders | 3.3% (2) | 2.5% (4) | 0.09 | 0.77 |
| Borderline Personality Disorders | 3.3% (2) | 0.0% (0) | 5.13 | 0.02 |
| Depressive Disorders | 83.6% (51) | 90.4% (142) | 2.02 | 0.15 |
| Developmental Disorders | 3.3% (2) | 7.6% (12) | 1.39 | 0.24 |
| Eating Disorders | 3.3% (2) | 1.3% (2) | 0.98 | 0.32 |
| Factitious Disorders | 0.0% (0) | 0.6% (1) | 0.39 | 0.53 |

(Table 8) Contd…
| - | Cyberbullied ($n=68$) | Not Cyberbullied ($n=150$) | $\chi^2$ | p-value |
|---|---|---|---|---|
| Family Conflict | 3.3% (2) | 0.0% (0) | 5.13 | 0.02 |
| Obsessive Compulsive Disorders | 1.6% (1) | 2.5% (4) | 0.16 | 0.69 |
| Oppositional Defiant Disorder | 3.3% (2) | 3.8% (6) | 0.04 | 0.85 |
| Psychotic Disorders | 4.9% (3) | 8.3% (13) | 0.73 | 0.39 |
| Somatic Symptom Disorder | 0.0% (0) | 0.6% (1) | 0.39 | 0.53 |
| Substance Abuse Disorders | 18.0% (11) | 13.4% (21) | 0.76 | 0.38 |
| Tic Disorders | 0.0% (0) | 0.6% (1) | 0.39 | 0.53 |

Note: ADHD: Attention Deficit and Hyperactivity Disorder.

4. DISCUSSION AND CONCLUSION

There does not appear to be a specific demographic at higher risk for psychiatric hospitalization related to digital media, but there does appear to be a unique digital media “phenotype” for those patients with digital media-related admissions. Those adolescents admitted with digital media-related chief complaints were more likely to engage in social network use and sexting, as well as experience cyberbullying. This “phenotype” also aligns with our finding that relational conflict (specifically cyberbullying) was the most common reason for digital media-related psychiatric admission. Our study population may therefore be more prone to experiencing serious relational conflict when engaging in social media use (sexting or being cyberbullied) compared to peers without psychiatric illness.

Even among the general adolescent population, a recent survey study found that the majority of youth stated they needed social media “breaks” as a direct result of exposure to relational drama occurring over social media (Rideout & Fox, 2018). However, teens in psychiatric distress may be particularly vulnerable to online harassment in their social media use; relevant evidence includes a recent comparison of youth with low vs. high socio-emotional well-being showed that 35% of youth with low socio-emotional well-being reported having been cyberbullied, compared to only 5% of those at the other end of the spectrum (Rideout & Fox, 2018). Additionally, while the majority of youth engages in sexting without negative outcomes (Englander, 2012), youth struggling with self-esteem issues are more likely to feel coerced into sexting, or have their “sexts” spread outside the original intended audience (Scholes-Balog, Francke, & Hemphill, 2016). Prior studies indicated that “at risk” youth have differing online experiences than those peers without history of depression, parental conflict or victimization; teenagers with these risk factors are more likely to search for relationships online, and subsequently are subject to increased online solicitation (Mitchell, Finkelhor, & Wolak, 2001; Wells & Mitchell, 2008; Wolak, Mitchell, & Finkelhor, 2003). Thus, when psychiatrically vulnerable adolescents communicate through any type of digital media (e.g. social media, texting, YouTube), it may be more common for their digital experiences to trigger online conflict and precipitate a psychiatric admission compared to peers with higher emotional well-being.

Digital media use itself has also been associated with increased depression and self-harm. However, while there is a recognized association between increased amount of screen time and depressive/suicide-related symptoms (Durkee et al., 2012; Kross et al., 2013; Twenge et al., 2017), our subjects with digital-media related chief complaints had a significant risk of hopelessness and suicide planning without a significantly higher amount of screen use than subjects with admissions unrelated to digital media. An alternative explanation, therefore, may be that the increased suicidality is a result of a teen’s qualitative experiences using digital media rather than the amount of time spent on using digital media (i.e. quality rather than quantity). Both being cyberbullied and sexting have also been connected to increased depression and suicidality (Frankel, Bass, Patterson, Dai, & Brown, 2018; Landoll, La, Lai, Chan, & Herge, 2015; Medrano, Rosales, & Gámez-guadix, 2018; Ouytsel, Walrave, Lu, Temple, & Ponnet,
2018; Schneider, Donnell, Stueve, & Coulter, 2012; Van Geel, Vedder, & Tanilon, 2014), and our subjects with digital media-related admissions were more likely both to sext and be cyberbullied. This may help explain why our sample of adolescents with digital media-related admissions was at higher risk for some suicide-related risk factors compared to their hospitalized peers without such admissions. It is less evident why only suicide planning and hopelessness were significantly associated with having digital media-related admissions, but it may be that the overall high-risk level of our study population muted the greater discrepancy in risk seen between high and low digital media-utilizers in studies of the general adolescent population.

Caution should be used in interpreting the significant associations between discharge diagnoses, digital media-related admissions, and risky digital media use of cyberbullying and sexting given low numbers of certain diagnoses. While participants with digital media-related admissions, recent cyberbullying or sexting were not more likely to have depressive disorders, certain diagnoses that were significantly related to both cyberbullying and sexting may reflect important clinical associations supported in the literature. While evidence is limited, the manic phase of bipolar disorder is associated with both hypergraphia and hypersexuality, of which sexting may be a logical next extension (Emeagwali, Bailey, & Azim, 2012; Flaherty, 2005). Cyberbullying has previously been correlated with a history of PTSD in a study of 353 adolescents (Ranney et al., 2016), and borderline personality disorder has also been associated with significant childhood trauma (Battle et al., 2004; Yen, Shea, & Battle, 2002). Teens with borderline personality disorder and trauma may therefore be more susceptible to cyber-victimization than peers without such related diagnoses. Finally, while very few adolescents had discharge diagnoses related to family conflict, the diagnostic category’s association with digital media-related admissions, cyberbullying, and sexting may highlight both the frequency of parent/child disagreement in relation to risky digital media use and the necessity for family psychoeducation about digital media use during an adolescent’s psychiatric admission. Future studies should also concentrate on identifying unique digital media habits of teens with specified psychiatric diagnoses.

Taken together, our findings suggest that pediatric mental health providers should consider standardized screening for online relational conflict in their practices, as this may be a driving factor for psychiatric hospitalization in their patient population (Carson, Gansner, & Khang, 2018). This screening, if positive, should also extend to specific and relevant safety planning surrounding the type of conflict. An adolescent who is being coerced in some manner to send sexually explicit material electronically may be reluctant to openly disclose this information, and may require adult intervention to extricate him or herself from this situation. Similarly, an adolescent admitting to being cyberbullied should prompt questioning about which social media platforms he or she is being cyberbullied on, as being bullied by one person on one platform may be less likely to lead to psychiatric hospitalization than being bullied by multiple people on several different platforms. A provider might also support an adolescent in registering a formal complaint with the platform, or bringing the bullying to the attention of other authority figures who could help to intervene. Adolescents with psychiatric illness are already a high-risk subset with an increased likelihood of psychiatric hospitalization; therefore, adopting screening practices that include those specific digital media-related risk factors associated with psychiatric hospitalization, as well as diagnosis-specific digital media screenings, are important preventative strategies to mitigate digital media-related risks.

ABOUT THE AUTHORS

Nicholas Carson, MD, FRCPC, is a child and adolescent psychiatrist who is an Assistant Professor of Psychiatry at Harvard University and a Clinical Research Associate at the Health Equity Research Lab and the Center for Multicultural Mental Health Research at Cambridge Health Alliance. He is also an attending psychiatrist at Cambridge Health Alliance and Associate Program Director for the child psychiatry fellowship program at the Cambridge Health Alliance.

Meredith Gansner, MD is a second-year child psychiatry fellow at Cambridge Health Alliance.

Erin Belfort, MD is a child and adolescent psychiatrist who practices in Portland, Maine and is on the staff of Maine Medical Center.
Caroline Leahy is a medical student at Duke University School of Medicine.

Danielle Mirda is a medical student at George Washington University School of Medicine.

HUMAN AND ANIMAL RIGHTS
Humans were used for this study.

FUNDING
None.

CONFLICT OF INTEREST
The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS
Declared none.

SUPPLEMENTARY MATERIAL
Supplementary material is available on the publisher’s web site along with the published article.

Appendix 1

| Search Terms to Determine Admissions with Digital-Media Relevance |
|---------------------------------------------------------------|
| Social media                                                  |
| Password                                                      |
| Laptop                                                        |
| Computer                                                      |
| Tablet                                                       |
| Phone                                                        |
| Cell                                                         |
| Myspace                                                      |
| Facebook                                                     |
| Tumbler                                                      |
| Grindr                                                       |
| Snapchat                                                    |
| Twitter                                                      |
| Tinder                                                       |
| Instagram                                                    |
| Online                                                       |
| Website                                                      |
| App                                                          |
| Cyber                                                        |
| Sext                                                         |
| Text                                                         |
| Internet                                                     |

REFERENCES

Altbäcker, A., Plözer, E., Darnai, G., Perlaki, G., Horváth, R., Orsi, G., ... Janszky, J. (2015). Problematic internet use is associated with structural alterations in the brain reward system in females. *Brain Imaging and Behavior*, 953-959. https://doi.org/10.1007/s11682-015-9454-9

Battle, C. L., Shea, M. T., Johnson, D. M., Yen, S., Zlotnick, C., Zanarini, M. C., ... Morey, L. C. (2004). Childhood Maltreatment Associated With Adult Personality Disorders: Findings From the Collaborative Longitudinal Personality Disorders Study. *Journal of Personality Disorders*, 18(2), 193–211. https://doi.org/10.1521/pedi.18.2.193.32777

Carson, N. J., Gansner, M., & Khang, J. (2018). Assessment of Digital Media Use in the Adolescent Psychiatric Evaluation. *Child and Adolescent Psychiatric Clinics of North America*, 27(2), 133-143. https://doi.org/10.1016/j.chc.2017.11.003

Centers of Disease Control and Prevention. (2017). Youth Risk Behavior Survey. Retrieved October 11, 2018, from www.cdc.gov/yrbs.

Chamberlain, S. R., & Grant, J. E. (2018). Minnesota Impulse Disorders Interview (MIDI): Validation of a structured diagnostic clinical interview for impulse control disorders in an enriched community sample. *Psychiatry Research*, 265(August 2017), 279–283. https://doi.org/10.1016/j.psychres.2018.05.006

Durkee, T., Kaess, M., Carli, V., Parzer, P., Wasserman, C., Floderus, B., ... Wasserman, D. (2012). Prevalence of pathological internet use among adolescents in Europe: demographic and social factors. *Addiction*, 107(12), 2210–2222. https://doi.org/10.1111/j.1360-0443.2012.03946.x

Emeagwali, N. A., Bailey, R. K., & Azim, F. (2012). Textmania: Text messaging during the manic phase of bipolar i disorder. *Journal of Health Care for the Poor and Underserved*, 23(2), 519–522. https://doi.org/10.1353/hpu.2012.0062

Englander, E. K. (2012). Low risk associated with most teenage sexting: A study of 617 18-year-olds. *Massachusetts Aggression Reduction Center*, 5, 1–12.

Flaherty, A. (2005). Frontotemporal and dopaminergic control of idea generation and creative drive. *Journal of Comparative Neurology*, 493(1), 147-153. https://doi.org/10.1002/cne.20768.

Frankel, A., Bass, S., Patterson, F., Dai, T., & Brown, D. (2018). Sexting, risk behavior, and mental health in adolescents : An examination of 2015 Pennsylvania Youth Risk Behavior Survey, *Journal of School Health*, 88(3), 190-199. doi: 10.1111/josh.12596.

Gámez-Guadix, M., Borrajo, E., & Almendros, C. (2016). Risky online behaviors among adolescents: Longitudinal relations among problematic Internet use, cyberbullying perpetration, and meeting strangers online. *Journal of Behavioral Addictions*, 5(1), 100–107. https://doi.org/10.1556/2006.5.2016.013

Gansner, M., Belfort, E., Cook, B., Leahy, C., Colon-Perez, A., Mirda, D., & Carson, N. J. (2018). Problematic internet use and associated high-risk behavior in an adolescent clinical sample: results from a survey of
Grant, J., Levine, L., Kim, D., & Potenza, M. (2005). Impulse control disorders in adult psychiatric inpatients. *American Journal of Psychiatry, 162*(11), 2184–2188. https://doi.org/10.1176/appi.ajp.162.11.2184

Grant, J., Williams, K., & Potenza, M. (2007). Impulse-control disorders in adolescent psychiatric inpatients: Co-occurring disorders and sex differences. *Journal of Clinical Psychiatry, 68*(10), 1584–1592.

Ioannidis, K., Chamberlain, S. R., Treder, M. S., Kiraly, F., Leppink, E. W., Redden, S. A., … Grant, J. E. (2016). Problematic internet use (PIU): associations with the impulsive-compulsive spectrum. An application of machine learning in psychiatry. *Journal of Psychiatric Research, 83*, 94–102. https://doi.org/10.1016/j.jpsycho.2016.08.010

Jelenchick, L. A., Eickhoff, J., Christakis, D. A., Brown, R. L., Zhang, C., Benson, M., & Moreno, M. A. (2014). The Problematic and Risky Internet Use Screening Scale (PRIUSS) for adolescents and young adults: scale development and refinement. *Computers in Human Behavior, 35*. https://doi.org/10.1016/j.chb.2009.10.020

Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D. S., Lin, N., … Ybarra, O. (2013). Facebook use predicts declines in subjective well-being in young adults. *PLoS ONE, 8*(8), 1–6. https://doi.org/10.1371/journal.pone.0069841

Landoll, R. R., La, A. M., Lai, B. S., Chan, S. F., & Herge, W. M. (2015). Cyber victimization by peers: Prospective associations with adolescent social anxiety and depressive symptoms. *Journal of Adolescence*, 42, 77-86. https://doi.org/10.1016/j.adolescence.2015.04.002

Lenhart, A. (2015, April). Teens, social media and technology overview 2015. Pew Research Center, retrieved from http://www.pewinternet.org/2015/04/09/teens-social-media-technology-2015/

Lewis, S. P., & Seko, Y. (2016). A double-edged sword: a review of benefits and risks of online nonsuicidal self-injury activities. *Journal of Clinical Psychology, 72*(3), 249–262. https://doi.org/10.1002/jclp.22242

Liu, T. C., Desai, R. A., Krishnan-Sarin, S., Cavallo, D. A., & Potenza, M. N. (2011). Problematic internet use and health in adolescents: Data from a high school survey in Connecticut. *Journal of Clinical Psychiatry, 72*(6), 836-845. https://doi.org/10.4088/JCP.10m-06057

Medrano, J. L. J., Rosales, F. L., & Gámez-guadix, M. (2018). Assessing the links of sexting, cybervictimization, depression, and suicidal ideation among university students. *Archives of Suicide Research*, 22(1), 153–164. https://doi.org/10.1080/13811118.2017.1304304

Minnesota Department of Health. (2017). *Patient Health Questionnaire-2 (PHQ-2) instrument review*. Retrieved October 11, 2018, from www.health.state.mn.us

Mitchell, K. J., Finkelhor, D., & Wolak, J. (2001). Risk Factors for and Impact of Online Sexual Solicitation of Youth. *Journal of the American Medical Association, 285*(23), 3011–3014.

Mojtabai, R., Olfsen, M., & Han, B. (2016). National trends in the prevalence and treatment of depression in adolescents and young adults. *Pediatrics, 138*(6), e20161878–e20161878. https://doi.org/10.1542/peds.2016-1878

Muller, K., Ammerschlager, M., Freediving, F., Beutel, M., & Wolfling, K. (2012). Addictive internet use as a comorbid disorder in the youth psychiatric setting: prevalence and psychopathological symptom burden. *Journal of Child and Adolescent Psychiatry and Psychotherapy, 40*, 331–339. https://doi.org/10.1024/1422-4917/a000190

Ouysel, J. Van, Walrave, M., Lu, Y., Temple, J. R., & Ponnet, K. (2018). The associations between substance use, sexual behavior, deviant behaviors and adolescents’ engagement in sexting: does relationship context matter? *Journal of Youth and Adolescence, 47*(11), 2353-2370. doi: 10.1007/s10964-018-0903-9. https://doi.org/10.1007/s10964-018-0903-9

Ranney, M., Patena, J., Nugent, N., Spirtos, A., Boyer, E., Zatzick, D., & Cunningham, R. (2016). PTSD, cyberbullying, and peer violence: prevalence and correlates among adolescent emergency department patients. *General Hospital Psychiatry, 39*, 32–38. https://doi.org/10.1016/j.genhosppsych.2015.12.002

Richardson, L. P., Rockhill, C., Russo, J. E., Grossman, D. C., Richards, J., McCarty, C., … Katon, W. (2010). Evaluation of the PHQ-2 as a brief screen for detecting major depression among adolescents. *Pediatrics, 125*(5), e1097–e1103. https://doi.org/10.1542/peds.2009-2712

Rideout, V. (2015). The Common Sense Census: Media use by tweens and teens. *Common Sense Media, 1*–104. https://doi.org/10.1017/CBO9781107415324.004

Rideout, V., & Fox, S. (2018). Digital health practices, social media use, and mental well-being among teens and young adults in the U.S: a national survey sponsored by Hopelab and Well Being Trust. Retrieved from https://www.hopelab.org/reports/pdf/a-national-survey-by-hopelab-and-well-being-trust-2018.pdf

Schneider, S., Donnell, L. O., Stueve, A., & Coulter, R. W. S. (2012). Cyberbullying, school bullying, and psychological distress: a regional census of high school students, *JAPA*, 171–177. https://doi.org/10.2105/AJPH.2011.300308

Scholes-Balog, K., Francke, N., & Hemphill, S. (2016). Relationships between sexting, self-esteem, and sensation seeking among Australian young adults. *Sexualization, Media, and Society, 2*(2), 2374623815627790. https://doi.org/10.1177/2374623815627790

Shapira, N. A., Goldsmith, T. D., Keck, P. E., Khosla, U. M., & McElroy, S. L. (2000). Psychiatric features of individuals with problematic internet use. *Journal of Affective Disorders, 57*(1–3), 267-272. https://doi.org/10.1016/S1054-8738(00)0107-X

Twenge, J. M., Joiner, T. E., Rogers, M. L., & Martin, G. N. (2017). Increases in depressive symptoms, suicide-related outcomes, and suicide rates among U.S. adolescents after 2010 and links to increased new...
media screen time. *Clinical Psychological Science*. https://doi.org/10.1177/2167702617723376

Van Geel, M., Vedder, P., & Tanilon, J. (2014). Relationship between peer victimization, cyberbullying, and suicide in children and adolescents a meta-analysis. *JAMA Pediatrics*, 168(5), 435–442. https://doi.org/10.1001/jamapediatrics.2013.4143

Wells, M., & Mitchell, K. J. (2008). How do high-risk youth use the internet? Characteristics and implications for prevention. *Child Maltreatment*, 13(3), 227–234. https://doi.org/10.1177/1077559507312962

Wolak, J., Mitchell, K. J., & Finkelhor, D. (2003). Escaping or connecting? Characteristics of youth who form close online relationships, 26, 105–119.

Ybarra, M. L., Espelage, D. L., & Mitchell, K. J. (2007). The co-occurrence of Internet harassment and unwanted sexual solicitation victimization and perpetration: associations with psychosocial indicators. *Journal of Adolescent Health*, 41(6 SUPPL.), S31–S41. https://doi.org/10.1016/j.jadohealth.2007.09.010

Yen, S., Shea, M., & Battle, C. (2002). Traumatic exposure and posttraumatic stress disorder in borderline, schizotypal, avoidant, and obsessive-compulsive personality disorders: Findings from the collaborative longitudinal personality disorders study. *Journal of Nervous and Mental Disease*, 190(8), 510–518. https://doi.org/10.1097/01.NMD.0000026620.66764.78

Zhang, J.-T., Ma, S.-S., Li, C.-S. R., Liu, L., Xia, C.-C., Lan, J., … Fang, X.-Y. (2016). Craving behavioral intervention for internet gaming disorder: remediation of functional connectivity of the ventral striatum. *Addiction Biology*. https://doi.org/10.1111/adb.12474

Zhou, Y., Lin, F., Du, Y., Qin, L., Zhao, Z., Xu, J., & Lei, H. (2011). Gray matter abnormalities in Internet addiction: A voxel-based morphometry study. *European Journal of Radiology*, 79(1), 92–95. https://doi.org/10.1016/j.ejrad.2009.10.025