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# Cyberbullying among college students with disabilities

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ABSTRACT

Cyberbullying has received increasing attention in recent years. However, the majority of this research has focused on children in middle school and on neurotypical youth, to the omission of people with disabilities. The current study, however, examines cyberbullying as it occurs among college students with and without disabilities. Two hundred five students completed a survey examining their experiences with cyberbullying, along with measures of predictor and outcome variables theorized to be related to cyberbullying. The results revealed that, as with traditional bullying, students with disabilities are at particular risk for cyberbullying victimization. Predictors of victimization included traditional bullying victimization, Internet use, and the noticeability of the disability. Outcomes of cyberbullying victimization (e.g., low self-esteem, high depression) appear to be particularly pronounced for individuals with disabilities.



Since Columbine, attention to the topic of bullying has burgeoned. Increased media attention has been devoted to the topic, the number of research articles published on the topic has ballooned, and the majority of states now have some type of legislation related to bullying. Early on, this attention was directed primarily toward traditional bullying, defined as an act of aggression that is typically repeated over time and that occurs among individuals between whom there is a power imbalance (Olweus, 1993). This power imbalance can take any number of different forms including differences in social status, physical stature, or socio-economic level, to name a few. More recently, attention has shifted toward electronic bullying or cyberbullying (Kowalski, Giumetti, Schroeder, & Lattanner, 2014; Kowalski, Limber, & Agatston, 2012a). Cyberbullying refers to bullying that occurs via the Internet or text messaging. Like traditional bullying, cyberbullying is an act of aggression that is often repeated over time (e.g., a single message posted where thousands of people can view it), and that occurs among individuals whose relationship is defined by a power imbalance. In the case of cyberbullying, this power imbalance may be as simple as a difference in technological expertise.

Much of the research on both traditional bullying and cyberbullying has focused on middle school children as this seems to be a particularly vulnerable age during which bullying is likely to occur. In addition, this research has been largely limited to neurotypical samples of children, to the relative exclusion of examinations of bullying, particularly cyberbullying, among youth with disabilities. The purpose of the present study was to fulfill two gaps in the literature by examining antecedents and consequences of cyberbullying in a college-age sample of students with and without disabilities. The National College Health Assessment sponsored by the American College Health Association in 2014 found that 56.2% of college students reported being diagnosed or treated by a professional for some type of disability, the most common of which was ADHD (8%). In addition, the National Assessment found that, within the previous 12 months, 33.2% of college students felt so depressed that they found it difficult to function, a significant majority of these stating that the depression interfered with their academic performance. Given these statistics, understanding behaviors, such as cyberbullying, that are related to depression and related emotions, is critical to improving the physical, psychological, and social well-being of college students.

## 1. Prevalence rates of cyberbullying

Prevalence rates of cyberbullying are highly variable across studies. Allowing for these variations, estimates of the prevalence of cyberbullying typically range between 10% and 40% for secondary school age students (e.g., Kowalski et al., 2014; Kowalski & Limber, 2007; Lenhart, 2010; O'Brennan, Bradshaw, & Sawyer, 2009) and between 10% and 28% for college-age students

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(Francisco, Samoa, Ferreira, & das Dores Martins, 2015; Na, Dancy, & Park, 2015; Schenk & Fremouw, 2012; Selkie, Kota, Chan, & Moreno, 2015).

Although only a handful of studies have examined cyberbullying among youth with disabilities (see, e.g., Didden et al., 2009; Heiman & Olenik-Shemesh, 2015; Heiman, Olenik-Shemesh, & Eden, 2015; Kowalski & Fedina, 2011), research on traditional bullying among adolescents with disabilities has highlighted the vulnerability of this population (see e.g., Annerback, Sahlqvist, & Wingren, 2014; Christensen, Fraynt, Neece, & Baker, 2012; Farmer et al., 2012; Rose, Espelage, Aragon, & Elliott, 2011a; Rose et al., 2011b; Rose, Simpson, & Moss, 2015; Swearer, Wang, Maag, Siebecker, & Frerichs, 2012; Twyman et al., 2010). Research on traditional bullying suggests that individuals with certain disabilities are more likely to be bullied than others. For example, Zeedyk, Rodriguez, Tipton, Baker, and Blacher (2014) found that youth with autism spectrum disorders not only experienced higher rates of bullying than youth with intellectual disabilities and youth without disabilities, but they also experienced higher relates of internalizing relational issues. Sterzing, Shattuck, Narendorf, Wagner, and Cooper (2012) found that youth with autism spectrum disorder were more likely to perpetrate bullying than individuals in other disability categories that they tested. Additionally, they observed that students with disabilities in general education settings were more likely to be victimized than those in special education settings. Youth with ADHD and/or autism spectrum disorder have been shown to be more likely to be both victims and perpetrators of traditional bullying and cyberbullying (Heiman et al., 2015; Kowalski & Fedina, 2011; Twyman et al., 2010; Unnever & Cornell, 2003; Yen et al., 2014). Furthermore, individuals with physical health conditions (e.g., obesity, eczema, diabetes) or special needs (e.g., muscular dystrophy) that set them apart from others are more likely to be bullied (Dawkins, 1996; Fox & Farrow, 2009; Magin, Adams, Heading, Pond, & Smith, 2008; Storch et al., 2004).

In keeping with research on traditional bullying, the few studies that have been conducted on cyberbullying among students with disabilities have been consistent in finding that youth with disabilities report higher rates of cyber victimization and perpetration than youth without disabilities. Adolescents with ADHD report higher levels of cyberbullying victimization (Didden et al., 2009; Heiman et al., 2015; Kowalski & Fedina, 2011), cyberbullying perpetration (Heiman et al., 2015; Kowalski & Fedina, 2011), and cyberbullying witnessing (Heiman et al., 2015). Additionally, adolescents with ADHD who were both victims and nonvictims of cyberbullying report greater feelings of loneliness and lower feelings of social self-efficacy compared to youth without ADHD (Heiman et al., 2015). Adolescents with learning disabilities attending special education classes report higher levels of both cybervictimzation and cyberbullying perpetration than youth with learning disabilities in mainstream classes (Heiman & Olenik-Shemesh, 2015). However, these studies, while informative, provide only an initial foray into the cyberbullying experiences of individuals with disabilities. Additionally, they focus on middle and high school students, to the exclusion of an examination of the experiences of college-age students with disabilities.

## 2. Predictors of cyberbullying

The General Aggression Model (GAM; Anderson & Bushman, 2002) has been used as a theoretical model to outline variables related to cyberbullying victimization and perpetration (Kowalski et al., 2014). Antecedent factors to cyberbullying behavior include a number of person and situational variables that influence aggressive behavior. Representative person factors include age, gender, and personality characteristics. Situational variables include school climate, parental involvement, provocation/support, and perceived anonymity (Casas, Del Ray, Ortega-Ruiz, 2013; Kowalski et al., 2014). Person factors of interest in the present study were dispositional social anxiety and the Big Five personality traits of openness, conscientiousness, extraversion, agreeableness, and neuroticism. Research has been consistent in showing that cyberbullying victimization is correlated with higher levels of anxiety (Kowalski et al., 2014; Kowalski & Limber, 2013). Much of this research, however, has focused on anxiety as a consequence of cyberbullying victimization rather than a predictor, hence the focus of the current study on dispositional social anxiety. Youth with anxiety, low self-esteem, and depression are at increased risk of traditional bullying victimization (Fekkes, Pijpers, Fredriks, Vogels, & Verloove-VanHorick, 2006; Swearer, Grills, Haye, & Cary, 2004). Given the co-occurrence between traditional bullying victimization and cyberbullying victimization (Kowalski et al., 2014), it follows that anxiety might also be a predictor for cyberbullying victimization. Indeed, recent research has shown self-esteem to be a predictor of cyberbullying victimization among high school students (Brewer & Kerslake, 2015). Given that self-esteem and social anxiety are frequently inversely related (Leary, 1983), social anxiety should positively correlate with cyberbullying victimization. Additional support for this can be found in the fact that socially anxious individuals engage in more problematic Internet use, placing them at increased risk for negative outcomes (Kim & Davis, 2009), cyberbullying being a likely negative outcome.

In addition, research has demonstrated differences in the Big Five personality traits by disability status (Gagliano et al., 2014). In this study, dyslexic children scored lower on openness, conscientiousness, and agreeableness than children who did not have dyslexia. The dyslexic children also displayed poor emotion control and moodiness. Like social anxiety, personality traits such as low agreeableness may make it more likely that an individual becomes a victim of any type of bullying, including cyberbullying. Support for this was found in a study by Neuber, Künsting, and Phieler (2014) who found that cyberbullying victimization correlated negatively with agreeableness and positively with neuroticism in a sample of 1800 adolescents. A meta-analytic review of research on traditional bullying victimization and personality supports the link between high neuroticism, low agreeableness, and bullying victimization (Mitsopoulou & Giovazolias, 2015; see also Kodžopeljić, Smederevac, Mitrović, Dinić, & Čolović, 2014).

Researchers have also examined the role that involvement in traditional bullying as victim and/or perpetrator plays in cyberbullying victimization and perpetration. Kowalski et al. (2014) found a correlation of 0.45 between perpetrating traditional bullying and perpetrating cyberbullying (see also, Kowalski, Morgan, & Limber, 2012b). They similarly found a correlation of 0.40 between traditional victimization and cyberbullying victimization. Consistent with these findings and the GAM, one would expect a positive relationship between traditional victimization and cyber victimization, particularly for individuals with disabilities who are more likely to have experienced traditional bullying victimization.

## 3. Consequences of cyberbullying

The consequences of bullying involve a number of physical and psychological difficulties. Victims of cyberbullying experience higher levels of loneliness, anxiety, and depression, and lower levels of self-esteem (Eagan & Perry, 1998; Kowalski et al., 2012a; Selkie et al., 2015; Schenk & Fremouw, 2012; Tennant, Demaray, Coyle, & Malecki, 2015; Undheim & Sund, 2010). Individuals involved in cyberbullying also show higher levels of suicidal

ideation than uninvolved youth (Hinduja & Patchin, 2010; Klomek, Marrocco, Kleinman, Schonfeld, & Gould, 2008). Additionally, compared to youth not involved with cyberbullying, cyberbullied adolescents are more likely to be absent from school, to experience decrements in their academic performance, and to experience a higher number of physical health symptoms (e.g., headache, stomachache, trouble sleeping) (Kowalski & Limber, 2013; Nakamoto & Schwartz, 2010).

While individuals with disabilities and those without would be expected to experience similar negative effects of cyberbullying victimization, the magnitude of the effects experienced may vary. For example, individuals with particular disabilities may be more likely to internalize the blame for their bullying than normally developing victims, leading perhaps to further victimization (Christensen et al., 2012). Additionally, because people with disabilities, such as autism spectrum disorder, often have impaired social skills, they also have narrowed social networks (Heiman, 2000). This narrowing in the number of friends relative to normally developing individuals deprives individuals with certain disabilities of social support that might prevent or minimize the negative effects of cyberbullying (Kowalski et al., 2014). Additionally, adolescents who lack Theory of Mind skills and who are, thus, unable to discern the intent of others may not recognize that what is happening to them is actually cyberbullying.

Youth who perpetrate cyberbullying also experience negative physical and psychological health consequences. Similar to victims, perpetrators experience higher levels of loneliness, depression, and anxiety, along with lower self-esteem (Kowalski et al., 2014; Kowalski & Limber, 2013; Selkie et al., 2015). They also have higher levels of drug use, alcohol use, and antisocial behavior, and lower levels of academic achievement compared to those not involved in cyberbullying (Kowalski et al., 2014).

## 4. Hypotheses

Research on cyberbullying among college students, while limited, suggests that prevalence rates mirror, if not exceed, those observed among middle and high school students. While one would expect similar antecedents and consequences to accompany cyberbullying in college students, one purpose of the current study was to examine particular variables thought to precede and follow from cyberbullying. Based upon the results in Kowalski et al. (2012b), traditional bullying victimization was hypothesized to have an increasing effect on cyberbullying victimization, traditional bullying perpetration was hypothesized to have an increasing effect on cyberbullying perpetration, and victimization was expected to have an increasing effect on perpetration for both traditional bullying and cyberbullying. Following from the application of the General Aggression Model to cyberbullying in Kowalski et al. (2014), we hypothesized that demographics and personality would be predictive of cyberbullying victimization and perpetration, that social anxiety would have an increasing effect on cyberbullying victimization, that parental involvement would have a decreasing effect on cyberbullying victimization and perpetration, and that patterns of internet use would be predictive of cyberbullying victimization and perpetration. We hypothesized that students with disabilities would be more likely to become targets of cyberbullying because of their disability status and that they are more likely to also become perpetrators of cyberbullying. Students involved in traditional bullying and cyberbullying as victims or perpetrators were expected to experience more adverse outcomes (lower grades, higher levels of depression, lower self-esteem, and greater physical symptomology) than individuals not involved with bullying. We also hypothesized that these adverse effects of bullying would be more pronounced among students with disabilities, due to the potentially more narrow social support networks of students with disabilities mentioned above.

## 5. Method

### 5.1. Participants

One hundred thirty three female and 72 male undergraduate students participated. Eighty-two of these participants had some type of disability; 123 did not. Two subjects abandoned the survey very early and were dropped from analysis. Participants' average age was 19.90 ($SD$ = 4.04). Eighty-five percent of the sample was Caucasian.

### 5.2. Procedure

Students in the disability sample received an email from Student Disability Services at a large southeastern university asking if they would participate in a study on Internet use and bullying. The link to an online survey was provided. Students without disabilities were enrolled in introductory psychology courses and participated in partial fulfillment of a course research requirement. Students with disabilities completed questions regarding what type of disability they had (open-ended), whether they received accommodations for their disability (no/yes), whether they took medication for their disability (no/yes), as well as how noticeable they perceived their disability to be to others (1 = not at all noticeable; 5 = extremely noticeable).

After answering a series of demographic questions, all participants indicated the extent to which they used a number of technological tools (e.g., texting, e-mail, Twitter, Instagram, gaming). They also responded to two items asking how much their parents knew about what they did on the Internet and how often their parents communicated with them about safety issues surrounding use of the Internet and cellular phones. Both of these questions were answered using 5-point scales.

All participants were asked about their experiences with both traditional bullying and cyberbullying. Definitions of each type of bullying provided to participants can be found in Kowalski and Limber (2013). Participants were asked how often they had been bullied (cyberbullied) within the previous two months as well as how often they had bullied (cyberbullied) others within the previous two months. Participants also indicated how often they had witnessed someone being cyberbullied within the previous two months. The response format for these questions ranged from 1 (I haven't been bullied in the past couple of months) to 5 (several times a week).

Additional questions were about the antecedents and consequences of the cyberbullying experience. In addition to Internet use and traditional bullying victimization already described, two additional antecedents were examined: the Big Five personality construct and social anxiety. The Big Five personality factors of openness, conscientiousness, extraversion, agreeableness, and neuroticism were assessed using a 45-item measure (John, Donahue, & Kentle, 1991). Cued by the prompt “I see myself as someone who … .”, participants responded to each of the 45 items (e.g., is talkative, is depressed) using a 5-point scale (1 = disagree strongly; agree strongly). After reverse-scoring, items specific to each of the five subscales were averaged with higher numbers indicating more of the construct of interest. The five subscales, openness, conscientiousness, extraversion, agreeableness, and neuroticism, had inter-item reliabilities (Cronbach's $\alpha$) of 0.78, 0.76, 0.86, 0.79, and 0.84, respectively. Leary's (1983) 15-item Interaction Anxiousness Scale assessed the subjective experience of social anxiety ($\alpha$ = .89). Participants indicated how characteristic each

item was of them using a 5-point scale (1 = not at all characteristic of me; 5 = extremely characteristic of me). After reverse-scoring, scores were averaged so that higher numbers indicated higher social anxiety.

Five outcome variables were assessed: grades, depression, self-esteem, ostracism, and physical symptomology. Regarding grades, participants were asked, "What grades do you usually get in school" with a response format ranging from "mostly A's" to "mostly F's." Self-esteem was measured with the 10-item Rosenberg (1965) Self-Esteem Scale ($\alpha = .92$). Participants responded to each of the items using a 4-point scale (1 = strongly agree; 4 = strongly disagree). Appropriate items were reverse scored before averaging so that higher scores indicated higher self-esteem. Saylor et al.'s (2012) BOSS-B Ostracism Scale was used to measure ostracism ($\alpha = .91$). Participants used a 5-point response format (1 = almost never; 5 = almost all of the time) to indicate how often they felt or experienced each of the 15 items. Representative items include "I feel like I don't exist" and "I feel rejected." After reverse-scoring particular items, scores were averaged with higher scores indicating greater feelings of ostracism. Depression was measured using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff; 1977); interitem reliability was 0.90. Participants indicated the extent to which they had experienced each of 20 different emotions (e.g., I was happy; I felt lonely) using a 4-point scale (1 = rarely or none of the time; 4 = most or all of the time). After reverse-scoring, scores were averaged with higher numbers indicating higher levels of depression. Participants also indicated the extent to which they experienced each of 10 physical symptoms (e.g., have a headache, feel tired, have skin problems; Fekkes, Pijpers, & Verloove-VanHorick, 2004) using a 4-point response format (1 = never; 4 = always). Principal components analysis was used on these 10 items and the first component extracted to represent them (proportion of variance = 0.37). Each of the items loaded strongly onto this component ($w > 0.2$), with the exception of the last item ("wet your bed").

Some participants skipped entire groups of related questions (such as all items from a scale); these observations were dropped from model fitting when the measure was involved. For those participants who missed only some of the items in a block of related questions, a non-parametric learning algorithm (gradient boosted trees; Hastie, Tibshirani, & Friedman, 2009) was used to impute missing values based on the remaining questions in the block.

## 6. Analyses

After running basic descriptive analyses, regularized regression models were fit using the glmnet package in R (Friedman, Hastie, & Tibshirani, 2010). Regularized regression provides control over model complexity by adding a penalty, lambda, on the size of the coefficients to the objective function minimized in model estimation. Elasticnet regression is a special from of regularized regression that includes a mixing rate, alpha, that controls the balance between $L_1$ (lasso) and $L_2$ (ridge) regularization (Friedman et al., 2010; Hastie et al., 2009):

$$\min_{\beta_0,\beta} \frac{1}{N}\sum_{i=1}^{N}\left(y_i - \beta_0 + \beta^T x_i\right) + \lambda\left[(1-\alpha)||\beta||_2^2/2 + \alpha||\beta||_1\right]$$

In the models fitted here, an equal mix of ridge and lasso penalties was used (alpha = 0.5). This combination of penalties allows the model to drop out predictors with low predictive power while lending stability in the presence of multicollinearity. When fitting each model, we used k-fold cross validation to choose the regularization parameter lambda with the lowest generalization error. K-fold cross validation can be used to measure the ability of a model to predict new data that it has not been trained on, or, in other words, how generalizable the model is. It can also be used to tune the complexity of a model to minimize error on new data, and thus avoid over- or under-fitting. K-fold cross validation works by splitting the data into k groups randomly. Each group is successively used as a holdout sample, the model is fit on the rest of the data, and the error is measured on the holdout group. This process is repeated for each of the k groups and the error rate is averaged across them (Hastie et al., 2009).

We chose to use regularized regression with a mixture of ridge and lasso penalties for model fitting because of the control this algorithm allows over model complexity and because of the $L_1$ regularization property of leading to sparse, parsimonious models, which make model interpretation easier. The ability to control model complexity was tantamount here, because our cross-

**Table 1**
Candidate effects for model fitting.

| *Predictor variables* | *Response variables* | | | | |
|---|---|---|---|---|---|
| | Traditional victimization | Traditional perpetration | Cyber victimization | Cyber perpetration | Adverse outcomes[h] |
| Traditional victimization | 0 | 1 | 1 | 1 | 1 |
| Traditional perpetration | 0 | 0 | 1 | 1 | 1 |
| Cyber victimization | 0 | 0 | 0 | 1 | 1 |
| Cyber perpetration | 0 | 0 | 0 | 0 | 1 |
| Other cyberbullying involvement[a] | 0 | 0 | 1 | 1 | 1 |
| Disability factors[b] | 1 | 1 | 1 | 1 | 1 |
| Disability and bullying interactions[c] | 0 | 0 | 0 | 0 | 1 |
| Demographics[d] | 1 | 1 | 1 | 1 | 1 |
| Parental knowledge[e] | 1 | 1 | 1 | 1 | 1 |
| Internet use patterns[f] | 0 | 0 | 1 | 1 | 1 |
| Social anxiety | 1 | 1 | 1 | 1 | 1 |
| Personality factors[g] | 1 | 1 | 1 | 1 | 1 |

*Note*. 0 = effect excluded, 1 = candidate effect included in model fitting. Candidate predictors could be dropped from the model due to the use of $L_1$ regularization; see Analyses section for details on regularization.

[a] Frequency of witnessing cyberbullying or hearing about others being cyberbullied.
[b] Disability status, accommodations status, medication status, noticeability degree, and disability classification.
[c] Interaction terms between noticeability degree and victimization and perpetration scales for traditional bullying and cyberbullying.
[d] Age, year in college, gender, and race.
[e] Parental knowledge and communication about Internet; feelings of safety on Internet.
[f] Frequency of texting, gaming, chatrooms, IM, email, Facebook, MySpace, Twitter, Tumblr, YouTube, Google, Instagram.
[g] Agreeableness, extraversion, conscientiousness, neuroticism, openness to experience.
[h] Grades, depression, self-esteem, ostracism, and physical symptoms.

validation results show that the generalization error was minimized only when some degree of regularization was used; in other words, ordinary least squares regression would have over-fit on every model in this study.

### 6.1. Modeling procedure

For each model fit in the study, we first selected candidate predictors for each response variable in accordance with our hypotheses and developed with guidance from the theoretical models of cyberbullying in Kowalski et al. (2014). See Table 1 for a compact representation of the candidate effects included in the analyses. Following from our hypotheses, all of these terms are main effects, with the exception of the interaction terms between noticeability and bullying involvement included when modeling the adverse outcomes. These interaction effects were included because of the hypothesis that the negative effects of bullying involvement will be more pronounced among students with disabilities. After selecting an initial set of candidate predictors, we chose the lambda parameter that minimized the cross-validation mean square error, with 10 folds and 50 repetitions. Next, we refit the model on the full dataset at the chosen lambda to obtain point estimates for the coefficients. Using the chosen lambda, we then used bootstrapping with 1000 replications to measure empirical 95% confidence intervals and standard deviations for the coefficient estimates.

## 7. Results

Because the range of disabilities reported by participants in the disability portion of the sample was extensive, disability classifications were grouped into five categories: (a) ADHD; (b) Anxiety Disorders (unspecified anxiety disorder, OCD, panic disorder); (c) Learning Disorders (unspecified learning disorder, math disorder, spelling disorder, reading disorder, processing disorders, dyslexia); (d) Physical Disabilities (unspecified physical disorder, kidney problems, Crohn's, allergies, thoracic problem, cystic fibrosis, immune deficiency, cerebral palsy, hearing impairment, muscular dystrophy, pain, diabetes, IBS, epilepsy, sickle sell anemia, metabolism); (e) Other Psychological Disorders (Asperger's, autism, stress, PTSD, sleep disorder, narcolepsy, depression, bipolar disorder). ADHD was the most frequent disability classification with 45% ($n = 37$) of those in the disability group listing ADHD either alone or in combination with other disability classifications. Ninety-four percent ($n = 77$) of participants with disabilities indicated that they received some type of accommodations for their disability, and 76% ($n = 62$) of individuals with a disability reported taking medication for their disability.

Traditional bullying and cyberbullying victimization and perpetration varied depending on the presence or absence of a disability. More than twice as many students with disabilities (28%) reported being a victim of traditional bullying compared to students without disabilities (12.2%). Similarly, students with disabilities (13.9%) were much more likely to be victims of cyberbullying. Interestingly, the presence of a disability seemed to curb perpetration of traditional bullying, as 3.7% of individuals with disabilities indicated that they had perpetrated traditional bullying compared to 8.9% of students without disabilities. The same was not true for cyberbullying, however; 8.9% of students with disabilities said they had perpetrated cyberbullying compared to 1.6% of those without a disability. For students in both the disability and the non-disability groups, the most common venues by which cyberbullying victimization occurred were social media and text messaging.

The co-occurrence of traditional bullying and cyberbullying depended, in part, on the presence or absence of a disability. As shown in Table 2, in the non-disability sample, traditional victimization was correlated with cyber victimization and traditional bullying perpetration was correlated with cyber perpetration, with magnitudes similar to those from the meta-analysis in Kowalski et al. (2014). Among students with disabilities, traditional bullying victimization was related to traditional bullying perpetration and cyberbullying victimization. Perpetration of traditional bullying was related to both cyberbullying victimization and cyberbullying perpetration.

### 7.1. Disability as an influence on bullying involvement

Elasticnet regression models were fit for each bullying type (traditional victimization and perpetration, cyber victimization and perpetration) using disability-related predictors along with covariates including other bullying victimization and perpetration, demographics, parental involvement, internet use and digital media use, social anxiety, and the Big Five personality factors. The models for cyber victimization and cyber perpetration had moderately strong effect sizes under 10-fold cross-validation, with $R^2 = 0.27$ and 0.08 respectively, and will be discussed (traditional victimization CV $R^2 = -0.01$, traditional perpetration CV $R^2 = 0.03$). See Figs. 1 and 2 for plots of the 10-fold cross-validation mean square error as a function of log(lambda) for cyber victimization and perpetration.

*Cyber victimization and disability.* Table 3 contains the standardized coefficients for the selected predictors in the elasticnet model along with the standard deviation and upper and lower bounds of the estimates based on bootstrap samples (with lambda fixed at the optimal from cross-validation), and Fig. 3 displays histograms of the bootstrap samples for each coefficient. Unsurprisingly, traditional victimization and frequency of witnessing cyberbullying had strong positive effects on the frequency of cyber victimization. Disability status was also a factor, as noticeability (the noticeability of one's disability) and accommodations (whether the students received accommodations) both had positive effects. Interestingly, the frequency of YouTube use also had a

**Table 2**
Co-occurrence of traditional bullying (TB) and cyberbullying (CB) involvement.

| | | TB victim | TB perpetrator | CB victim | CB perpetrator |
|---|---|---|---|---|---|
| Non-disability sample | TB victim | 1 | | | |
| | TB perpetrator | 0.02 | 1 | | |
| | CB victim | 0.57** | 0.13 | 1 | |
| | CB perpetrator | −0.01 | 0.25* | 0.1 | 1 |
| Disability sample | TB victim | 1 | | | |
| | TB perpetrator | 0.39** | 1 | | |
| | CB victim | 0.42** | 0.33** | 1 | |
| | CB perpetrator | 0.1 | 0.43** | −0.03 | 1 |

*Note.* *$p < .05$; **$p < .01$.

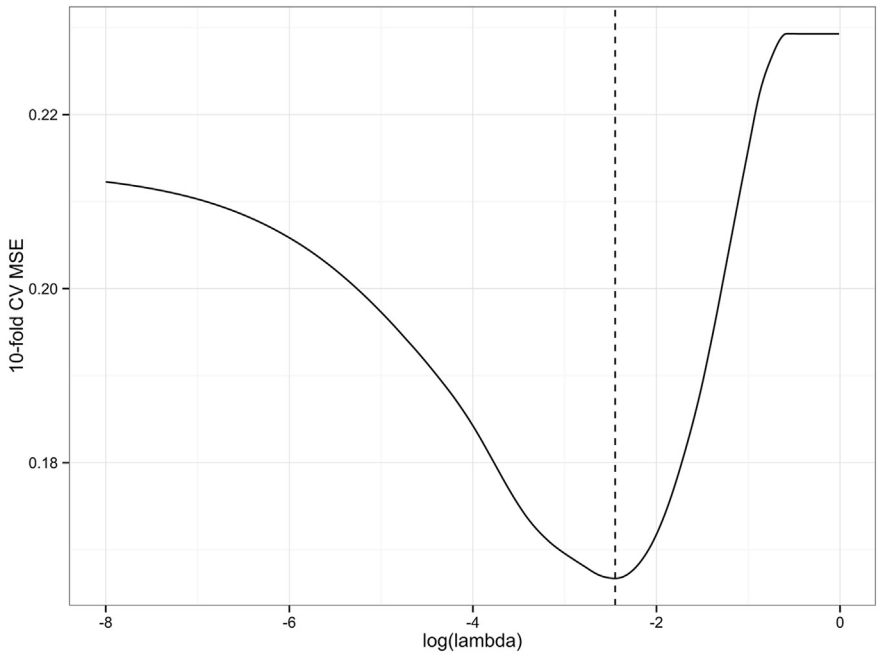


**Fig. 1.** Cyber victimization model lambda selection.

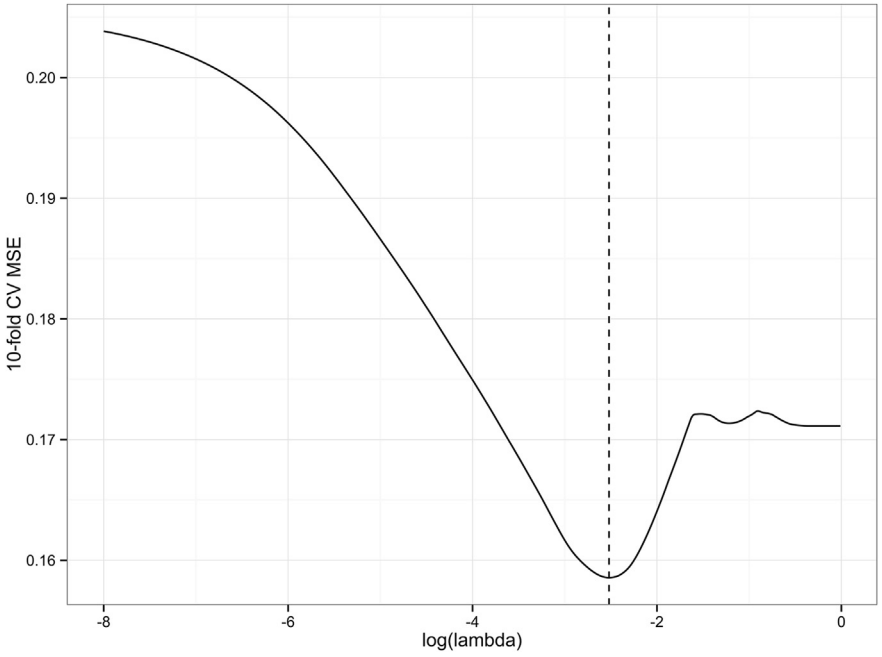


**Fig. 2.** Cyber perpetration model lambda selection.

**Table 3**
Cyber victimization model.

| Predictor | Standardized estimate | Standard deviation | 95% CI |
|---|---|---|---|
| (Intercept) | 1.135 | 0.028 | (1.077, 1.190) |
| Traditional victim | 0.181 | 0.067 | (0.043, 0.301) |
| Cyber witness | 0.097 | 0.042 | (0.011, 0.180) |
| Accommodations | 0.019 | 0.013 | (0.000, 0.046) |
| Noticeablility | 0.035 | 0.036 | (0.000, 0.116) |
| YouTube | −0.008 | 0.023 | (−0.071, 0.000) |

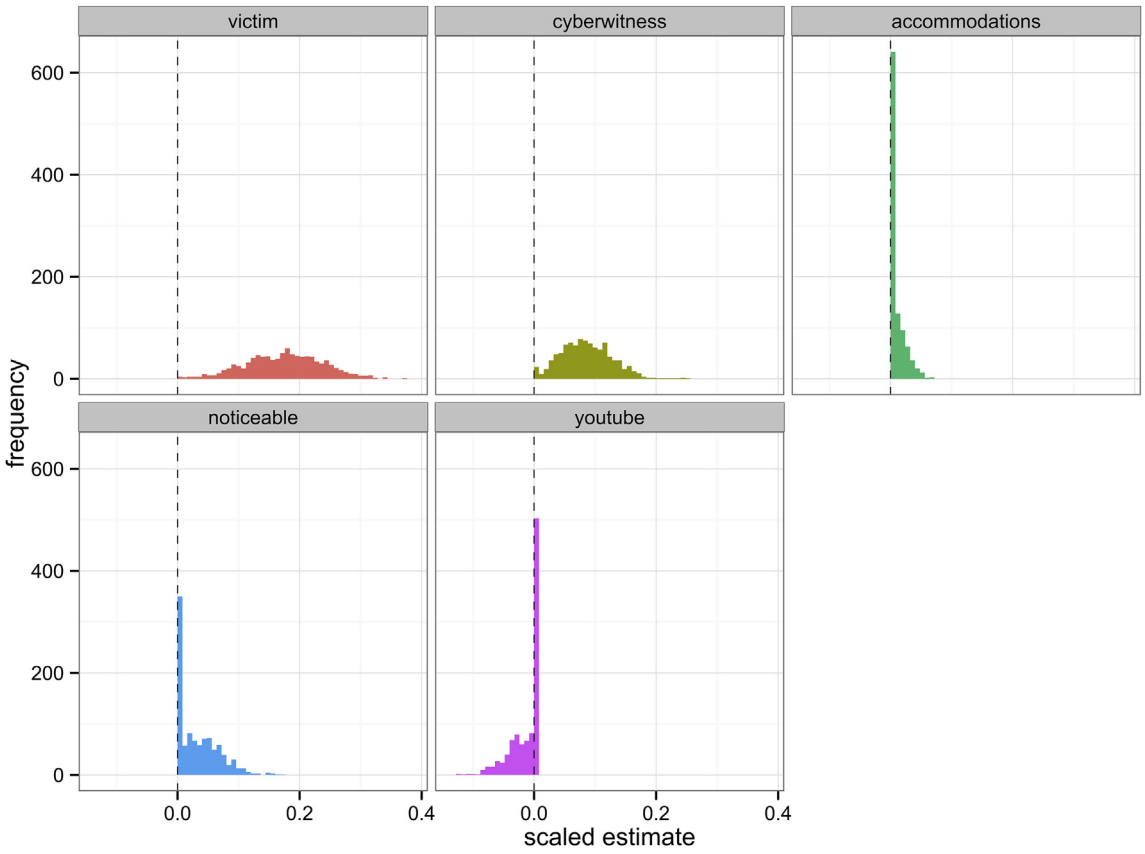


**Fig. 3.** Bootstrap samples of cyber victimization model coefficients.

small negative effect.

Note that noticeability is measured with a 5-point scale (1 = not at all noticeable, 5 = extremely noticeable) and is only applicable for the participants in the disability group, so all participants without disabilities have this measure set at 1. Noticeability is thus correlated with disability status ($r = 0.66$), and is selected instead by the elasticnet procedure because the 5-point scale is apparently providing additional information over and above the binary status feature and because having both in the model would be somewhat redundant.

*Cyber perpetration and disability.* Table 4 reports standardized coefficients and confidence intervals and Fig. 4 displays histograms of bootstrap samples for each predictor selected by elasticnet. In the cyber perpetration model, texting was interestingly a strong negative predictor. Bullying involvement was again important, with both traditional perpetration and witnessing cyberbullying having positive effects. Disability status was also a factor, with the noticeability of the disability and ADHD having positive effects. Frequency of Google use interestingly had a negative effect, and conscientiousness also had a very slight negative effect.

*Disability as a moderator of bullying outcomes.* Models of bullying outcomes were also fit using traditional bullying and cyberbullying victimization and perpetration, disability status and type, demographics, parental involvement, Internet use, social anxiety, and the Big Five personality factors. Also included in the candidate predictors for these outcome models were interaction terms between the noticeability of the disability and the bullying involvement features. Bullying outcomes tested included self-reported grades, measures of depression, self-esteem, and ostracism, and the first principal component of the physical symptoms items. The model for grades had very weak predictive power under cross-validation ($R^2 = 0.03$) and is not discussed further. The other outcome models each show moderately strong predictive power and evidence of the effects of bullying involvement and disability status. See Table 5 for the cross-validation $R^2$ of the outcome models and Table 6 for the standardized coefficients from the

**Table 4**
Cyber perpetration model.

| Predictor | Standardized estimate | Standard deviation | 95% CI |
|---|---|---|---|
| (Intercept) | 1.075 | 0.023 | (1.026, 1.120) |
| Traditional perpetration | 0.027 | 0.028 | (0.000, 0.093) |
| Cyberbullying witness | 0.044 | 0.031 | (0.000, 0.103) |
| Noticeability | 0.014 | 0.020 | (0.000, 0.071) |
| ADHD | 0.053 | 0.027 | (0.000, 0.093) |
| Texting | −0.161 | 0.099 | (−0.353, 0.000) |
| Google | −0.023 | 0.042 | (−0.131, 0.000) |
| Conscientiousness | −0.001 | 0.009 | (−0.033, 0.000) |

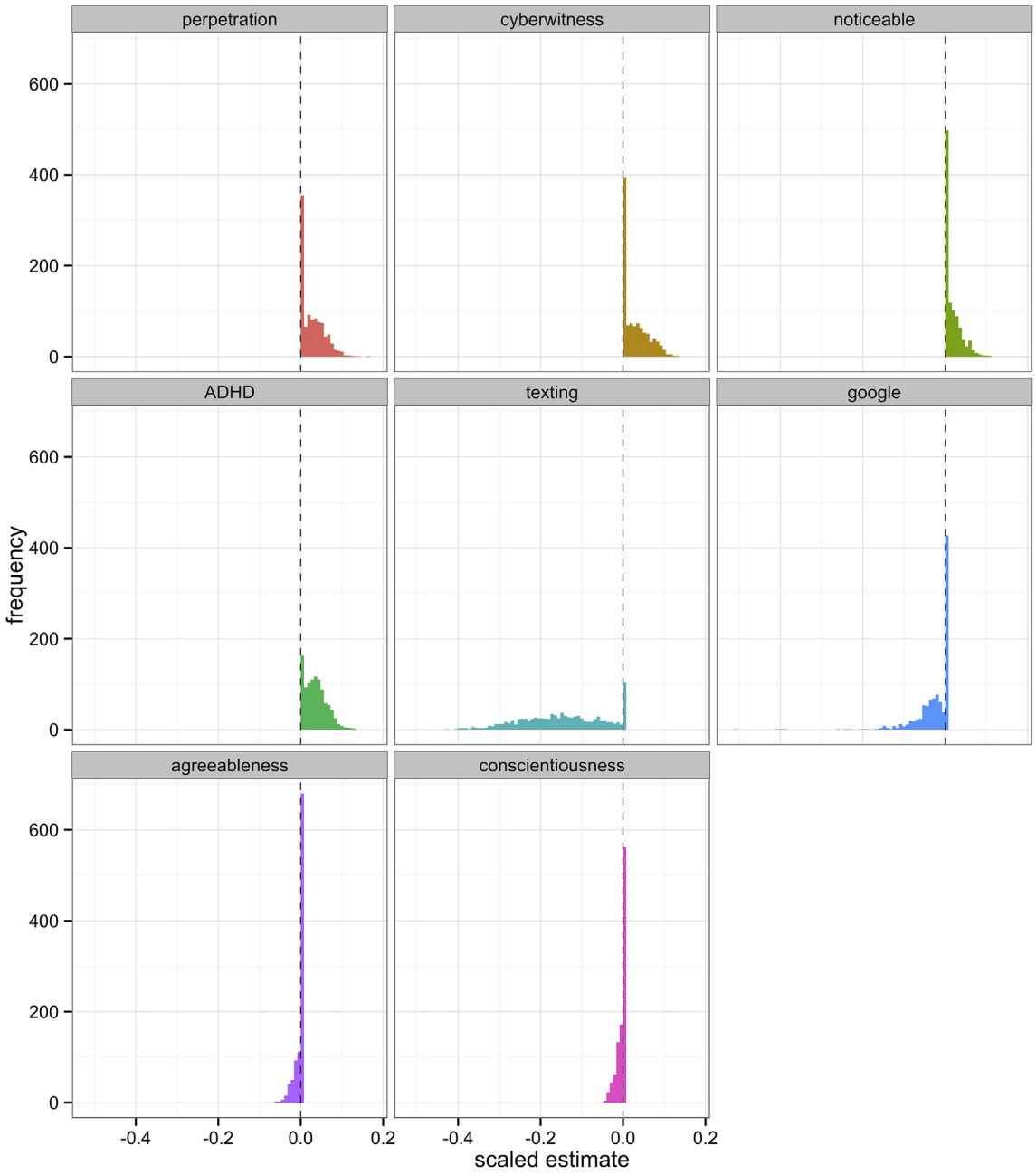


**Fig. 4.** Bootstrap samples of cyber perpetration model coefficients.

outcome models with standard deviations from bootstrapping in parentheses.

As shown in Table 6, the personality factor neuroticism had a strong detrimental effect on all of these outcomes, especially on the physical symptoms score, and social anxiety also has a fairly strong detrimental effect on self-esteem and ostracism. Extraversion and conscientiousness appear to have largely positive effects, with both being associated with less depression and ostracism. Conscientiousness alone was also associated with higher self-esteem and less adverse symptoms, though extraversion was associated with more adverse symptoms. Traditional bullying victimization had some association with these outcomes as well. Cyber victimization was associated with higher depression and lower self esteem, cyber perpetration was associated with higher depression and (interestingly) lower adverse symptoms, and traditional victimization was associated with higher ostracism.

Disability also had associations with the negative outcomes. Participants with anxiety disorders tended to have more adverse physical symptoms, those with physical disabilities felt more depressed and ostracized and had lower self-esteem, and those with other psychological disorders tended to report more

**Table 5**
Outcome models predictive power.

| Outcome | 10-fold CV $R^2$ |
|---|---|
| Depression | 0.437 |
| Self-esteem | 0.439 |
| Ostracism | 0.537 |
| Symptoms PC1 | 0.348 |

**Table 6**
Outcome model estimates.

| Predictor | Depression | Self-esteem | Ostracism | Physical symptoms |
|---|---|---|---|---|
| (Intercept) | 1.739 (0.024) | 3.082 (0.030) | 2.501 (0.029) | 0.014 (0.081) |
| Cyber victimization | 0.010 (0.016) | −0.047 (0.026) | – | – |
| Cyber perpetration | 0.025 (0.024) | – | – | −0.126 (0.083) |
| Traditional victimization | – | – | 0.057 (0.031) | – |
| Anxiety disorders | – | – | – | 0.084 (0.074) |
| Physical disabilities | 0.003 (0.017) | −0.019 (0.024) | 0.048 (0.028) | – |
| Other psych disorders | 0.034 (0.031) | −0.038 (0.028) | 0.066 (0.035) | 0.046 (0.064) |
| Age | – | −0.002 (0.012) | 0.060 (0.027) | 0.054 (0.055) |
| Gender = Female | – | – | – | −0.164 (0.092) |
| Year in school | – | – | −0.040 (0.028) | – |
| Race = Asian | – | −0.008 (0.012) | 0.040 (0.030) | – |
| Race = Black | – | – | −0.037 (0.034) | −0.001 (0.051) |
| Race = Hispanic | −0.001 (0.007) | – | – | −0.064 (0.056) |
| Race = White | – | – | – | 0.092 (0.071) |
| Parents' knowledge | −0.012 (0.016) | 0.028 (0.025) | −0.031 (0.026) | −0.039 (0.061) |
| Parents' communication | – | 0.010 (0.018) | −0.027 (0.026) | −0.047 (0.058) |
| Frequency of internet use | 0.035 (0.023) | – | 0.008 (0.019) | 0.130 (0.088) |
| Texting | −0.035 (0.031) | 0.002 (018) | – | 0.147 (0.095) |
| Facebook | – | – | 0.013 (0.027) | 0.105 (0.079) |
| MySpace | 0.012 (0.014) | −0.021 (0.025) | – | 0.131 (0.107) |
| Twitter | – | −0.027 (0.025) | – | – |
| Gaming | – | −0.041 (0.025) | 0.035 (0.026) | 0.158 (0.091) |
| YouTube | – | – | −0.029 (0.026) | – |
| Chatrooms | 0.010 (0.019) | – | 0.025 (0.025) | −0.023 (0.046) |
| Instant messaging | – | 0.007 (0.019) | – | – |
| Email | – | 0.014 (0.027) | – | – |
| Tumblr | – | −0.009 (0.018) | 0.046 (0.029) | – |
| Social anxiety | 0.014 (0.022) | −0.104 (0.035) | 0.202 (0.045) | – |
| Extraversion | −0.018 (0.020) | – | −0.083 (0.038) | 0.106 (0.073) |
| Conscientiousness | −0.011 (0.018) | 0.061 (0.031) | −0.003 (0.018) | −0.117 (0.078) |
| Neuroticism | 0.254 (0.030) | −0.265 (0.039) | 0.212 (0.040) | 0.720 (0.089) |
| Cyber victimization* Noticeability | 0.002 (0.025) | – | – | 0.068 (0.047) |
| Cyber perpetration* Noticeability | 0.025 (0.025) | – | – | – |
| Victim* Noticeability | 0.017 (0.014) | – | – | – |
| Perpetrator* Noticeability | – | – | 0.013 (0.015) | – |

depression, ostracism, adverse physical symptoms and lower self-esteem. In addition to these main effects of disability, how noticeable a disability is also has several moderating effects. These interactions are with cyber victimization, cyber perpetration, and traditional perpetration on depression, traditional perpetration on ostracism, and cyber victimization on physical symptoms. In all of these cases, this interaction has an exacerbating effect: the more noticeable the disability, the more drastic the negative impact of bullying involvement on these outcomes. As an example, see Fig. 5, showing the predicted physical symptoms score as a function of cyber victimization and noticeability of disability.

Turning to Internet use, parental involvement had a beneficial impact on these outcomes, with parental knowledge of Internet use contributing to less depression, ostracism, and adverse symptoms, and higher self-esteem, and with parental communication about digital safety contributing to higher self-esteem, less ostracism and fewer adverse symptoms. In general, more frequent Internet use is associated with higher depression, ostracism, and adverse symptoms, though different channels of digital communication had differing effects. For example, gaming was associated with lower self-esteem and higher ostracism and adverse symptoms, whereas texting was associated with lower depression and higher adverse symptoms. Finally, demographics also had various effects on the outcome variables, the strongest of these effects being that females showed less adverse physical symptoms than males.

## 8. Discussion

Much of the research on cyberbullying to date has focused on middle school youth as this group is perceived to be particularly vulnerable to cyberbullying victimization and its concomitant effects. The results of the current study highlight another at-risk group that warrants additional research attention: college students, particularly those with disabilities. Based on the current study, not only is cyberbullying a problem among college students with disabilities, but the negative outcomes experienced also mirror those experienced by middle school students. As the first study to examine cyberbullying among college students with disabilities, this study provides useful information regarding prevalence rates and consequences of traditional and cyberbullying victimization and perpetration. Importantly, the time parameter used in the present study was the previous two months, suggesting that both traditional bullying and cyberbullying are alive and well on college campuses. The models of bullying victimization and perpetration provide evidence that students with disabilities are more likely to become involved in cyberbullying both as victims and perpetrators. Furthermore, those students with more outwardly noticeable disabilities are particularly at risk to become involved in cyberbullying. Consistent with the current study, Seigfried-Spellar, O'Quinn, and Treadway (2015) found that, compared to individuals not on the autism spectrum, individuals with autistic traits were more likely to perpetrate cyberbullying. Although more research is needed in this area, individuals with disabilities may be more likely than those without to engage in retaliatory bullying, perhaps due to the perception of fewer response alternatives. In addition, electronic communication can provide a way to interact with others that does not draw attention to disability and that may be less difficult for someone with impaired social skills due to disabilities such as autism. This lessening of social barriers and the possible redefinition of the typical

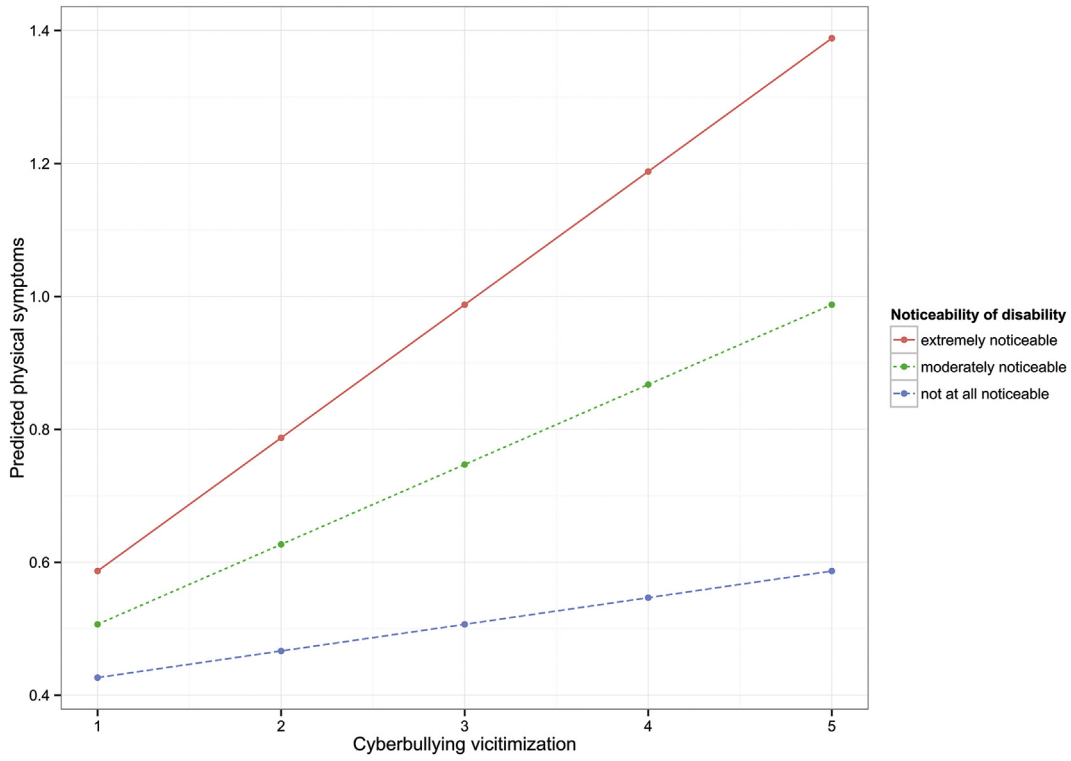


**Fig. 5.** Predicted symptoms value.

social balance of power may explain why students with disabilities might be more likely to become both victims and perpetrators of cyberbullying than those without disabilities.

This study also provides evidence that disability status and bullying involvement both have main and interaction effects on the adverse outcomes of depression, self-esteem, ostracism, and physical symptoms. Thus, students with disabilities are not only at higher risk of bullying victimization and perpetration, but the negative outcomes associated with bullying are likely to be more pronounced for disabled students. These effects tend to be moderate to small, but their inclusion is beneficial to the predictive power of adverse bullying effects models.

One reason for these findings may be the seemingly greater percentage of bully/victims who fall within the disability as opposed to the non-disability group. The pattern of correlations examining the overlap in involvement between traditional bullying and cyberbullying victimization and perpetration showed that, for the non-disability group, the relationships were between traditional bullying and cyberbullying victimization and between traditional bullying and cyberbullying perpetration. However, for individuals in the disability group, traditional bullying perpetration was correlated with both cyberbullying victimization and perpetration. Previous research has highlighted that bully/victims are the most at-risk individuals for experiencing the harmful physical and psychological consequences that follow from involvement in bullying (Kokkinos, Antoniadou, & Markos, 2014; Kowalski et al., 2012a). Not only was this supported with the disability sample in the current study, but it also highlights the importance of student disability services and college educators paying close attention to college students, particularly those with disabilities, who are involved in traditional bullying and cyberbullying.

Noticeability of the disability was an important predictor of cyberbullying victimization. This is consistent with research showing that youth with visible disabilities were more likely to be victims of traditional bullying (Olweus, 1993). Two words of caution are noted here, however. First, whereas noticeability immediately connotes physical disabilities, for example, other disabilities, such as ADHD, become noticeable because of specific behavioral manifestations. In addition, regardless of how noticeable the disability, individuals across the spectrum of disabilities are more vulnerable to being bullied, so caution is in order that school educators and administrators address their prevention and intervention efforts toward all individuals, not just those with noticeable disabilities. Furthermore, the noticeability of one's disability, while a significant predictor, becomes less “noticeable” in the online world. Indeed, noticeability may take a different form in the virtual world than in the non-virtual world. Personality characteristics such as impulsivity may, in fact, be more noticeable than physical features.

Witnessing cyberbullying was also a significant predictor of cyberbullying victimization. This is an important variable that may distinguish cyberbullying on some level from traditional bullying. Many people become inadvertently caught up in cyberbullying via a cyberbullying-by-proxy situation in which they, at least initially, assume the role of bystanders to ongoing cyberbullying (Aftab, 2006). In chat rooms and in gaming situations, however, it is easy to get called into a response that sets oneself up for cyberbullying victimization. With traditional bullying, on the other hand, while bystanders may appear to be supporting the perpetrator, they can still maintain a position of neutrality more easily than in a cyberbullying situation (Kowalski et al., 2012a).

That parental knowledge of Internet use was inversely related to depression and ostracism and positively related to self-esteem highlights the importance of parental involvement in the online activities of youth, including college students (see also Özdemir, 2014). Kowalski and Fedina (2011) observed that there is often a disconnect between students' online activities and parents' perceptions of those online activities. While one might assume that, by the time a student is in college, he or she no longer needs parental

involvement regarding online activities, the current data do not support this assumption.

Surprisingly, the hypothesis that personality factors including social anxiety and neuroticism would be related to cyberbullying victimization was not supported in the current study. While clearly a risk factor for traditional bullying, dispositional social anxiety and neuroticism may have less influence in cyberbullying because of the anonymity that often accompanies cyberbullying, and because people online do not display visible manifestations of their anxiety (e.g., nervous habits, sweaty palms, etc.) that might set them up as targets of traditional bullying.

### 8.1. Future research

One of the difficulties inherent in conducting bullying research on individuals with disabilities is that negative outcomes, such as depression and anxiety, often follow from the disability itself independently of the occurrence of bullying, as shown in the current study. One source of these negative outcomes is the stigma attached to some disabilities, particularly mental health problems (Corrigan, Druss, & Perlick, 2014). Future research is needed to attempt to disentangle the complex relationships among disability status, mental health, and bullying, particularly as regards the causal direction of these relationships. The effect of disability on risk of bullying victimization and perpetration and the exacerbation of bullying's effect on negative outcomes warrant further research and more attention from college disability services groups. In addition to replicating the effects evidenced in this study, further research to articulate the differential effects of disability type would be particularly valuable. That noticeability of the disability plays a role in bullying on college campuses suggests that disability services may want to pay special attention to how they handle student accommodations, taking perhaps even greater effort to maintain privacy in handling accommodations.

The current study is limited by the fact that it relied exclusively on self-report measures, which could compromise the reliability of the analyses. However, some of the data patterns are similar to those obtained in previous research (e.g., showing that individuals with disabilities experience bullying to a higher degree than those without; e.g., Kowalski & Fedina, 2011), leading us to believe that the results of the study are reliable.

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