



Examining the Psychosocial and Behavioral Factors Associated with Adolescent Engagement in Multiple Types of Cyberdeviance: Results from an Australian Study

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Abstract

Research has shown that psychosocial and behavioral factors are associated with engagement in a range of deviant behaviors across offline settings. To date, however, very little research has explored the impact of these factors in online contexts. This article addresses this gap by examining the psychosocial and behavioral factors associated with common types of adolescent cyberdeviance. This is accomplished through an empirical study of 327 adolescents enrolled in a high school located in a large Australian city. The study assesses various aspects of psychosocial and behavioral functioning using the *Strengths and Difficulties Questionnaire* (total difficulties, internalizing problems, externalizing problems, prosocial behavior), as well as numerous types of cyberdeviance relevant to young people, including cyberfraud, cyberhate, cyberviolence, sexting, digital piracy, hacking, and cyberbullying. A series of multivariate logistic regression analyses were conducted to demonstrate the association between psychosocial and behavioral difficulties and various types of cyberdeviance, independent of gender, school grade, socioeconomic status, and engagement in offline delinquency. Results indicate that total difficulties, internalizing problems, and externalizing problems were significantly associated with greater likelihood of engagement in most types of cyberdeviance examined in this study, whereas prosocial behavior was associated with a lower likelihood of engagement in digital piracy only. A discussion of the findings highlights the importance of understanding these factors in a digital context, as well as demonstrating the need to account for them when designing targeted interventions.

Keywords Cyberdeviance and cybercrime · Adolescence · Internalizing and externalizing problems · Prosocial behavior · Strengths and Difficulties Questionnaire (SDQ)

Highlights

- Identifying evidence-based approaches to help develop effective interventions for young people is critical due to the potentially serious social and economic harms associated with many types of cyberdeviance.
- A survey of Australian adolescents examined the relationship between types of cyberdeviance and various psychosocial and behavioral factors.

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- Internalizing and externalizing problems, as well as prosocial behaviors, were all differentially associated with engagement in various types of cyberdeviance.
- Further research regarding the development of interventions that target internalizing and externalizing problems is proposed.

Digital information and communication technologies play a significant and increasingly central role in adolescent life. This is especially evident in Australia, where adolescents use digital devices and the internet more than any other age group (Australian Bureau of Statistics, 2018). By consequence, young people are also more susceptible than others to engage in a range of deviant behaviors online (Näsi et al., 2015; Oksanen & Keipi, 2013). These include behaviours that are illegal, but also those behaviors that may be antisocial, harmful to others, or violate social norms—and which may also lead to adverse consequences. Scholarly and practitioner interest in these myriad dimensions has intensified in recent years, with a wide range of online behaviors engaged in by young people being identified as being problematic, or having the potential to lead to more risky, harmful or aggressive behaviors down the track, including, for example, cyberfraud, digital piracy, sexual expression, unauthorized computer access (hacking, hereafter), cyberbullying, and advocating hate or violence, amongst various others (e.g., see <https://www.esafety.gov.au/key-issues>; Goldsmith & Brewer, 2015; Livingstone et al., 2010, 2011). This growing and diverse body of work has led to the emergence of the term ‘cyberdeviance’ within the literature as a means of capturing such a broad range of behaviors (see Payne, 2020), and provides a lens through which one can identify and explore the overlap between said behaviors. Indeed, researchers, practitioners, and policymakers are now seeking more effective ways to prevent and intervene in situations where young people may engage in many of these behaviors. However, there is limited available empirical evidence guiding these strategies (Shin & Lwin, 2016). Extant initiatives (especially those aimed at young people) largely overlook the role of the perpetrator (who can shift to new targets, methods, or types of cyberdeviance), and instead place the onus on victims to protect themselves (Brewer et al., 2019). As such, many of the interventions being developed and deployed for young people are not necessarily targeting those who are at risk of offending.

Identifying evidence-based approaches to help develop effective interventions for young people is critical due to the potentially serious social and economic harms associated with many types of cyberdeviance. Before such approaches are developed, it is crucial to first consider who should be targeted for intervention, and where, when, and how the intervention should be implemented—acknowledging that this may be different from one type of cyberdeviance to the next (Brewer et al., 2019). These decisions should be based on

several factors, including the characteristics of the perpetrator group and the environment in which the behavior occurs, as well as other practical considerations such as available resources. Accordingly, scholars advocate that the development of effective interventions relies first on the *accurate identification of factors known to contribute to a young person engaging in said behavior(s)*, so that such factors may be addressed through intervention (e.g., Andrews & Bonta, 2010; Andrews et al., 1990; Bonta & Andrews, 2017; Dowden & Andrews, 1999; Koehler et al., 2013).

Research in offline contexts has shown that psychosocial and behavioral factors, namely, deficits in emotional, social, and behavioral skills, particularly during childhood and adolescence, have been shown to be associated with engagement in deviant behavior later in life (e.g., Agnew & Brezina, 1997; Hammerton et al., 2019; Murray et al., 2015). To date, however, very little research has explored the impact of said psychosocial and behavioral factors in cyber contexts, particularly amongst young people. To our knowledge, there exists only a handful of studies exploring the independent association of such factors with some specific types of cyberdeviance, including cyberbullying, sexting, cyberhate and image-based sexual abuse (e.g., Fletcher et al., 2014; Foody et al., 2019; Kaakinen et al., 2020; Ybarra & Mitchell, 2014). Other types of cyberdeviance increasingly being observed in adolescent populations (e.g., piracy, hacking, cyberviolence), have not yet been considered. Given the proliferation and degree of adolescent engagement in different types of cyberdeviance in recent decades (see Brewer et al., 2018; Holt et al., 2012, 2021; Gunter et al., 2010; Lee, 2018; Livingstone et al., 2011; Udris, 2016), accounting for any potential differences in the factors driving deviance in off- and online contexts, as well as between various different types of cyberdeviance, is immensely important from a policy perspective.

This article addresses this gap by examining the psychosocial and behavioral factors associated with common types of adolescent cyberdeviance in Australia. This is accomplished through an empirical study of 327 adolescents enrolled in a secondary school in a large Australian city. The study assesses various aspects of psychosocial and behavioral functioning using the *Strengths and Difficulties Questionnaire* (i.e., total difficulties, internalizing problems, externalizing problems, prosocial behavior) (Goodman, 1997), as well as numerous types of cyberdeviance, including cyberfraud, cyberhate, cyberviolence, sexting, digital piracy, hacking, and cyberbullying.

The Relationship Between Psychosocial and Behavioral Functioning and Deviance

A growing body of work has established a relationship between psychosocial and behavioral functioning and deviance, particularly amongst adolescents (e.g., Fontaine et al., 2019; Haney-Caron et al., 2019; Rasskazova et al., 2019; Van Zalk et al., 2020). Accordingly, researchers have worked to develop a number of robust screening tools to assess psychosocial and behavioral functioning, one of the most widely implemented being the *Strengths and Difficulties Questionnaire* (SDQ; Goodman, 1997). Said tools are based on extensive research and numerous factor analyses within the field of psychology, which have identified two broad-band groupings of psychosocial and behavioral problems—referred to as *internalizing* and *externalizing* problems—with these groupings employed in the DSM-5 to cluster disorders (Achenbach, 1966; Achenbach et al., 2016). *Internalizing factors* reflect an individual's internal emotional distress (e.g., anxiety, depression and somatic symptoms), as well as difficulty in establishing and maintaining relationships with peers of the same age (Achenbach et al., 2016). *Externalizing factors* bring the individual into conflict with others (Oldehinkel et al., 2004), and are commonly represented in the literature as incorporating both hyperactivity and inattention (e.g., restlessness, difficulty concentrating), as well as a variety of conduct problems (e.g., issues with authority, lying, cheating, stealing) (Goodman et al., 2010). Additionally, research highlights *prosocial behavior*, which refers to acts of kindness (e.g., sharing and assisting others) as both relevant and inversely related to poor psychosocial and behavioral functioning (Foody et al., 2019; Goodman, 2001; Memmott-Elison et al., 2020).

While there is an extant evidence base that clearly demonstrates independent relationships between internalizing and externalizing problems with engagement in a broad range of deviant behaviors, this body of work is largely limited to offline contexts. Accordingly, drawing distinctions between these problems is important to fully understand how these difficulties may be expressed across a wide range of cyber contexts, and facilitate the development of more precise, targeted interventions. Moreover, an understanding of the role of prosocial behaviors is needed, particularly given that prior research has found such behavior to function as a protective factor and that strengths-based approaches to addressing deviance can foster desirable behavior and build the skills necessary for social competence (Spruit et al., 2018; Sutherland et al., 2010; Thulin et al., 2022). The following section will discuss how deviance has been examined within previous research as an outcome of internalizing and externalizing problems, as well as prosocial factors.

Internalizing Problems and Deviance

Several studies have demonstrated that internalizing problems have consistently been identified as a risk factor for *offline* deviance. A meta-analysis conducted by Assink et al. (2015) determined that both domains of internalizing problems, including emotional symptoms and peer relationship problems, represented two of the strongest predictors of adolescent engagement in offline deviance. More specifically, research has demonstrated that emotional symptoms (i.e., anxiety, depression, withdrawal), and peer relationship problems (i.e., popularity with peers, quality of relationships, peer rejection), are associated with violent (fighting, bullying, threats of violence) and non-violent (lying, cheating, running away from home, vandalism, truancy, substance use) forms of deviance in adolescence (Fontaine et al., 2019; Higgins et al., 2011; Kim & Nho, 2017; Kofler et al., 2011; Trentacosta & Shaw, 2009; Yang et al., 2018). Furthermore, research has demonstrated that emotional symptoms and relationship problems may be associated with frequent recidivism (of offences more serious than traffic violations) into adulthood (Elonheimo et al., 2009).

Beyond offline deviance, a number of studies have examined the occurrence of these internalizing problems in adolescent perpetrators of different types of *cyberdeviance*, although this work predominantly focuses on the emotional symptoms, rather than the peer relationship problems. For example, numerous studies have found greater emotional difficulties are associated with adolescent involvement in various types of cyberdeviance, compared to their non-involved counterparts. This includes anxiety, depression and stress for cyberbullying (Campbell et al., 2013; Fletcher et al., 2014; Foody et al., 2019; Kaiser et al., 2020; Yang et al., 2013); anxiety, depression, suicidal ideation and self-harm for sexting (Bauman, 2015; Chaudhary et al., 2017; Dake et al., 2012; Dawson et al., 2019; Frankel et al., 2018; Gamez-Guadix & De Santisteban, 2018; Gasso et al., 2020; Klettke et al., 2019; Ybarra & Mitchell, 2014); anxiety and depression for both image-based sexual abuse (Gasso et al., 2020), and disseminating cyberhate (Kaakinen et al., 2020); and anger and depression for a combined measure of 'cyber delinquent behaviors' (Lee & Kim, 2017)—the latter construct being measured as collective engagement in hacking, online fraud, and cyberbullying. Conversely, the literature on peer relationship problems is less comprehensive as it is constrained to the cyberbullying context, and somewhat inconsistent. That is, some studies demonstrate greater peer problems (as measured by the SDQ) in cyberbullying perpetrators (Campbell et al., 2013), and those that are both perpetrators and victims (Kaiser et al., 2020), while others studies do not (Fletcher et al., 2014; Foody et al., 2019). Despite mixed findings on the impact of peer relationship problems for cyberbullying, extensive research has demonstrated that emotional symptoms

are a key risk factor for numerous types of cyberdeviance. Additional research is required to ascertain how peer relationship problems *and* emotional symptoms impact on the perpetration of different types of cyberdeviance, as the literature focusing on offline deviance suggests that these are important factors to consider.

Externalizing Problems and Deviance

Cross-national research has demonstrated that both the hyperactivity/inattention and conduct problems domains of externalizing factors are important risk factors for offline deviance. For example, research demonstrates that hyperactivity/inattention (i.e., restless, distracted, impulsive) and conduct problems (i.e., aggression, defiance, oppositional behavior, tantrums) are predictive of both violent (i.e., robbery, assault and sexual assault, carried or used a weapon during a fight) and non-violent forms of deviance (i.e., theft, property damage, drug distribution, burglary, arson, bullying) in adolescence (Galán et al., 2019; Kumpulainen et al., 2001; Lambie & Krynén, 2017; Murray et al., 2015; Wolke et al., 2000).

Currently, there is a dearth of research examining the association between hyperactivity/inattention, conduct problems, and types of cyberdeviance, with the limited available studies focusing solely on cyberbullying. Using samples in Australia, England, Finland and Ireland, these studies have demonstrated that cyberbullying perpetrators, and perpetrators who are also victims, score higher on the hyperactivity/inattention and conduct problems domains of the SDQ compared to their non-involved counterparts (Campbell et al., 2013; Fletcher et al., 2014; Foody et al., 2019; Kaiser et al., 2020; Sourander et al., 2010). To the authors' knowledge, no studies have examined how these externalizing problems are associated with other types of cyberdeviance. Given the importance of these factors demonstrated in offline settings, greater understanding of their impact in various cyber contexts is needed.

Covariate factors associated with the occurrence of internalizing and externalizing problems and deviance

Research has established various interrelated and interacting factors associated with the development of internalizing and externalizing problems in adolescence, with many of these factors also contributing to adolescent engagement in deviance off- and online. For example, while the role of gender is mixed across the literature, trends indicate higher rates of internalizing problems in females and externalizing problems in males (Deighton et al., 2019; Derdikman-Eiron et al., 2012; Leadbeater et al., 1999; Rocchino et al., 2017). Additionally, males represent the largest overall proportion

of adolescent perpetrators of deviance (Pusch & Holtfreter, 2018)—though this varies across crime types, with males overrepresented in more violent offline deviance (e.g., fighting, assault, carrying a weapon) (Junger-Tas, 2012) and more skilled types of deviance online (e.g., hacking, software piracy) (Holt et al., 2012; Udris, 2016). Age also plays a role, with longitudinal research highlighting trends that suggest externalizing problems reduce from childhood into adolescence (Bongers et al., 2003; Shi & Etekal, 2021), while mixed results for internalizing problems indicate an increase (Costello et al., 2003; Gilliom & Shaw, 2004) or a decline/stable trend into adolescence (Keiley et al., 2003; Shi & Etekal, 2021). The well-established age-crime curve indicates a sharp increase in deviance during late childhood and early adolescence, with this beginning to decrease during late adolescence into early adulthood (Le Blanc, 2020). Furthermore, research identifies disparities for low socioeconomic groups (e.g., poverty, increased life stressors) which may place those individuals at risk of increased psychosocial and behavioral problems and engagement in deviance (Alegría et al., 2015; Farrington, 1990; Jarjoura et al., 2002; Leventhal & Brooks-Gunn, 2000; Reiss, 2013).

Beyond these demographic factors, a number of other personal and social factors associated with poor psychosocial development and behavioral problems have also been empirically linked to engagement in adolescent deviance. For example, research has evidenced overlaps between internalizing and externalizing problems and: dimensions of psychopathy, specifically callous-unemotional traits, (Eisenbarth et al., 2016; Fanti et al., 2013); low self-control (Flores et al., 2020); and deviant peer associations (Fanti & Henrich, 2010; Fortuin et al., 2015). Each of these factors have also been linked to engagement in offline deviance (Fanti et al., 2019; Frick et al., 2014), and in a more limited capacity, some types of cyberdeviance (Holt et al., 2012; Wright et al., 2019). While these factors may represent potential mediating variables for the link between psychosocial and behavioral functioning and deviance (e.g., Dishion et al., 2010; Lansford et al., 2014; Lee-Rowland et al., 2020), this is beyond the scope of the present research.

Prosocial Behavior and Deviance

Longitudinal studies have found prosocial behavior to be predictive of fewer internalizing emotional problems (i.e., depression and anxiety) and externalizing behavioral problems (i.e., lying, cheating, theft and custodial sentences) (Padilla-Walker et al., 2015; van der Laan et al., 2021). Furthermore, research has demonstrated the protective function of prosocial behavior against engagement in various forms of offline deviance. For example, prosocial behavior has been found to reduce aggressive behavior in

offline contexts, and such acts as robbery, theft, joyriding, trespassing and vandalism, as well as general deviance (measured as collective engagement in such acts as substance abuse, truancy, theft and disruptive behavior at school) (Carlo et al., 2014; Padilla-Walker et al., 2018).

Only limited research has been conducted to assess how this protective factor impacts deviance in an online context, and this has solely focused on cyberbullying. To this end, studies employing the SDQ have found that increased prosocial behavior is associated with lower levels of cyberbullying perpetration (Campbell et al., 2013; Foody et al., 2019; Kaiser et al., 2020; Sourander et al., 2010). Therefore, the extent of its impact across various online contexts requires further consideration.

In summary, the extant research has demonstrated a link between poor psychosocial and behavioral functioning and different types of deviance—both on- and offline. Internalizing problems have been quite extensively assessed in conjunction with deviance. While peer problems have been linked to offline deviance (Agnew & Brezina, 1997; Trentacosta & Shaw, 2009), findings have been less consistent online (Fletcher et al., 2014; Foody et al., 2019). Emotional problems, however, have consistently been associated with offline deviance, as well as numerous types of cyberdeviance (including cyberbullying, sexting, image-based sexual abuse and dissemination of cyberhate) (Chaudhary et al., 2017; Elonheimo et al., 2009; Gasso et al., 2020; Kaakinen et al., 2020). Research into externalizing problems has determined that engagement in offline deviance, and cyberbullying, is associated with both hyperactivity/inattention and conduct problems (Campbell et al., 2013; Murray et al., 2015). Finally, prosocial behaviors have been associated with *decreased* engagement in offline deviance, and cyberbullying (Padilla-Walker et al., 2015; Sourander et al., 2010)—demonstrating that this is a protective factor against perpetration. In an online context, the vast majority of literature has focused on cyberbullying, to the exclusion of other types of cyberdeviance. While limited, existing research would suggest that internalizing, externalizing and prosocial factors are important to consider in the context of cyberdeviance.

Study Aims

In this article, we aim to identify the psychosocial and behavioral functioning factors that are associated with various types of cyberdeviance in an Australian youth cohort, using the SDQ. We hypothesize that participants who exhibit poorer overall psychosocial and behavioral functioning (i.e., total difficulties, which is a measure of the combined strength of internalizing and externalizing problems) will be more likely to engage in the various types of cyberdeviance examined in this study (H1). Beyond making

such broad assessments, we also seek to better understand the relationship between individual aspects of psychosocial and behavioral functioning, including internalizing problems, externalizing problems and prosocial behaviors, and engagement in the different types of cyberdeviance. To this end, and in light of the limited research currently available, we hypothesize that increased reporting of internalizing problems will be associated with greater engagement across the types of cyberdeviance considered (H2). Likewise, increased reporting of externalizing problems is hypothesized to be associated with greater engagement across these types of cyberdeviance (H3). Conversely, we hypothesize that increased reporting of prosocial behaviors will be associated with decreased engagement across the types of cyberdeviance examined (H4).

In order to assess these hypotheses, we draw upon a sample of Australian adolescents to examine their engagement in a variety of different types of cyberdeviance that have been identified as particularly relevant to young people in Australia and around the world (e.g., see <https://www.esafety.gov.au/key-issues>). These include: (1) cyberbullying or abuse, (2) sexting, (3) hacking, (4) cyberfraud, (5) digital piracy, (6) cyberhate, and (7) cyberviolence. Importantly, with regard to cyberhate and cyberviolence, the literature distinguishes between passive (viewing) and active (creating/sharing) types of cyberhate and cyberviolence (e.g., see Jacks & Adler, 2015; Turner et al., 2022), which we also distinguish. Developing a nuanced understanding of these risk factors associated with and across each of these types of cyberdeviance provides essential evidence that can be used in the development of targeted interventions in these areas.

Methodology

Sample and Procedures

The participants were an entire cohort of students ($N = 332$) enrolled in grades 10 (13.9%), 11 (43.4%) and 12 (42.8%) at a metropolitan secondary school, present on the day of data collection. The school is located in an inner-city neighborhood of a large Australian city (greater than one million inhabitants). Based on quintile calculations from participants' primary residential postcode (see below *Covariates* section for details on how this is calculated), there was variation in the residential socioeconomic status of the sample, but with the majority of participants residing in more advantaged areas (quintile 1: 6.7%; quintile 2: 20.2%; quintile 3: 13.1%; quintile 4: 27.8%; quintile 5: 26.6%; with 5.5% missing postcode data). Moreover, the majority of participants were from a White/Caucasian background (60.1%), with the remaining participants from Asian (31.9%), Arab and Middle Eastern (4.9%), Latino and

Hispanic (1.5%), African (0.9%) and Pacific Islander (0.6%) backgrounds.

During class time, participants were administered a paper-based survey by the research team in March 2020. Members of the research team were present during the data collection period, in order to assist with comprehension or other questions. Surveys included the SDQ alongside a series of other questions described below, and took participants on average 25-minutes to complete. Ethics approval was obtained through the host university Human Research Ethics Committee. Further permission was granted by the school's Principal, and individual classroom teachers. Parents and participants were required to consent to participate in this project, using an opt-out procedure. Participants were assured that they would remain confidential and instructed that they could withdraw from the survey at any time without prejudice.

Dependent variables

Seven different types of cyberdeviance were measured, adapted from earlier survey instruments (e.g., Brewer et al., 2018; Holt et al., 2010, 2012; Holt & Kilger, 2012; Li et al., 2015) and validated by the authors. Participants were asked if, in the last 12 months, they had “never”, “less than weekly”, “about once a week”, “several times a week”, “about once a day”, or “several times a day”, used any of their digital devices to engage in various behaviors. An indicator variable was created for each type of cyberdeviance, indicating whether participants had ever engaged in that behavior over the last 12 months. Each of the behaviors measured will be discussed in turn.

Cyberfraud This involves deceiving others online to acquire money, goods or services, and is derived from five items ($\alpha = 0.81$) asking participants when they are online whether they have: (1) “bought anything that might be against the law”, (2) “sold anything that might be against the law”, (3) “tricked another person into sending you their personal information”, (4) “tricked another person into giving you money”, and (5) “tricked a business or organization into sending you money, goods, or services”.

Sexting Participants' experiences with viewing and sharing personal sexual content makes up this type of cyberdeviance, as measured by two items ($\alpha = 0.70$) asking whether they had: (1) “seen sexual content (e.g., text, images, or videos) of someone you know” and (2) “shared sexual content of yourself”.

Cyberbullying This involves using online communication to bully others, and is made up of three items ($\alpha = 0.78$) which asked participants whether they: (1) “searched for

information online about someone that you could use to make them feel bad or scared”, (2) “privately sent content (e.g., text, images or videos) to make someone feel bad or scared”, and (3) “publicly shared content to make someone feel bad or scared”.

Digital piracy This involves use of online tools to engage in copyright infringement, measured through four items ($\alpha = 0.84$) asking participants whether they: (1) “listened to music that you think you should have paid for”, (2) “watched a video that you think you should have paid for”, (3) “downloaded software, games, or eBooks that you think you should have paid for”, and (4) “shared music, videos, software, games, or eBooks with others that you think they should have paid for”.

Hacking This type of cyberdeviance involves the unauthorized access of others' devices or accounts, measured through 4 items ($\alpha = 0.86$) asking participants whether they: (1) “accessed another person's device (without their permission) to look at information, photos, videos or other files”, (2) “accessed another person's device (without their permission) to add, delete or change information or other files”, (3) “accessed another person's online account (without their permission) to look at information (messages, emails, etc.), photos, videos, or other files”, and (4) “accessed another person's online account (without their permission) to add, delete or change information/files”.

Cyberhate (passive and active) The use of digital communication tools to view or share content that is discriminatory in nature is encompassed by this type of cyberdeviance. This was measured as *passive participation in cyberhate* with three items ($\alpha = 0.74$) asking participants whether they had: (1) “seen content (text, images or video) making fun of someone you know because they were different”, (2) “seen content making fun of someone you don't know because they were different”, and (3) “seen content making fun of a group of people because they were different”. *Active participation in cyberhate was assessed with two items* ($\alpha = 0.79$) gauging whether participants had: (1) “shared content (text, images or video) making fun of a particular person because they were different”, and (2) “shared content making fun of a group of people because they were different”.

Cyberviolence (passive and active) This type of cyberdeviance involves the use of online communication tools to view or share content depicting violence against others. This was measured as *passive participation in cyberviolence* with three items ($\alpha = 0.77$) assessing whether participants had: (1) “seen content (e.g., text, images, or videos) involving serious violence against someone you know”, (2)

“seen content involving serious violence against someone you don’t know (not including movies, tv, or video games)”, and (3) “seen content involving serious violence against a group of people (not including movies, TV, video games)”. *Active participation in cyberviolence was measured through* two items ($\alpha = 0.79$) asking whether participants had: (1) “shared content (text, images or videos) involving serious violence against another person” and (2) “shared content involving serious violence against a group of people”.

Independent variables

Psychosocial and behavioral functioning Adolescent psychosocial and behavioral functioning was measured using the *Strength and Difficulties Questionnaire* (SDQ) (see Goodman, 1997). The SDQ is a well-validated measure of psychosocial and behavioral functioning, has demonstrated a high degree of concordance with clinician-related diagnoses of child behavioral and mental health problems (Goodman & Goodman, 2009; Goodman et al., 2010), and has been validated in Australia (see Mellor, 2005). Participants indicated their agreement with 25 statements according to a three-point scale which included “not true”, “somewhat true”, and “certainly true”. These items correspond to five comprehensive domains of functioning (Dickey & Blumberg, 2004; Koskela et al., 2001), designated (1) *prosocial behavior*, including “I try to be nice to other people”, “I usually share with others”, “I am helpful if someone is hurt, upset or feeling ill”, “I am kind to younger children”, “I often volunteer to help others”; (2) *hyperactivity/inattention*, including “I am restless; I cannot stay still for long”, “I am constantly fidgeting or squirming”, “I am easily distracted”, “I think before I do things (reverse coded)”, “I finish the work I am doing (reverse coded)”; (3) *emotional symptoms*, including “I get a lot of headaches, stomach aches or sickness”, “I worry a lot”, “I am often unhappy, downhearted or tearful”, “I am nervous in new situations”, and “I have many fears; I am easily scared”; (4) *conduct problems*, including “I get very angry and often lose my temper”, “I usually do as I am told (reverse coded)”, “I fight a lot”, “I am accused of lying or cheating”, “I take things that are not mine”; and (5) *peer relationship problems*, including “I am usually on my own”, “I have one good friend or more (reverse coded)”, “other people my age generally like me (reverse coded)”, “other children or young people pick on me”, and “I get on better with adults than with people my age”. Prior studies have, however, found that while such domains are valid for high-risk children, these five subscales may not all adequately assess distinct aspects of child mental health for ‘low-risk’ samples (Goodman et al., 2010), such as the one included in this study. Accordingly, we use composite measures of internalizing problems (emotional and peer problems; $\alpha = 0.73$), externalizing problems

(hyperactivity and conduct problems; $\alpha = 0.72$) and prosocial behaviors ($\alpha = 0.63$), which Goodman et al. (2010) demonstrated can be more appropriate when used as an explanatory variable in empirical studies involving low-risk samples. For each domain, scores range from 0–10, with higher scores indicating poorer functioning (except for prosocial behavior, where higher scores indicated better functioning). Additionally, we also calculate the *total difficulties score* ($\alpha = 0.76$) for each participant, which is the sum of the emotional, peer, conduct and hyperactivity domains, and has been found to be a psychometrically sound measure of overall child mental health problems (e.g., Achenbach et al., 2016; Goodman, 1997; Goodman et al., 2000; Klasen et al., 2000).

Covariates

The current study adjusts for a number of covariates that may confound the association between psychosocial and behavioral functioning and adolescent engagement in the different types of cyberdeviance; specifically: student grade (Holt et al., 2012; Nodeland & Morris, 2020); gender (Holt et al., 2012; Udris, 2016); socioeconomic status (Farrington, 1990; Jarjoura et al., 2002); and, offline deviance (Ellonen et al., 2020; Rokven et al., 2018). At the start of the survey, participants reported their sex (male/female) and school grade (10, 11, or 12). Residential socioeconomic status was computed from the Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-Economic Advantage and Disadvantage (IRSAD), which was based on participants’ primary residential postcode. The SEIFA indices correspond to the average income and employment status of individuals living within postcodes across Australia (Pink, 2013). IRSAD quintiles were derived from the 2016 Australian census, and range from most disadvantaged (quintile 1) to most advantaged (quintile 5). A dichotomous indicator was created so that quintiles 1 and 2 corresponded to socioeconomic disadvantage, and quintiles 3 to 5 were categorized as the reference group.

Engagement in offline deviance was measured using a nine-item scale ($\alpha = 0.82$), made up of a number of widely validated measures of offline deviance derived and adapted from the *International Self-Report Delinquency Study* (Enzmann et al., 2010). Participants were asked how often in the last 12 months (i.e., “never”, “less than weekly”, “about once a week”, “several times a week”, “about once a day”, or “several times a day”) they engaged in various offline delinquent behaviors, including “drunk alcohol”, “used illegal drugs”, “damaged or vandalized something on purpose”, “stolen something small, like a purse or phone”, “stolen something big, like a bicycle or skateboard”, “been in a fight, even if it wasn’t your fault”, “threatened to hurt someone”, “intentionally hurt someone”, “gone into a building or area you should have not been”. A binary

variable was created indicating whether or not participants had engaged in at least one type of offline deviance within the last 12 months (0 = no; 1 = less than weekly or more).

Analytical strategy

Of the 332 students who participated in this study, five (1.5%) provided incomplete or anomalous data, and were excluded from subsequent analyses. This left a total sample of 327 participants, of whom 39.4% ($n = 129$) were male; 26.9% ($n = 88$) resided in a socioeconomically disadvantaged area; and 14.1% ($n = 46$) were enrolled in Year 10, 43.5% ($n = 143$) in Year 11, and 42.2% ($n = 138$) in Year 12. For those remaining 327 participants, we first presented the descriptive statistics for all variables. A series of univariate and multivariate logistic regression analyses were then conducted, examining the association between each of the independent variables and types of cyberdeviance separately. All multivariate analyses control for participant gender, grade, socioeconomic disadvantage, and engagement in offline deviance. For the regression models, we reported the Odds Ratio (OR) and the 95% Confidence Interval (95% CI) as measures of effect size and precision of associations (Norman & Streiner, 2012) between the independent and dependent variables. While we also report exact p values, we note that recent debates in biostatistics and epidemiology have highlighted that p values are a poor indicator of the precision of statistical association, often leading to misunderstood or irreproducible findings (e.g., Colquhoun, 2017; Halsey et al., 2015; Nuzzo, 2014; Ranstam, 2012). Furthermore, we note that numerous criticisms have been levied against the application of Bonferroni correction to p values, including the arbitrary criteria at which the correction is applied, the assumption that all null hypotheses are simultaneously true, and that its implementation is often guided by the same misunderstandings underpinning p values (Morgan, 2007; Nakagawa, 2004; O’Keefe, 2003; Rothman, 1990). These criticisms have been highlighted by the American Statistical Association (Wasserstein & Lazar, 2016), with many arguing that confidence intervals are a more suitable approach to determining the precision and strength of an association (e.g., Andrade, 2019; Halsey, 2019; Ranstam, 2012). Therefore, we base our interpretation of the results on the effect size confidence intervals, with results considered statistically significant if the 95% Confidence did not cross 1.00. Analyses were conducted in IBM SPSS version 24.

Results

The descriptive statistics presented below in Table 1 indicate that most participants had reportedly engaged in at least

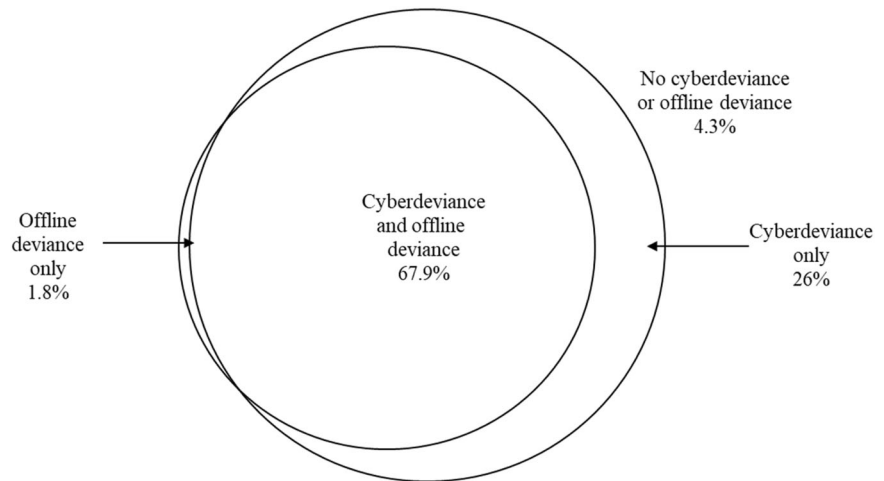
one type of offline deviance within the last 12 months (69.7%). This proportion was similar for both males ($n = 88$, 68.2%) and females ($n = 137$, 70.3%) (OR = 0.91 [95% CI = 0.56–1.47], $p = 0.697$), and for those who did and did not reside in a socioeconomically disadvantaged area ($n = 63$, 28.5% vs. $n = 25$, 28.4%), (OR = 1.01 [95% CI = 0.58–1.74], $p = 0.986$). However, the proportion of participants who had engaged in offline deviance was significantly higher for those in Year 12 ($n = 104$, 75.4%), (OR = 2.15 [95% CI = 1.07–4.35], $p = 0.033$), but not Year 11 ($n = 97$, 67.8%), (OR = 0.67 [95% CI = 0.34–1.34], $p = 0.258$), relative to participants in Year 10 ($n = 27$, 58.7%), with no difference between those in Year 11 and Year 12 (OR = 1.45 [95% CI = 0.86–2.45], $p = 0.163$).

Almost all participants (93.9%) engaged in at least one type of cyberdeviance within the last 12 months. The majority of all participants reportedly engaged in passive participation in cyberhate (75.8%), digital piracy (65.7%), or passive participation in cyberviolence (61.2%). The proportion of participants who engaged in any type of cyberdeviance did not significantly differ by socioeconomic status (disadvantage $n = 83$, 94.3%; not disadvantaged

Table 1 Descriptive statistics ($n = 327$)

Variable	n	%	m	SD
Socioeconomic disadvantage	88	26.9		
Offline deviance	228	69.7		
Student grade				
Grade 10	46	14.1		
Grade 11	143	43.7		
Grade 12	138	42.2		
Gender				
Male	129	39.4		
Female	195	59.6		
Strengths and difficulties				
Total difficulties			13.34	5.56
Internalizing problems			7.33	3.73
Externalizing problems			6.02	3.29
Prosocial behavior			7.67	1.81
Cyberdeviance				
Cyberfraud	41	12.5		
Sexting	89	27.2		
Cyberbullying	54	16.5		
Digital piracy	215	65.7		
Hacking	106	32.4		
Passive participation in cyberhate	248	75.8		
Active participation in cyberhate	51	15.6		
Passive participation in cyberviolence	200	61.2		
Active participation in cyberviolence	36	11.0		
Any cyberdeviance	307	93.9		

Fig. 1 Overlap in engagement in offline- and cyberdeviance ($n = 327$)



$n = 210$, 95.0%) (OR = 0.87 [0.29–2.58], $p = 0.801$), Year level (Year 10 $n = 44$, 95.7%; Year 11 $n = 134$, 93.7%; Year 12 $n = 129$, 93.5%), (OR = 0.86 [95% CI = 0.44–1.67], $p = 0.649$), or gender (male $n = 123$, 95.3%; female $n = 181$, 92.8%) (OR = 1.59 [95% CI = 0.59–4.24], $p = 0.358$).

Most participants indicated that, in the last 12 months, they had both engaged in at least one type of offline- and cyberdeviance (67.9%), whilst 26.0% indicated that they *only* engaged in at least one type of cyberdeviance, and 1.8% indicated that they *only* engaged in at least one type of offline deviance. Only 14 participants (4.3%) indicated that they had not engaged in any type of cyberdeviance or offline deviance. Figure 1 presents a proportional Venn diagram detailing the overlap in offline- and cyberdeviance. Further analysis also revealed that participants who engaged in offline deviance were six times more likely (OR = 6.09 [95% CI = 2.27–16.38], $p < 0.001$), to have also engaged in the types of cyberdeviance examined (or vice versa).

The unadjusted odds of the association between the independent variables and types of cyberdeviance are presented in Table 2. Of the eight independent variables examined, most were associated with cyberbullying and passive cyberviolence, followed by sexting and active cyberhate, then digital piracy, active cyberviolence, cyberfraud, then passive cyber hate, and finally hacking. Offline deviance was associated with nearly all types of cyberdeviance (except active cyberviolence and cyberfraud), gender was associated with three types, participant grade with two types, whilst socioeconomic disadvantage was associated with none. Each of the psychosocial and behavioral factors were associated with between two to six types of cyberdeviance.

Table 3 presents the adjusted odds of engagement in cyberdeviance, independent of gender, grade, socioeconomic disadvantage, and offline deviance. The results provided

partial support for H1. The odds of engaging in some types of cyberdeviance increased for participants reporting higher *total difficulties* scores. That is, for every one-unit increase in a participant's total difficulties score, the odds of engaging in various types of cyberdeviance increased, including for sexting (OR = 1.06 [95% CI = 1.01–1.11]), cyberbullying (OR = 1.10 [95% CI = 1.04–1.17]), passive cyberviolence (OR = 1.07 [95% CI = 1.02–1.13]), active cyberviolence (OR = 1.09 [95% CI = 1.02–1.16]), active cyberhate (OR = 1.08 [95% CI = 1.02–1.13]), and cyberfraud (OR = 1.13 [95% CI = 1.06–1.20]). No statistically significant relationships were observed between total difficulties and digital piracy, hacking and passive cyberhate.

Internalizing problems were associated with an increased odds of engagement in cyberbullying (OR = 1.13 [95% CI = 1.04–1.24]), passive cyberhate (OR = 1.08 [95% CI = 1.00–1.17]), passive cyberviolence (OR = 1.07 [95% CI = 1.00–1.15]), and cyberfraud (OR = 1.10 [95% CI = 1.01–1.21]). Conversely, no statistically significant relationships were found between internalizing problems and sexting, digital piracy, hacking, active cyberhate and active cyberviolence. This provided partial support for H2. Again, partial support was provided for H3, with a similar pattern of association evident for *externalizing problems*, which were associated with greater odds of sexting (OR = 1.10 [95% CI = 1.02–1.19]), cyberbullying (OR = 1.12 [95% CI = 1.02–1.24]), passive cyberviolence (OR = 1.11 [95% CI = 1.03–1.20]), active cyberviolence (OR = 1.15 [95% CI = 1.03–1.20]), active cyberhate (OR = 1.12 [95% CI = 1.02–1.23]), and cyberfraud (OR = 1.24 [95% CI = 1.11–1.38]). No statistically significant relationships were found between externalizing problems and digital piracy, hacking, and passive cyberhate. Moreover, *prosocial behavior* was associated with a *decreased* likelihood of engagement in digital piracy only (OR = 0.83 [95% CI = 0.72–0.97]); no other significant associations were observed, providing minimal support for H4.

Table 2 Univariate odds ratios (OR) and 95% confidence intervals (95% CI) of the associations with types of cyberdeviance (*n* = 327)

Cyberdeviance	Cyberfraud	Sexting	Cyberbullying	Digital piracy	Hacking	Passive cyberhate	Active cyberhate	Passive cyberviolence	Active cyberviolence
Total difficulties	1.12 (1.05–1.19) <i>p</i> < 0.001	1.07 (1.02–1.12) <i>p</i> = 0.004	1.09 (1.03–1.15) <i>p</i> = 0.001	1.04 (0.99–1.08) <i>p</i> = 0.110	1.02 (0.98–1.07) <i>p</i> = 0.256	1.04 (0.99–1.09) <i>p</i> = 0.089	1.07 (1.01–1.13) <i>p</i> = 0.013	1.08 (1.03–1.13) <i>p</i> < 0.001	1.06 (1.00–1.12) <i>p</i> = 0.060
Prosocial behavior	0.91 (0.77–1.08) <i>p</i> = 0.284	1.15 (1.00–1.33) <i>p</i> = 0.056	0.87 (0.74–1.01) <i>p</i> = 0.067	0.86 (0.75–0.98) <i>p</i> = 0.028	0.91 (0.80–1.03) <i>p</i> = 0.127	0.97 (0.84–1.11) <i>p</i> = 0.629	0.93 (0.79–1.09) <i>p</i> = 0.383	1.04 (0.92–1.17) <i>p</i> = 0.561	0.99 (0.82–1.20) <i>p</i> = 0.902
Internalizing problems	1.09 (1.00–1.19) <i>p</i> = 0.052	1.05 (0.99–1.12) <i>p</i> = 0.118	1.09 (1.01–1.18) <i>p</i> = 0.023	1.03 (0.97–1.10) <i>p</i> = 0.343	1.02 (0.95–1.08) <i>p</i> = 0.647	1.08 (1.00–1.15) <i>p</i> = 0.046	1.05 (0.97–1.14) <i>p</i> = 0.200	1.07 (1.00–1.13) <i>p</i> = 0.042	1.02 (0.93–1.12) <i>p</i> = 0.731
Externalizing problems	1.24 (1.12–1.37) <i>p</i> < 0.001	1.13 (1.05–1.22) <i>p</i> = 0.002	1.14 (1.05–1.24) <i>p</i> = 0.003	1.06 (0.99–1.14) <i>p</i> = 0.102	1.05 (0.98–1.13) <i>p</i> = 0.161	1.03 (0.95–1.11) <i>p</i> = 0.543	1.13 (1.04–1.24) <i>p</i> = 0.006	1.14 (1.06–1.22) <i>p</i> < 0.001	1.15 (1.04–1.28) <i>p</i> = 0.006
Male	1.19 (0.61–0.35) <i>p</i> = 0.608	1.07 (0.65–1.75) <i>p</i> = 0.806	2.49 (1.37–4.53) <i>p</i> = 0.003	1.03 (0.65–1.65) <i>p</i> = 0.888	1.31 (0.82–2.10) <i>p</i> = 0.265	0.90 (0.54–1.50) <i>p</i> = 0.683	2.40 (1.30–4.44) <i>p</i> = 0.005	0.93 (0.59–1.46) <i>p</i> = 0.739	3.04 (1.48–6.25) <i>p</i> = 0.003
Student grade	0.82 (0.52–1.30) <i>p</i> = 0.397	1.26 (0.88–1.80) <i>p</i> = 0.215	0.99 (0.65–1.51) <i>p</i> = 0.967	1.50 (1.08–2.08) <i>p</i> = 0.016	0.85 (0.61–1.18) <i>p</i> = 0.323	0.82 (0.56–1.18) <i>p</i> = 0.284	1.14 (0.74–1.76) <i>p</i> = 0.561	1.52 (1.10–2.10) <i>p</i> = 0.011	1.06 (0.64–1.75) <i>p</i> = 0.825
SES disadvantage	1.18 (0.57–2.47) <i>p</i> = 0.651	0.84 (0.48–1.47) <i>p</i> = 0.534	1.63 (0.87–3.06) <i>p</i> = 0.131	1.07 (0.63–1.80) <i>p</i> = 0.810	1.29 (0.76–2.16) <i>p</i> = 0.343	0.96 (0.54–1.71) <i>p</i> = 0.883	1.82 (0.96–3.46) <i>p</i> = 0.066	1.05 (0.63–1.76) <i>p</i> = 0.845	0.94 (0.42–2.10) <i>p</i> = 0.871
Offline deviance	1.93 (0.86–4.33) <i>p</i> = 0.114	3.31 (1.74–6.30) <i>p</i> < 0.001	5.15 (1.98–13.35) <i>p</i> < 0.001	2.57 (1.57–4.19) <i>p</i> < 0.001	3.09 (1.72–5.50) <i>p</i> < 0.001	2.13 (1.26–3.61) <i>p</i> = 0.005	3.14 (1.36–7.25) <i>p</i> = 0.007	2.71 (1.67–4.40) <i>p</i> < 0.001	2.35 (0.95–5.84) <i>p</i> = 0.066

Statistically significant are shown in bold

Table 3 Multivariate odds ratios (OR) and 95% confidence intervals (95% CI) of the associations with types of cyberdeviance, adjusted for gender, grade, socioeconomic disadvantage, and offline deviance (*n* = 327)

Cyberdeviance	Cyberfraud	Sexting	Cyberbullying	Digital piracy	Hacking	Passive cyberhate	Active cyberhate	Passive cyberviolence	Active cyberviolence
Total difficulties	1.13 (1.06–1.20) <i>p</i> < 0.001	1.06 (1.01–1.11) <i>p</i> = 0.024	1.10 (1.04–1.17) <i>p</i> = 0.002	1.04 (0.99–1.09) <i>p</i> = 0.126	1.02 (0.97–1.06) <i>p</i> = 0.490	1.03 (0.98–1.09) <i>p</i> = 0.223	1.08 (1.02–1.14) <i>p</i> = 0.013	1.07 (1.02–1.13) <i>p</i> = 0.003	1.09 (1.02–1.16) <i>p</i> = 0.013
Internalizing problems	1.10 (1.01–1.21) <i>p</i> = 0.040	1.05 (0.98–1.13) <i>p</i> = 0.189	1.13 (1.04–1.24) <i>p</i> = 0.006	1.05 (0.98–1.13) <i>p</i> = 0.169	1.02 (0.95–1.09) <i>p</i> = 0.639	1.08 (1.00–1.17) <i>p</i> = 0.059	1.08 (0.99–1.18) <i>p</i> = 0.059	1.07 (1.00–1.15) <i>p</i> = 0.042	1.08 (0.98–1.20) <i>p</i> = 0.125
Externalizing problems	1.24 (1.11–1.38) <i>p</i> < 0.001	1.10 (1.02–1.19) <i>p</i> = 0.019	1.12 (1.02–1.24) <i>p</i> = 0.020	1.04 (0.97–1.12) <i>p</i> = 0.298	1.03 (0.95–1.11) <i>p</i> = 0.526	1.00 (0.92–1.08) <i>p</i> = 0.967	1.12 (1.02–1.23) <i>p</i> = 0.023	1.11 (1.03–1.20) <i>p</i> = 0.007	1.15 (1.03–1.29) <i>p</i> = 0.014
Prosocial behavior	0.96 (0.79–1.16) <i>p</i> = 0.647	1.16 (0.99–1.37) <i>p</i> = 0.067	0.86 (0.72–1.03) <i>p</i> = 0.097	0.83 (0.72–0.97) <i>p</i> = 0.015	0.91 (0.79–1.04) <i>p</i> = 0.168	0.95 (0.81–1.11) <i>p</i> = 0.522	0.95 (0.79–1.14) <i>p</i> = 0.592	1.01 (0.88–1.16) <i>p</i> = 0.867	1.09 (0.87–1.37) <i>p</i> = 0.445

Statistically significant are shown in bold

Discussion

The current study introduced four separate hypotheses to explore the independent association between aspects of adolescent psychosocial and behavioral functioning and engagement in various types of cyberdeviance. Once adjusted for gender, grade, socioeconomic disadvantage and offline deviance, the results reported provide partial support for each of these hypotheses. However, these findings must be interpreted within the context that effect sizes were small. Nevertheless, we discuss each finding in turn, and provide guidance for future research that may be undertaken to elucidate the pattern of relationships found in the current study. First, a relationship was expected between poor overall psychosocial and behavioral functioning (i.e., total difficulties) and poor behavioral outcomes through engagement in cyberdeviance (H1). Indeed, a significant positive relationship was observed between total difficulties and most types of cyberdeviance, including sexting, cyberbullying, passive and active cyberviolence, active cyberhate, and cyberfraud. However, no statistically significant relationship was observed between total difficulties and digital piracy, hacking, and passive cyberhate. Taken together, these findings may support the limited extant literature demonstrating the association between higher total difficulties and deviance; both off- and online (see Fletcher et al., 2014; Foody et al., 2019; Hunnikin et al., 2020; Kaiser et al., 2020; Murray et al., 2015; Sourander et al., 2010). With respect to cyberdeviance, the results of the current study are consistent with these previous studies demonstrating links between total difficulties and cyberbullying, but extend this work by showing that such relationships also exist beyond cyberbullying to include other types of cyberdeviance.

While using the overall total difficulties score—which combines problems related to both internalizing and externalizing factors—may prove useful in identifying those individuals who might be at risk of engagement in certain forms of deviance, this measure arguably lacks the precision required for targeted and robust intervention. That is, there are vast differences in the purpose and way in which an individual engages in different types of cyberdeviance (e.g., digital piracy, cyberbullying, and sexting are each associated with distinctly different processes and outcomes), and this may likely translate to differences in the driving factors of such behavior. Therefore, beyond this overall measure of total difficulties, further analysis provides a better understanding of the relationship between the individual aspects of psychosocial and behavioral functioning (including internalizing problems, externalizing problems and prosocial behaviors), and engagement in cyberdeviance. A positive relationship was expected between engagement in various types of cyberdeviance and internalizing problems (H2). As

was the case for total difficulties (H1), a significant positive relationship was observed for some, but not all types of cyberdeviance assessed in this study. That is, greater internalizing problems were associated with engagement in cyberbullying, passive cyberhate and cyberviolence, and cyberfraud (while no relationship was observed for sexting, piracy, hacking, and active cyberhate and cyberviolence). The associations observed in this current study between internalizing problems and various types of cyberdeviance are consistent with findings reported in prior literature, including for cyberbullying (see also Campbell et al., 2013; Kaiser et al., 2020, Yang et al., 2013), passive cyberhate and passive cyberviolence (see Kvardova et al., 2021), and fraud (see Lee & Kim, 2017). In the current study, a statistically significant association was not observed between internalizing problems and sexting, or active cyberhate, which differs from findings reported in several studies (see Chaudhary et al., 2017; Kaakinen et al., 2020; Klettke et al., 2019; Ybarra & Mitchell, 2014), although these studies all adopted different measures of internalizing problems, which may account for these discrepancies.

Beyond internalizing problems, a positive relationship was also hypothesized in the current study between externalizing problems and engagement in cyberdeviance (in its various types) amongst participants (H3). Results showed that increased externalizing problems were found to be associated with increased engagement in comparatively more types of cyberdeviance than internalizing problems, including sexting, cyberbullying, passive and active cyberviolence, active cyberhate, and cyberfraud (with no relationship observed for piracy, hacking and passive cyberhate). The associations observed in the current study between externalizing problems and various types of cyberdeviance are also consistent with the limited prior literature available for cyberbullying (see Campbell et al., 2013; Fletcher et al., 2014; Foody et al., 2019; Sourander et al., 2010). Beyond cyberbullying, it is not surprising that other types of cyberdeviance are associated with externalizing problems, particularly given results reported in numerous offline studies (e.g., Falk et al., 2017; Kumpulainen et al., 2001; Murray et al., 2015; Wolke et al., 2000) have demonstrated a robust association between externalizing problems and other violent and non-violent forms of deviance.

Taken together, these results indicated that the majority of the different types of cyberdeviance were related to both internalizing and externalizing problems, as well as with total difficulties. However, it is important to note that effect sizes indicated that the significant associations between dimensions of the SDQ and cyberdeviance were relatively weak. There were gender differences for engagement in different types of deviance, with males more likely to engage in the more overt aggressive behaviors (i.e., cyberbullying, active cyberhate and violence), as consistent with

the off- and online literature indicating greater perpetration of direct aggression in adolescent males (e.g., Björkqvist, 2018; Card et al., 2008; Wachs et al., 2019). Elsewhere, there was an effect of age with participants from higher grade levels being associated with greater engagement in digital piracy and passive cyberviolence. Nevertheless, significant associations between psychosocial and behavioral factors and cyberdeviance were still present after controlling for gender and grade level as covariates, as well as SES. Additionally, where there were significant associations between the types of cyberdeviance examined and internalizing and externalizing problems, the strength of this association was relatively consistent. However, two types of cyberdeviance—digital piracy and hacking—were not significantly related to either factor. Performing these activities may require a higher degree of technical proficiency than other types of cyberdeviance, and may contribute to these differences. As outlined in the literature review, social factors such as deviant peer associations have demonstrated links with various forms of deviance (both on- and offline), and may facilitate the learning of such advanced activities (Holt et al., 2012, 2020), as well as demonstrated relationships with psychosocial and behavioral functioning (Fanti & Henrich, 2010; Fortuin et al., 2015). Thus, while aspects of psychosocial and behavioral functioning were not directly related to digital piracy and hacking, further research should examine the potential mediating role of deviant peer associations to better understand this relationship and inform more specific intervention efforts for those behaviors.

It was also hypothesized that increased reporting of prosocial behaviors would be associated with decreased engagement in cyberdeviance (H4). While such a relationship was observed for digital piracy, no significant associations were found for the other types of cyberdeviance assessed in this study. While these findings for digital piracy were expected, and are consistent with previous findings for other forms of deviance (offline and online), prior research has observed a relationship between prosocial behavior and cyberbullying which was not identified in the current study (see Campbell et al., 2013; Foody et al., 2019; Kaiser et al., 2020; Sourander et al., 2010). These differences may be due to discrepancies in the way that cyberbullying was measured. That is, where our study asked participants to report their engagement in three specific behaviors that are consistent with widely accepted definitions of cyberbullying (i.e., Hinduja & Patchin, 2009), previous research has used a direct questioning approach (specifically asking if participants had “bullied” or “cyberbullied” within a given time period), which may increase susceptibility to social desirability bias (Fisher, 1993). Despite these differences, there is nevertheless longstanding support in criminology emphasizing the crime control benefits of developing and

promoting prosocial behaviors (e.g., Wilson & Hoge, 2013), highlighting that additional research may be necessary to ascertain the suitability and efficacy of promoting prosocial behavior in digital contexts.

Altogether, these results suggest it may be advantageous to employ a strategy to target both internalizing and externalizing problems as risk factors within future intervention efforts for different types of cyberdeviance. The development of effective interventions relies on a nuanced understanding of the risk factors associated with each type of cyberdeviance. Furthermore, the efficacy of cyberdeviance interventions is reliant on the identification of risk factors which have been empirically shown to correlate with the problematic behavior (Andrews & Bonta, 2010; Andrews et al., 1990; Bonta & Andrews, 2017). The results indicate that internalizing and externalizing problems relate to various types of cyberdeviance, and hence may need to be targeted when either: (1) identifying young people at risk of becoming involved in these activities, or (2) developing intervention programs to reduce engagement in various types of cyberdeviance. However, it is imperative that interventions address a full range of potential co-existing and interacting risk factors, given that intervention programs designed to target risk factors within a single domain are unlikely to effectively address engagement across all types of cyberdeviance. As is evident from this study, internalizing and externalizing problems only had weak relationships with engagement in most types of cyberdeviance (and no relationship with digital piracy or hacking types). Therefore, it may be of greater value to target other areas of functioning that have strong, evidenced relationships with engagement in certain types of cyberdeviance (e.g., callous-unemotional traits, low self-control, peer relationships, Holt et al., 2012, 2021), and examine how those factors may also interact with psychosocial and behavioral functioning.

While it is important to understand the risk factors associated with engagement in different types of cyberdeviance, the identification of commonly occurring risk factors across a range of cyberdeviance types is also valuable, as it enables the design of interventions to potentially reduce multiple forms of problematic behavior. Designing interventions that target multiple risk factors which have been shown to influence the likelihood of engagement in numerous forms of cyberdeviance is, therefore, likely to be more efficient than designing an intervention targeting only one domain for one type of cyberdeviance. Therefore, further research informing the development of intervention strategies should examine other potential risk factors, in conjunction with psychosocial and behavioral functioning, to gain a greater understanding of the interacting risk factors that influence young peoples’ engagement in various types of cyberdeviance.

Conclusion

This study has demonstrated links between psychosocial and behavioral functioning and different types of cyberdeviance. However, the evidenced relationship between these variables was weak—indicating that there may be other factors not explored in the current study that may have greater explanatory power, or interact with psychosocial and behavioral functioning, when understanding adolescent engagement in cyberdeviance. Nevertheless, the discussion flags the potential importance of accounting for these psychosocial and behavioral risk factors, along with other factors, when considering the development of new interventions targeted across various types of cyberdeviance, given the relationships found in the present study.

It is important that the results be interpreted with caution as this study has some methodological limitations. First, characteristics of the sample may reduce the generalizability of the results to other contexts. For example, the current study is based on a convenience sample of grade 10, 11 and 12 students enrolled at a single school in a large Australian city, with the majority of students from a higher SES background. Additionally, male students were under-represented within the sample (though gender was controlled for in the analysis), with research highlighting males are often over-represented compared to females when it comes to engagement in many types of cyberdeviance (Donner, 2016; Holt et al., 2012; Sorrentino et al., 2019), and other sample characteristics including the special needs status of participants were not specifically accounted for during data collection. Second, the statistical power of the study was limited given the size of the sample of participants. Further research with increased power would contribute to a greater understanding of the relationship between dimensions of the SDQ and cyberdeviance—with the current study indicating relatively weak associations based on effect size indicators. Third, the data was collected via self-report surveys, and is potentially prone to response bias. To minimize such effects, great care was taken in the design and administration of surveys—including using previously validated measures, derived from questions that were purposefully non-specific (i.e., about specific illicit events, dates and times), instructing participants to skip any questions that they would prefer not to answer, as well as providing assurance that any answers provided would remain anonymous. Fourth, it is also acknowledged that the types of cyberdeviance examined in this study are not exhaustive, and that subsequent analysis of other behaviors pertinent to young people (e.g., image-based sexual abuse, spreading misinformation, stalking, amongst others) may also offer important insights. Nonetheless, the results offer important new knowledge by identifying and directly addressing individual-level risk-factors differentially associated with various types of adolescent cyberdeviance.

Finally, despite presenting numerous paths forward from which to build on the findings of this current study, we acknowledge that at present, little is known about the efficacy of psychosocial and behavioral interventions in the context of cyberdeviance. Further studies informing the development, and assessing the implementation of such interventions, will be critical.

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Compliance with ethical standards

Conflict of interest The authors declare no competing interests.

Ethical approval This research project was approved by the host University's institutional review board. Participants and guardians provided their informed consent to participate in the research, and were free to withdraw from the study at any time and without consequence.

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