Can the General Theory of Crime and General Strain Theory Explain Cyberbullying Perpetration?

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Abstract
Cyberbullying is an increasingly common characteristic of contemporary online communication. The current study surveyed 320 Internet-active young adults and found up to 80% reported engaging in this behavior at least once. In addition, the ability of the general theory of crime and general strain theory to explain cyberbullying perpetration was tested. Evidence for both theories was observed, with both low self-control and higher levels of strain related to cyberbullying perpetration. Furthermore, opportunity (operationalized as moderate and high number of hours online) interacted with low self-control to increase perpetration, and anger partially mediated the relationship between strain and cyberbullying. Implications of the findings are discussed.

Keywords
cyberbullying, self-control, strain, anger

Introduction
Bullying has long been a subject of concern to researchers, educators, and parents. Dating from the work of Dan Olweus in Norway (Olweus, 1993), a

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A considerable body of international research has accumulated that indicates school bullying is prevalent in all countries studied (Craig et al., 2009), is committed by between a quarter and a third of students and experienced by a similar proportion of victims (Craig et al., 2009; Modecki, Minchin, Harbaugh, Guerra, & Runions, 2014), and has a number of serious consequences for both perpetrator and victim, including depression, anxiety, poor school performance (Arseneault, Bowes, & Shakoor, 2010; Haltigan & Vaillancourt, 2014; Hemphill et al., 2011; Strøm, Thoresen, Wentzel-Larsen, & Dyb, 2013), and for the bullies, at least, antisocial and delinquent behavior (Farrington, Losel, Ttofi, & Theodorakis, 2012; Renda, Vassallo, & Edwards, 2011).

More recently, attention has been drawn to a new form of deviant behavior, cyberbullying. It is clear the Internet and electronic forms of communication have revolutionized the way individuals interact and the speed with which information can be conveyed around the world. Use of the Internet and mobile phones is ubiquitous in many developed countries. For example, in Europe, North America, and Oceania/Australia, the proportion of the population using the Internet was reported to be 73.5%, 87.9%, and 73.2%, respectively (Miniwatts Marketing Group, 2016). While this new and interconnected digital world has had many benefits, it has also proven to have a number of disadvantages, one of which is cyberbullying. Although a burgeoning research literature into this new phenomenon exists (Cassidy, Faucher, & Jackson, 2013; Kowalski, Giumetti, Schroeder, & Lattanner, 2014), much remains to be known about its etiology. The current study will investigate the prevalence and causes of cyberbullying in an international sample of Internet-active young adults. It will also investigate whether this new form of antisocial behavior can be explained by two well-established criminological theories, the general theory of crime (GTC; Gottfredson & Hirschi, 1990) and general strain theory (GST; Agnew, 1992). Such an investigation is important for two reasons. First, it will provide valuable information for policy makers and educators interested in addressing the problem of cyberbullying. Second, it will investigate whether two important criminological theories can explain a phenomena that did not exist at the time of their formulation. In what follows, we will define cyberbullying, review evidence as to its prevalence and consequences, and then describe the theoretical basis of this study.

**Definition, Prevalence, and Consequences of Cyberbullying**

The established definition of bullying is behavior that intentionally causes harm, is repetitious, and involves an imbalance of power between perpetrator and victim (Olweus, 1993). There has been some controversy regarding
whether this definition holds for cyberbullying. Olweus (2013) has argued that the traditional definition does apply to cyberbullying, however, the power imbalance may manifest itself in technological superiority, rather than differences in physical strength or popularity. Others have questioned the inclusion of the characteristic of a power imbalance, given that unpopular and rejected individuals can cyberbully a socially powerful peer or celebrity (Buckels, Trapnell, & Paulhus, 2014). Repetition may also not apply to cyberbullying, as one instance of victimization stays online forever and can be re-sent many times by others (Dooley, Pyzalski, & Cross, 2009). Cyberbullying is also anonymous, as the perpetrator can hide their identity (Barlett, Gentile, & Chew, 2014). Taking these competing considerations into account, cyberbullying will be defined in the current study as,

the use of information and communication technologies to carry out a series of acts as in the case of direct bullying, or an act as in the case of indirect cyberbullying, intended to harm another (the victim) who cannot easily defend him or herself (Langos, 2012, p. 288).

Behaviors considered to comprise cyberbullying include “flaming,” that is, making rude and vulgar comments; online harassment in the form of repeated insults; denigration by posting false or wounding comments; impersonating others online; posting private material such as videos or photos intended to humiliate the victim; and excluding people from online groups (Willard, 2005).

Although establishing causal relationships has proven difficult, there are a number of risk factors that have been observed to increase the likelihood of cyberbullying. Longitudinal studies have found cyberbullying to be associated with alcohol use, delinquent behavior, depression, low self-esteem, relational aggression, peer rejection, and acceptance of aggression (Hemphill et al., 2012; Modecki, Barber, & Vernon, 2013; Wright & Li, 2013). Furthermore, callous-unemotional traits, greater time spent viewing violent images and media, as well as playing violent video games, have all been found to be associated with cyberbullying (Fanti, Demetriou, & Hawa, 2012).

Estimates of cyberbullying victimization in child and adolescent samples have ranged from 10% to 40% (Kowalski et al., 2014). The variance in these estimates is primarily a result of the differing measures and definitions of the construct adopted. Estimates also vary widely in samples of young adults, ranging from 5% (Hemphill & Heerde, 2014) to 21% (Kowalski, Giumetti, Schroeder, & Reese, 2012), and as high as 54.4% in Turkish university students (Aricak, 2009). Perpetration rates have also been observed to vary widely from around 4% to 22.5% (Aricak, 2009; Dilmaç, 2009; Hemphill
et al., 2012; Hertz & David-Ferdon, 2009; MacDonald & Roberts-Pittman, 2010). Furthermore, males are more likely to cyberbully than females (Barlett & Coyne, 2014).

Similar to conventional bullying, cyberbullying has a number of negative consequences for its victims. These include social difficulties, anxiety, and depression (Campbell, Spears, Slee, Butler, & Kift, 2012). In addition, cyber victims have been found to experience a sense of powerlessness, high levels of anger, sorrow, as well as a loss in confidence (Hoff & Mitchell, 2009). Finally, these individuals have greater levels of suicidal ideation and are nearly twice as likely to attempt suicide than non-involved peers (Hinduja & Patchin, 2010). Clearly, cyberbullying is a behavior with serious consequences for its victims (Beran, Rinaldi, Bickham, & Rich, 2012; Schenk & Fremouw, 2012).

**Theoretical Explanations**

Research has increasingly moved from studying the prevalence and consequences of cyberbullying to theoretical explanations for the phenomenon. Two theories drawn from criminology have been used to explain traditional bullying and cyberbullying as specific forms of deviant or delinquent behaviors, namely, the GTC (Gottfredson & Hirschi, 1990) and GST (Agnew, 1992).

**GTC**

Gottfredson and Hirschi (1990) argue antisocial behavior is committed by individuals with low self-control. They conceptualize low self-control as a stable personality trait that develops in the context of deficient early childhood socialization, and that manifests itself as impulsivity, a need for immediate gratification, a preference for risky activities, simple tasks, physical rather than mental activities, and a quick temper and self-absorption (Gottfredson & Hirschi, 1990). Individuals with low self-control are more likely to engage in criminal and antisocial behavior because they pursue their self-interest and desire to maximize pleasure, and furthermore lack the capacity to govern their behavior in pursuit of this pleasure (Gottfredson & Hirschi, 1990). Low self-control, in combination with opportunity, determines whether an individual will commit a large range of antisocial activities across their lifespan, including, but not limited to, acts of force or fraud as well as excess alcohol consumption, bullying, truancy, negligent driving, and sexually promiscuous behavior (Gottfredson, 2008; Gottfredson & Hirschi, 1990).
A considerable body of research has made it clear individuals with low self-control are at greater risk of committing criminal offences (Cauffman, Steinberg, & Piquero, 2005; Nagin & Paternoster, 1993; Pratt & Cullen, 2000). There is also evidence to suggest individuals with low self-control are more likely to engage in traditional forms of bullying (Chui & Chan, 2013, 2015; Moon & Alarid, 2015; Unnever & Cornell, 2003). Given the relatively recent nature of cyberbullying, less research exists testing the extent to which Gottfredson and Hirschi’s theory can explain this phenomenon. Two studies found university students with low self-control were more likely to be cyberbullies (Marcum, Higgins, Freiburger, & Ricketts, 2012, 2014). Similarly, a study of European 11 to 16 year olds found that self-control predicted cyberbullying perpetration (CBP) both directly, but also indirectly through other behavior (Vazsonyi, Machackova, Sevcikova, Smahel, & Cerna, 2012). Those with low self-control were more likely to engage in antisocial acts or be victims or perpetrators of traditional bullying, which then made it more likely that they would perpetrate cyberbullying (Vazsonyi et al., 2012).

An important, and often overlooked, element of Gottfredson and Hirschi’s theory relates to the role of opportunity. Individuals with low self-control commit deviant acts when presented with the opportunity to do so (Gottfredson & Hirschi, 1990, p. 22). Grasmick, Tittle, Bursik, and Arneklev (1993) expanded on the definition of this construct provided by Gottfredson and Hirschi and identified three characteristics of situations where there is maximum opportunity for delinquent and criminal behavior: (a) where the behavior can result in instant pleasure, (b) where the behavior is easy to carry out, and (c) when there is a low chance of detection (Grasmick et al., 1993). Testing this aspect of the GTC requires demonstrating that an interaction between low self-control and opportunity results in increased deviant behavior. Evidence bearing on whether this relationship exists for bullying is mixed. Moon and Alarid (2015) found both self-control and opportunity were significant predictors of traditional bullying perpetration (TBP), with opportunity measured as greater association with bullies, less parental supervision, and greater negative teacher feedback. However, no tests for an interaction between self-control and opportunity factors were conducted, and the strongest predictor identified was association with peers who are bullies, suggesting that low self-control may not be the primary explanatory factor for bullying (Moon & Alarid, 2015). In relation to cyberbullying, opportunity, defined variously as time spent online or association with deviant peers, has been found to interact with low self-control in predicting the behavior (Donner, Marcum, Jennings, Higgins, & Banfield, 2014; Holt, Bossler, & May, 2012; Vazsonyi et al., 2012). However, given the differing ways in which opportunity has been operationalized, it is clear this is still a topic about which much remains to be learnt.
GST

GST argues crime and delinquency are caused by strain. Agnew (1992) proposed strain could be thought of as falling into three categories: (a) failure to achieve positively valued stimuli, (b) loss of positively valued stimuli, and (c) actual or anticipated presentation of noxious stimuli. These strains produce negative emotions such as anger, frustration, depression, or anxiety, and this is particularly so when strains are perceived as unjust, of a high magnitude, and are clustered in time (Agnew, 2008). In an effort to remedy the situation, alleviate the negative emotions, or exact revenge, individuals engage in delinquent or criminal acts (Agnew, 2001).

Research in general has been supportive of Agnew’s theory, finding, first, individuals exposed to strain are more likely to engage in delinquency (Agnew & White, 1992; Paternoster & Mazerolle, 1994); second, negative emotionality mediates the relationship between strain and offending (Broidy, 2001; S. J. Jang & Johnson, 2003; Mazerolle & Piquero, 1997; Mazerolle, Piquero, & Capowich, 2003); and third, strain leads to anger, which in turn leads to delinquency (Agnew, Brezina, Wright, & Cullen, 2002; Mazerolle & Maahs, 2000; Mazerolle & Piquero, 1997).

While some research has investigated whether bullying is best thought of as a strain causing delinquency (Cullen, Unnever, Hartman, Turner, & Agnew, 2008; Hay, Meldrum, & Mann, 2010), most investigations of GST and bullying have focused on the question of whether bullying results from strain. A longitudinal study of 655 South Korean middle-school students found partial support for GST being a predictor of traditional bullying, although the only strain related to bullying was caused by examination stress, and furthermore, anger was unrelated to bullying (Moon, Hwang, & McCluskey, 2011). In a later Korean study with a larger sample (N = 2,817), prior victimization and struggles with parents led to traditional bullying, especially when individuals had low self-control and connections with delinquent peers (Moon, Morash, & McCluskey, 2012). However, anger did not mediate the relationship between strain and bullying as hypothesized (Moon et al., 2012). A further study of students from the United States aged between 11 and 14 years did find a mediation effect in that strain resulted in greater anger, which increased the likelihood of perpetrating traditional bullying (Moon & Jang, 2014). A key distinction relates to the difference between situational and trait anger. For instance, Mazerolle et al. (2003) found strain to be related to situational anger, which was in turn related to intentions to commit assault, in a structural equation model testing the core assumptions of GST. It should be noted, trait anger also predicted intentions to assault, although the magnitude of the relationship was smaller.
The relationship between strain, anger, and deviant behavior has also been observed in relation to cyberbullying. Patchin and Hinduja (2011) investigated whether strain from relationship, academic, and financial stressors predicted both traditional and cyberbullying, as well as testing if this relationship was mediated by negative affect, in a sample of young adolescents. They found those experiencing more strain and negative emotion were likelier to engage in both of these behaviors, however, negative affect did not mediate this relationship. In a study of Hong Kong university students, being cyberbullied in the past was the second strongest predictor of CBP after motivation (Xiao & Wong, 2013). These results suggest past victimization could be an important source of strain. Other studies have also implicated both traditional and cyber victimization, as well as relationship difficulties, lack of social support, and financial and academic problems as potential sources of strain (Caron, Lafontaine, Bureau, Levesque, & Johnson, 2012; Hemphill & Heerde, 2014; Hoff & Mitchell, 2009; H. Jang, Song, & Kim, 2014; Roberto, Eden, Savage, Ramos-Salazar, & Deiss, 2014; Ybarra & Mitchell, 2004).

The Current Study

The current study will test the extent to which these two well-established theories of criminology can explain a new form of deviant behavior, cyberbullying. In particular, it will explore whether low self-control and increased opportunity predict higher levels of cyberbullying perpetration, and whether anger, and in particular state anger, mediates the relationship between strain and cyberbullying. The research will contribute to an improved understanding of the prevalence and causes of cyberbullying. It will do so using an international sample of Internet-active young adults. Consistent with the research reviewed here, it is expected individuals with low self-control and greater opportunity will be more likely to engage in cyberbullying. It is also expected individuals experiencing strain will feel anger as a result and consequently be more likely to engage in cyberbullying.

Method

Sample

Data for this study were obtained using an online questionnaire after appropriate institutional ethical approvals were obtained. Participants were recruited through an online website where study details were posted by the researchers. Individuals registered with the site selected the research and completed the questionnaire via a web link. They were paid AUD 5.00 for completing the questionnaire.
A total of 341 individuals attempted the survey. Of these, 21 (6%) failed to provide responses for the dependent variable of the study (level of cyber-bullying) and were, thus, omitted from analyses, leading to a final sample of 320 young adults aged between 18 and 30 years. Males comprised 60% of the final sample ($N = 192$), and the mean age was $23.07$ ($SD = 2.75$). The sample was international, with the most commonly represented countries being the United States ($N = 72$), the United Kingdom ($N = 139$), and India ($N = 14$).

**Measures**

**Independent variables**

**Self-control.** Self-control was measured using the Grasmick et al. (1993) scale, which is based on the six components of low self-control identified by Gottfredson and Hirschi (1990): (a) impulsivity, (b) risk seeking, (c) preference for simple tasks, (d) preference of physical activities, (e) self-centeredness, and (f) a quick temper. The scale consists of 24 items with responses measured on a 4-point Likert-type scale from 1 (strongly disagree) to 4 (strongly agree). The scores were coded so that lower scores indicated lower self-control. The scale has been shown to have sound psychometric properties in a number of studies (Grasmick et al., 1993; Longshore, 1998; Longshore, Rand, & Stein, 1996; Moon & Alarid, 2015; Pratt & Cullen, 2000). In the current study, Cronbach’s alpha = .82.

**Opportunity.** Opportunity was measured using three items:

**Time spent using social networking sites.** Participants reported the average number of hours per week they used any social networking site. A similar measure was used by Wilson, Fornasier, and White (2010) and Marcum et al. (2014).

**Association with peers who commit acts of cyber deviancy.** Participants were asked how many of their friends engaged in pirating media, pirating computer software, viewing sexually offensive material online, harassing others online, and engaging in computer hacking in the previous 12 months. The final score was obtained by standardizing and averaging the individual items. The scale was developed by Holt et al. (2012) who observed a Cronbach’s alpha of .78. In the current study, an alpha of .85 was observed.

**Perceived anonymity when online.** Participants were asked to indicate their level of agreement with statements about their perceived anonymity
when online in a 5-item scale (Hite, Voelker, & Robertson, 2014). The developers of the instrument observed a reliability coefficient of .82, as well as good test-retest reliability at a 4-week time interval (Hite et al., 2014). In the current study, Cronbach’s alpha = .85.

**Strain.** A composite strain score was calculated from measurement of four strains: prior traditional or cyber victimization, perceived social support, academic strain, and financial strain. Calculation of the composite strain score involved reverse scoring the perceived social support variable so higher scores represented less social support, and, therefore, greater strain. The different strain variables were then standardized due to different measurement scales and averaged. A composite score was used to ensure analyses were more parsimonious. It is also consistent with the approach used in past studies (e.g., Mazerolle et al., 2003).

**Prior traditional bullying or cyberbullying victimization.** Prior victimization was measured using a 6-item scale employed by Hay and Meldrum (2010), where participants indicated how frequently they had been (a) the target of lies or rumors; (b) the target of attempts to get others to dislike them; (c) called names, made fun of, or teased in a hurtful way; (d) hit, kicked, or pushed by another student; (e) physically threatened by students; and (f) picked on by others. Hay and Meldrum (2010) conducted confirmatory factor analysis showing that the six items loaded onto the same factor. Furthermore, investigation of item internal reliability based on their sample showed that removal of any items decreased the Cronbach’s alpha value of .85 (Hay & Meldrum, 2010). Prior cyber victimization was measured by a 3-item scale also used by Hay and Meldrum (2010). Participants were asked how frequently in the past they had been (a) “the target of ‘mean’ text messages,” (b) “sent threatening or hurtful statements or pictures in an email or text message,” (c) “made fun of on the internet.” Scores could range from 3 to 12. Confirmatory factor analysis and analysis of internal reliability showed the items loaded onto the same factor, and taking items away lowered reliability of .80 found in their sample (Hay & Meldrum, 2010). Higher scores indicate more instances of traditional bullying victimization and cyberbullying victimization in the participants’ past. This measure has a Cronbach’s alpha of .87 in the current study.

**Perceived level of social support.** This was measured using the 12-item Interpersonal Evaluation List-12 (ISEL-12), developed by Cohen, Mermelstein, Kamarck, and Hoberman (1985). This scale measures functional and perceived level of social support on a 4-point scale, ranging from 0 (definitely
false) to 3 (definitely true). All items were summed to obtain a score ranging from 0 to 36, with higher scores indicating higher levels of perceived social support. The ISEL-12 has been used as a short measure of social support in health research (Cohen, 2015), and was derived from a longer 40-item measure of the Interpersonal Support Evaluation List (Cohen & Hoberman, 1983). The ISEL-12 is composed of three subscales representing appraisal, belonging, and tangible social support. The reliability and validity of this scale was demonstrated in a study of 1,399 adults (Cohen, 2008). In the current study, alpha = .86.

**Academic strain.** This variable was measured by 4 items used in the Korean Youth Panel Survey, cited in H. Jang et al. (2014) when they assessed study strain in a Korean youth sample. Participants responded to the following items: (a) “I get stressed by poor university or college grades,” (b) “I get stressed by home assignments and examinations,” (c) “I get stressed by preparations for college or an occupation,” and (d) “I get stressed because it is boring to study.” Responses vary from 1 (never) to 5 (always), and scores range from 4 to 20, with higher scores indicative of greater academic strain. Factor analysis showed the items loaded onto a single factor and moderately high levels of reliability were found over successive waves of administration in the longitudinal study by H. Jang et al. (2014), with Cronbach’s alphas ranging from .77 to .85. In the current study, an alpha of .79 was observed.

**Financial strain.** A six-item measure used by Selenko and Batinic (2011) in their study of financial strain and mental health was used to measure this variable. Two items asked about general strain, and four items assessed their feelings of being restricted in their daily life due to their finances: (a) “My current financial situation is a serious strain”; (b) “I often think about my current financial situation”; (c) “Due to my financial situation, I have difficulties paying for my apartment and utilities”; (d) “Due to my financial situation, I have to save considerably on food”; (e) “Due to my financial situation, I have to save considerably on clothes”; (f) “Due to my financial situation I am restricted in my leisure activities.” Scores range from 6 to 42, and higher scores indicate greater financial strain. Factor analysis found all items loaded onto one factor, and items showed good internal consistency, with a Cronbach’s alpha of .88 (Selenko & Batinic, 2011). The relevant reliability coefficient in the current study was .91.

**Situational anger.** The approach to measuring situational anger was adopted from Schieman, McMullen, and Swan (2007) and Moon, Morash, McCluskey, and Hwang (2009). Participants were asked to report the extent
to which they had experienced anger as a result of each of the previously described strains. Moon et al. (2009) observed a Cronbach’s alpha of .89. In the current study, the corresponding figure was .77. A composite anger score was calculated by averaging the anger scores.

Dependent Variable

Cyberbullying perpetration was measured by the 14-item Bully subscale from the Revised Cyber Bullying Inventory (RCBI; Erdur-Baker & Kavsut, 2007). Response options document the frequency with which participants have engaged in cyberbullying, ranging from 1 = never, 2 = once, 3 = two or three times to 4 = more than three times. Unlike traditional bullying, perpetrators can be classified as cyberbullies based on a single episode of cyberbullying because text or images can be sent to or viewed by multiple recipients and stay online forever (Dooley et al., 2009). The Bully subscale of the RCBI has been shown to have good reliability with a Cronbach’s alpha of .80 in a sample of 339 Turkish adolescents (Topcu & Erdur-Baker, 2010) and .79 in a sample of 164 young adult Australians (Brack & Caltabiano, 2014). Confirmatory factor analysis established a one factor structure for the Bully subscale, and both a significant and positive relationship with a traditional bullying scale confirmed its convergent validity (Topcu & Erdur-Baker, 2010). In the current study, an alpha coefficient of .85 was observed for this scale. Items and endorsement proportions can be seen in Table 1. The most commonly endorsed items were making fun of comments online and sharing private internet conversations without consent whereas the least commonly endorsed items were stealing email user names and passwords and sending hurtful or threatening emails.

Results

Descriptive statistics for the study are shown in Table 2. The majority of participants had experienced both traditional and cyberbullying, with only 10% and 31%, respectively, reporting no experience of these behaviors. Similarly, many of the sample reported engaging in cyberbullying, with only 55 individuals (17.2%) reporting never having done so.

Bivariate correlations between the independent and dependent variables of the study are shown in Table 3. Males and younger participants were more likely to be cyberbullies. Most of the other variables are related in the direction expected. In particular, people with lower self-control, greater strains, and more anger were more likely to engage in cyberbullying. Association with deviant online peers, and prior victimization (both traditional and cyber)
were also related to higher levels of cyberbullying. These bivariate relationships are consistent with the theoretical predictions of this study. We will now explore whether these relationships hold in multivariate analyses.

Ordinary least squares (OLS) hierarchical regression, mediation, and moderation analyses were conducted to explore the research questions of the current study. Outliers found in hours spent on social networking sites, cyberbullying victimization, and cyberbullying perpetration variables were trimmed to correspond to a z score of ±3.29 as recommended by Field (2013). Bootstrapping using bias-corrected and accelerated confidence intervals (CI)

Table 1. Items From the Revised Cyber Bullying Inventory and Endorsement Proportions as Percentages (N = 320).

<table>
<thead>
<tr>
<th>Item</th>
<th>Never</th>
<th>Once</th>
<th>2 or 3 times</th>
<th>More than 3 times</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Stealing personal information from a computer</td>
<td>73</td>
<td>15</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>2. Stealing computer nicknames/screen names</td>
<td>78</td>
<td>13</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>3. Threatening in online forums</td>
<td>85</td>
<td>6</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>4. Insulting in online forums</td>
<td>67</td>
<td>10</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>5. Excluding in online forums</td>
<td>64</td>
<td>11</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>6. Posting fake photos online</td>
<td>89</td>
<td>7</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>7. Sharing private Internet conversations without consent</td>
<td>57</td>
<td>16</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>8. Making fun of comments online</td>
<td>50</td>
<td>17</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>9. Sending hurtful or threatening text messages</td>
<td>88</td>
<td>8</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>10. Stealing email user names and passwords</td>
<td>89</td>
<td>7</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>11. Reading personal emails</td>
<td>79</td>
<td>12</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>12. Sending hurtful or threatening text messages</td>
<td>82</td>
<td>10</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>13. Misleading by pretending to be the other gender</td>
<td>74</td>
<td>14</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>14. Publishing embarrassing photos online without consent</td>
<td>83</td>
<td>7</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>
was used when appropriate, according to the procedure suggested by Field (2013), due to violations of normality and homoscedasticity in some variables. Bootstrap results, unless otherwise stated, were based on 1,000 bootstrap samples.

The results of the regression analyses are shown in Table 4. Model 1 shows individuals with low self-control were more likely to be cyberbullies, while controlling for age and gender. Model 2 included the opportunity variables. Having deviant cyber peers, spending more time online, and perceiving greater levels of online anonymity were all related to higher levels of cyberbullying. Inclusion of these variables moderated the relationship between self-control and cyberbullying somewhat, although the relationship still remained significant. Further analyses explored this relationship further by testing the extent to which low self-control and opportunity interacted to predict cyberbullying. Both self-control and the opportunity variables were mean centered prior to the analysis, as Field (2013) advises. The only significant interaction was between hours spent online and low self-control (Model 3). Specifically, individuals with low self-control who spent more time online

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-control</td>
<td>67.26</td>
<td>8.81</td>
<td>41.00</td>
<td>91.00</td>
</tr>
<tr>
<td>Opportunity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time online (hours per week)</td>
<td>16.75</td>
<td>15.01</td>
<td>0.00</td>
<td>72.00</td>
</tr>
<tr>
<td>Association with deviant peers online</td>
<td>0.00</td>
<td>0.66</td>
<td>-1.38</td>
<td>2.03</td>
</tr>
<tr>
<td>Perceived anonymity</td>
<td>22.50</td>
<td>6.20</td>
<td>5.00</td>
<td>35.00</td>
</tr>
<tr>
<td>Strain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional victimization</td>
<td>11.67</td>
<td>3.87</td>
<td>6.00</td>
<td>24.00</td>
</tr>
<tr>
<td>Cyber victimization</td>
<td>4.69</td>
<td>1.78</td>
<td>3.00</td>
<td>12.00</td>
</tr>
<tr>
<td>Lack of social support</td>
<td>36.20</td>
<td>6.75</td>
<td>17.00</td>
<td>48.00</td>
</tr>
<tr>
<td>Academic strain</td>
<td>12.82</td>
<td>3.47</td>
<td>4.00</td>
<td>20.00</td>
</tr>
<tr>
<td>Financial strain</td>
<td>23.90</td>
<td>9.21</td>
<td>6.00</td>
<td>42.00</td>
</tr>
<tr>
<td>Total strain</td>
<td>0.00</td>
<td>0.61</td>
<td>-1.42</td>
<td>1.99</td>
</tr>
<tr>
<td>Total anger</td>
<td>1.89</td>
<td>0.59</td>
<td>1.00</td>
<td>3.40</td>
</tr>
<tr>
<td>Cyberbullying perpetration</td>
<td>20.00</td>
<td>6.39</td>
<td>14.00</td>
<td>41.00</td>
</tr>
</tbody>
</table>

aVariable standardized.
bVariable descriptive statistics before reverse scoring, so higher scores indicated greater perceived social support. When this variable was included in the composite strain score, it was reverse scored, so higher scores would represent less perceived social support. This was done so higher scores would equate to greater strain, and directionality of scoring matched other strain variables.
cVariable whose scores were standardized and averaged.
Table 3. Pearson Correlations Among Variables (N = 320).

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gender</td>
<td></td>
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</tr>
<tr>
<td>2. Age</td>
<td></td>
<td>.02</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3. Self-control&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.13*</td>
<td>.18**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Time online</td>
<td>-.03</td>
<td>-.01</td>
<td>-.19**</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Association with deviant peers online&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-.19**</td>
<td>-.14**</td>
<td>-.28**</td>
<td>.16**</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Perceived anonymity</td>
<td>-.13*</td>
<td>-.17**</td>
<td>-.02</td>
<td>-.02</td>
<td>.10</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7. Traditional victimization</td>
<td>-.03</td>
<td>.02</td>
<td>-.21**</td>
<td>.15**</td>
<td>.25**</td>
<td>-.04</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>8. Cyber victimization</td>
<td>-.14*</td>
<td>.07</td>
<td>-.28**</td>
<td>.27**</td>
<td>.28**</td>
<td>-.12*</td>
<td>.58**</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Social support&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.13*</td>
<td>.11</td>
<td>.25**</td>
<td>-.03</td>
<td>-.09</td>
<td>.02</td>
<td>-.15**</td>
<td>-.13*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Academic strain</td>
<td>.14*</td>
<td>-.15**</td>
<td>-.16**</td>
<td>.02</td>
<td>.08</td>
<td>.06</td>
<td>.21**</td>
<td>.16**</td>
<td>-.24**</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>11. Financial strain</td>
<td>.01</td>
<td>.07</td>
<td>-.10</td>
<td>.02</td>
<td>.10</td>
<td>.12*</td>
<td>.21**</td>
<td>.09</td>
<td>-.12*</td>
<td>.26**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Total strain</td>
<td>-.05</td>
<td>-.03</td>
<td>-.33**</td>
<td>.16**</td>
<td>.26**</td>
<td>.01</td>
<td>.70**</td>
<td>.64**</td>
<td>-.54**</td>
<td>.61**</td>
<td>.55**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Total anger</td>
<td>.03</td>
<td>-.03</td>
<td>-.43**</td>
<td>.21**</td>
<td>.17**</td>
<td>-.02</td>
<td>.43**</td>
<td>.42**</td>
<td>-.14</td>
<td>.32**</td>
<td>.25**</td>
<td>.51**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Cyberbullying perpetration</td>
<td>-.27**</td>
<td>-.13*</td>
<td>-.38**</td>
<td>.29**</td>
<td>.46**</td>
<td>.03</td>
<td>.37**</td>
<td>.57**</td>
<td>-.17**</td>
<td>.09</td>
<td>.05</td>
<td>.41**</td>
<td>.32**</td>
<td>1.00</td>
</tr>
</tbody>
</table>

<sup>a</sup>Lower scores indicate lower self-control.
<sup>b</sup>Variable standardized.
<sup>c</sup>Variable intercorrelations before reverse scoring, so higher scores indicate greater perceived social support.

*<sup>p</sup> < .05, **<sup>p</sup> < .01 (two-tailed).
Table 4. Ordinary Least Squares Regression, Moderation, and Mediation Models Predicting Cyberbullying Perpetration (N = 320).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>p</td>
<td>B</td>
<td>p</td>
<td>B</td>
<td>p</td>
</tr>
<tr>
<td>Gender&lt;sup&gt;a&lt;/sup&gt;</td>
<td>−2.92</td>
<td>.001</td>
<td>−2.28</td>
<td>.001</td>
<td>−2.92</td>
<td>.001</td>
</tr>
<tr>
<td>Age&lt;sup&gt;b&lt;/sup&gt;</td>
<td>−0.16</td>
<td>.182</td>
<td>−0.11</td>
<td>.332</td>
<td>−0.20</td>
<td>.006</td>
</tr>
<tr>
<td>Self-control&lt;sup&gt;c&lt;/sup&gt;</td>
<td>−0.24</td>
<td>.001</td>
<td>−0.16</td>
<td>.001</td>
<td>−0.22</td>
<td>.001</td>
</tr>
<tr>
<td>Time online (hours per week)</td>
<td></td>
<td></td>
<td>0.08</td>
<td>.002</td>
<td>0.09</td>
<td>.001</td>
</tr>
<tr>
<td>Association with deviant peers online&lt;sup&gt;d&lt;/sup&gt;</td>
<td>3.25</td>
<td>.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived anonymity</td>
<td>−0.04</td>
<td>.358</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-control × Time online</td>
<td>−0.01</td>
<td>.004</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total strain&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>4.12</td>
<td>.001</td>
<td>3.23</td>
<td>.001</td>
</tr>
<tr>
<td>Total anger</td>
<td>.20</td>
<td>.35</td>
<td>.27</td>
<td>.024</td>
<td>.24</td>
<td>.029</td>
</tr>
</tbody>
</table>

<sup>a</sup>Control variables.  
<sup>b</sup>Variable mean centered in Model 3.  
<sup>c</sup>Variable standardized.  
<sup>d</sup>Variable standardized.  
<sup>e</sup>Variable standardized and averaged.
were most at risk of being cyberbullies. This relationship is shown in Figure 1, which clearly shows hours spent online to be a predictor of cyberbullying for people with low rather than high self-control. The greatest differences occur at moderate and lower levels of self-control. This is confirmed by implementing the Johnson-Neyman technique, which allows identification of points where the effect of the independent variable on the dependent variable transitions from statistically significant to non-significant (Hayes, 2013). The conditional effect of self-control on CBP transitioned in significance at the sixth percentile of the distribution in this sample, at 2 hr per week of social networking-site use, \( b = .11, SE = .05, t(314) = 1.97, p = .05, \) bootstrapped bias-corrected and accelerated CIs = [0.00, 0.21]. Therefore, in this sample, spending more than 2 hr on social networking sites interacts with low self-control to increase the likelihood of CBP.

Model 4 shows strain to be a predictor of cyberbullying, while controlling for age and gender. Model 5 shows anger resulting from these strains is also implicated in cyberbullying perpetration. The mediational analyses shown in Model 6 were conducted using the Hayes PROCESS software version 2.13 (Hayes, 2013). These analyses showed that increasing strain

\[ \text{Figure 1. Moderation of the effect of self-control on cyberbullying perpetration by hours per week spent on social networking sites.} \]

\[ \text{Note. HSNS = Hours per week on social networking sites.} \]
indirectly influences CBP through the anger it produces in individuals. Figure 2 shows that participants who experienced greater strain ($B = 0.50$, $p < .001$) experienced greater anger, and those experiencing greater anger were more likely to be cyberbullying perpetrators ($B = 1.77$, $p = .01$). A bias-corrected and accelerated bootstrap 95% CI, based on 10,000 bootstrap samples, indicated the indirect or mediated effect ($B = 0.89$, $SE = .31$) was entirely above zero [0.32, 1.56]. Along with a direct effect of strain on CBP ($B = 3.23$, $p < .001$), these results provide support for GST’s prediction that both increasing anger and strain would increase the likelihood of perpetrating cyberbullying, and moreover, this relationship would occur as a result of anger caused by strain.

Finally, regression analyses were conducted to determine which theory best explained CBP. Model 6 in Table 4 shows gender, self-control, and strain are all significant predictors of CBP, $F(4, 315) = 31.85$, $p < .001$, indicating being male, having low self-control, and experiencing more strain make it more likely that an individual will cyberbully others. Overall, adding self-control and strain to the model and controlling for age and gender explained an additional 20% of variance in CBP. The model shown in Table 4 (i.e., age, gender, self-control, and strain) accounts for significantly more variance than the model comprising age, gender, and self-control (see Model 1): $\Delta R^2 = .11$, $\Delta F(1, 316) = 42.52$, $p < .001$, and age, gender, and strain (see Model 4): $\Delta R^2 = .15$, $\Delta F(1, 316) = 63.99$, $p < .001$. Furthermore, the part or semi-partial correlations were squared for the predictors in Model 6 to gauge the variance in CBP uniquely accounted for by these. Self-control uniquely explains 4% of the variance in CBP, $r_{a(b,c)} = -.21$, $p = .001$, while strain uniquely explains 9% of the variance in CBP, $r_{a(b,c)} = -.30$, $p = .001$. 

**Figure 2.** Mediation model showing the coefficients for the direct and indirect effect of strain on cyberbullying perpetration.  
*Note. CBP = cyberbullying perpetration.*
Discussion

The current study aimed to investigate first, the prevalence of cyberbullying behavior in an international sample of Internet-using young adults, and second, the extent to which this behavior could be explained by two criminological theories, the GTC and GST.

In relation to the first aim, we found evidence cyberbullying behavior is common in contemporary online communication, although endorsement proportions varied according to the severity of the behavior. For instance, while half the participants reported making fun of comments online, just over 10% engaged in the more harmful activities of posting fake photos and stealing email user names, and of those, most reported engaging in these activities only once. Overall prevalence rates were higher than those reported elsewhere in the literature, with approximately 80% of the participants reporting cyberbullying another individual at least once, compared with Dilmaç (2009) and Arıçak (2009), who observed prevalence rates of 22.7% and 19.7%, respectively, for bullying at least once across the lifespan. In addition, we also observed high rates of victimization in comparison with other studies (Arıçak, 2009; Kowalski et al., 2012). Why we observed such high prevalence and victimization rates is unclear but is probably a result of both our choice of measurement as well as characteristics of the sample. For instance, our measures omitted the word bullying, which might have encouraged higher endorsement proportions. We also recruited our sample online and while we deliberately targeted an Internet-active sample, the participants’ frequent use of technology is likely to have increased their opportunity to cyberbully as well as their exposure to this behavior.

Turning to our second aim, we found support for both GTC and GST. Participants with low self-control were more likely to engage in cyberbullying, and this was particularly the case when they had greater opportunity to do so, as operationalized by greater time spent online. We also found strain to be a good predictor of cyberbullying, and this relationship was partially mediated by anger, as predicted by Agnew’s theory. Other notable predictors of cyberbullying were age and gender, with younger individuals and males being more likely to be perpetrators. It was noteworthy that the relationship between age and cyberbullying was not present when self-control was included in the multivariate models, suggesting older participants had greater self-control and a consequently lower likelihood of engaging in cyberbullying. Finally, our last multivariate model showed both low self-control and strain to be predictors of cyberbullying.

The strong relationship between low self-control and cyberbullying should come as no surprise given the long history of research linking this
construct with various forms of deviant behavior (Cauffman et al., 2005; Hay & Forrest, 2008; Longshore, 1998). The current findings provide additional support for the robustness of this relationship, and are especially noteworthy given cyberbullying did not exist at the time the GTC was formulated. An important, and sometimes overlooked, component of Gottfredson and Hirschi’s theory is the interaction between self-control and opportunity. In the current study, opportunity was operationalized as time spent online, association with deviant online peers, and perceived anonymity while online. Of these, only time spent online interacted with low self-control to produce higher levels of cyberbullying. Similar to Moon et al. (2011), we found association with deviant peers to be a significant bivariate and multivariate predictor of bullying, however, the predicted interaction with low self-control was not observed. It could be argued this construct is better conceptualized as a measure of differential association theory (Moon et al., 2011; Pratt et al., 2010; Sutherland & Cressey, 1974). Pratt et al. (2010), in fact, explicitly considered this when discussing whether an individual’s deviancy is more likely because of the “normative influence” (p. 789) of deviant peers or because deviant peers “alter opportunity structures” (p. 789) making deviant acts easier to commit. Association with deviant peers online is, without doubt, of importance in contributing to cyberbullying perpetration, however, whether this is a result of increased opportunity or the influence of deviant peers requires further investigation. Finally, perceived anonymity was not related to cyberbullying although whether this was because of deficiencies in the measurement of this construct or because the null relationship observed was accurate is unclear.

Although a composite measure of strain was used in our test of GST, experience of cyber victimization was the most important source of strain contributing to this behavior, as indicated by the strength of the bivariate correlation coefficients. Given the cross-sectional nature of the current data, it is difficult to determine the direction of causation, nevertheless, the experience of perpetration is closely linked to victimization, and may represent a form of retaliation, as GST suggests. The current findings also show the importance of measuring situational rather than trait anger in any test of GST, and furthermore, linking this anger directly to the strain experienced, as Mazerolle et al. (2003) but not Moon et al. (2012) and Patchin and Hinduja (2011) did. Further research could investigate this relationship further by measuring emotional reactions as they occur, through the use of devices such as palm pilots (Zirkel, Garcia, & Murphy, 2015).
Conclusion

As with all research, the current study had some limitations. We used a sample recruited online from a number of different countries. Further research is required to determine the extent to which the current findings can be replicated and are, indeed, generalizable. We were also unable to determine direction of causation given the cross-sectional nature of the data. Nevertheless, the scales we used had sound psychometric properties, and the relationships we observed were consistent with preexisting theory.

Overall, we found good evidence to support the efficacy of both GTC and GST in explaining cyberbullying. However, in addition to the theoretical material examined, this study also has a number of practical implications. Although the participants were all young adults, the results of the current study show time spent online without supervision can be a risk factor for both cyberbullying and victimization. Given the importance of online interaction in contemporary society and the increasing use of information and communication technologies (ICTs) in both primary and secondary education, parental supervision of their children’s online activity seems of vital importance. There is a long history of research in developmental criminology indicating the importance of effective parental supervision as a protective factor against antisocial behavior in adolescence (e.g., Cottle, Lee, & Heilbrun, 2001; Leschied, Chiodo, Nowicki, & Rodger, 2008; Loeber & Stouthamer-Loeber, 1986). This finding also appears to be relevant to the prevention of cyberbullying. Furthermore, the high rates of cyberbullying reported by the current participants suggest cyberbullying is an increasingly common phenomenon online, and one with a number of deleterious effects for its victims. This is a finding that should be of concern to online service providers and policy makers. Further research could investigate the situational determinants of cyberbullying as well as potential preventive measures. The ever-increasing importance of online communication in contemporary society makes this an important priority. Effective strategies to prevent this behavior should be implemented as a matter of urgency.

Authors’ Note

Helen Lianos is currently a master of professional psychology student at University of New England.

Declaration of Conflicting Interests

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