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An Empirical Examination of the Strength Differential Hypothesis in Cyberbullying Behavior

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Objective: Two studies were conducted to (re)examine whether the strength differential hypothesis—that face-to-face bullies are likely to be physically stronger than victims—is valid in the cyberbullying domain. The novel contribution of our research includes testing the relations between the belief that strength is irrelevant for online bullying, online power (technological abilities), and cyberbullying within the theoretical integration of the Barlett and Gentile cyberbullying model and Bandura's self-efficacy theory. ***Method:*** Two studies had participant's complete measures of cyberbullying behavior, cyberbullying attitudes, online power, and the belief that strength is irrelevant for online bullying. Study 1 ($N = 147$) utilized a cross-sectional design with a general adult population, whereas Study 2 ($N = 218$) employed a short-term longitudinal study of college students. ***Results:*** Correlation and regression findings from Study 1 showed that (a) the belief that muscularity is irrelevant for online bullying (but not online power) was associated with more cyberbullying, and (b) this relation was mediated by cyberbullying attitudes. Study 2 replicated these results using a longitudinal path analysis. ***Conclusion:*** The current research supports the postulates of the BGCM by confirming the theoretically predicted relations between the belief that muscularity is irrelevant in the online world and cyberbullying behavior through the development of cyberbullying attitudes. Online power, in the form of computer skill, did not show this pattern, suggesting that perceptions of physical strength are more relevant even in the online world, supporting the original strength differential hypothesis.

Keywords: cyberbullying, cyberaggression, bullying, strength differential, cyberbullying theory

Olweus (1993) defined *bullying* as a repeated and intentional harmful behavior directed toward another who cannot easily defend himself/herself. Olweus (1994) and others (e.g., Cullingford & Morrison, 1995) later added that although it is implied in this definition, bullying often requires a real or perceived power imbalance between the bully and the victim, herein referred to as the *strength differential hypothesis*. This hypothesis posits that bullies often have some perceived or real advantage(s) over their victim in terms of physical attributes (e.g., strength, height), social status (e.g., popularity), established hierarchical status (e.g., more senior individuals bullying their subordinates), and/or other perceived attribute that provides a sense of power to the bully. Several studies have found support for the strength differential hypothesis by showing that bullies tend to be physically stronger (Unnever & Cornell, 2003), popular (de Bruyn, Cillessen, & Wissink, 2010), and older (Scheithauer, Hayer, Petermann, & Jugert, 2006), whereas victims are shorter than average (Voss & Mulligan, 2000), physically weaker (Unnever & Cornell, 2003), and less popular (de Bruyn et al., 2010). Moreover, research by Sijtsema, Veenstra, Lindenberg, and Salmivalli (2009) suggested that one motivation to bully is to maintain social status and power. Despite the wealth of research showing the validity of the strength differential hypothesis as applied to traditional bullying, there is a paucity of research testing whether this hypothesis extends to the online world, specifically cyberbullying. Indeed, in their review Vandebosch and Van Cleemput (2008) stated that one of the differences between traditional and cyberbullying is how the original application of the physical strength differential hypothesis may change in the mediated world. That is, a lack of concern about physical strength differences in the context of the cyberworld may enable some individuals to engage in cyberbullying. However, there is no published research empirically testing this application. We therefore conducted two independent research studies to examine how concern about physical strength differences is related to cyberbullying, using a correlational design with a general population (Study 1) and a short-term longitudinal design with a college-student sample (Study 2). Overall, the purpose of the current study was to further examine the strength differential hypothesis as it applies to cyberbullying.

Strength Differential in a Cyberbullying Context

Cyberbullying is defined as "any behavior performed through electronic or digital media by individuals or groups that repeatedly communicates hostile or aggressive messages intended to inflict harm or discomfort on others" (Tokunaga, 2010, p. 278). Several scholars have elaborated on the differences between traditional and cyberbullying (see Dooley, Pyzalski, & Cross, 2009; Vandebosch

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& Van Cleemput, 2008; Ybarra, Espelage, & Mitchell, 2014) that could have important theoretical implications for both predicting and elucidating the psychological mechanisms involved in cyberbullying behavior. Relevant to the current research, one such difference is how the original formulation of the strength differential hypothesis may need to be reconceptualized to apply to online behavior. Although we have noted that the original derivation of the strength differential hypothesis includes physical *and* social components (e.g., popularity), our study focuses exclusively on the physical nature of the strength differential hypothesis as applied to the mediated world. Recent longitudinal research has demonstrated that Wave 1 popularity was unrelated to Wave 2 cyberbullying frequency (Wegge, Vandebosch, Eggermont, & Pabian, in press). Furthermore, Patchin and Hinduja (2006) and others (e.g., Erdur-Baker, 2010) have stated that the social dimension of the strength differential hypothesis is more relevant in a traditional bullying context, rather than online bullying. Related to the physical component of the strength differential hypothesis, since cyberbullying does not include physical contact between the bully and victim, the larger physical stature often observed in traditional bullies may be less influential. This presumes that the cyberbully is anonymous or that the cyberbully and victim are separated geographically. Indeed, research has shown a significant positive correlation between cyber and traditional bullying (e.g., Barlett & Gentile, 2012), making the traditional strength differential hypothesis applicable to cyberbullying in certain situations. This does not, however, preclude that the strength differential hypothesis is completely invalid in the online world; however, we will test whether the strength differential hypothesis may or may not need to change as it pertains to cyberbullying. Several hypotheses regarding the application of the strength differential hypothesis to cyberbullying are plausible. Three are particularly germane to our theoretical position.

Hypothesis 1: Barlett and Gentile Theoretical Model

The first hypothesis is that the belief that the online environment is an equalizing arena for individuals of varying physical strengths to aggress may predict subsequent cyberbullying behavior and aid in the development of procyberbullying attitudes. In other words, because of the online nature of cyberbullying, physically weaker people may believe that they are now more equal in ability to cause harm. Physically strong individuals may still cyberbully; however, technology has now given individuals who are physically weaker a method of bullying. Using a correlational research design with an emerging adult sample, Barlett and Gentile (2012) found that individuals who hold this belief are more likely to develop cyberbullying attitudes and subsequently cyberbully others. For the purposes of the current research, we termed this belief the *belief in the irrelevance of muscularity in online bullying* (BI-MOB).

An implicit assumption regarding the victim-bully dyad in face-to-face bullying is that the physically or socially weaker children are concerned about the actual physical or social strength differences between them and bullies. Indeed, research has shown that victims are likely to be absent from school and be school avoidant (see Dake, Price, & Telljohann, 2003 for review) to possibly avoid the bully. Moreover, Boulton and Underwood (1992) found that 36% of victimized youth believed that bullies attacked victims because the victims were smaller, weaker, and did not want to fight back. Finally, bullies who have high social capital (i.e., power to make others do things) were not only more relationally and physically aggressive compared to lower powered traditional bullies, but they also were more popular and had more social assets (i.e., better physically looking and leadership; Vaillancourt, Hymel, & McDougall, 2003). Therefore, we believe that in the school yard, victims may be concerned about the power differences between themselves and their bully(ies)—a belief that may be less prevalent in the online world. In other words, because (a) cyberbully/victim dyads are often not in the same physical space, (b) the increased perception of anonymity of the cyberbully, and (c) the nonphysical nature of cyberbullying, the belief that individuals regardless of physical stature can harm another may be appealing to youth who want to cause harm but cannot. Of course, this does not preclude that only physically weaker youth are cyberbullies, and several studies have shown a strong correlation between traditional and cyberbullying (e.g., Barlett & Gentile, 2012); however, we argue that due to the differences between cyber and traditional bullying, BI-MOB may be an important predictor of cyberbullying—a predictor that has received limited empirical attention.

Theoretically, the development of BI-MOB is posited by the Barlett and Gentile cyberbullying model (BGCM; Barlett & Gentile, 2012). This model applied broader learning (Gentile et al., 2009) and aggression (Anderson & Bushman, 2002) theories to predict the psychological mechanisms underlying cyberbullying behavior. Specifically, each time an individual attacks another person online can be conceived as a learning trial that, if positively reinforced (cf. Bandura, Ross, & Ross, 1963), will lead to the development of learned associations, expectations and normative beliefs that support cyberbullying behavior. Barlett and Gentile (2012) found evidence that after a cyberattack, the aggressor will likely learn that physical strength is less relevant in the online world compared to the relevance in the real (noncomputer mediated) world (among other possible learned beliefs and attitudes). Each additional successful cyberbullying act further reinforces this idea, which facilitates the development of procyberbullying attitudes. These attitudes are hypothesized to directly predict cyberbullying behavior, a finding that has been reliably shown in several studies (Barlett, 2013; Barlett, Gentile, & Chew, in press; Barlett et al., 2014; Doane, Pearson, & Kelley, 2014). Furthermore, Barlett and Gentile (2012) found that procyberbullying attitudes mediate the relation between BI-MOB and cyberbullying behavior in a correlational study.

Hypothesis 2: Bandura's Self-Efficacy Model

A second plausible hypothesis is that the strength differential typically associated with traditional bullying contexts has shifted from the importance of physical attributes to computer knowledge in an online context (see Erdur-Baker, 2010). Thus, one's perceived ability to transmit computer viruses, hack into another's online account, create damning exclusive social media groups, or anonymously post hurtful online statements—in other words, their cyberbullying efficacy expectations—may be predictive of one's actual use of such cyberbullying behaviors. We term this *harmful online power*. Support for this hypothesis would suggest that a new formulation of the strength differential hypothesis may be warranted in the cyberbullying domain. We are unaware of any empirical study that has tested this hypothesis; however, corollary research evidence suggests that cyberbullying frequency is positively correlated with self-reported time spent online (Li, 2007; Erdur-Baker, 2010) and computer skills (Vandebosch & Van Cleemput, 2009).

Bandura's (1977) self-efficacy theory offers additional insight into this hypothesis. Self-efficacy is often defined as ". . . a generative capability in which component cognitive, social, and behavioral skills must be organized into integrated courses of action to serve innumerable purposes" (Bandura, 1982, p. 122). In other words, self-efficacy is the belief that you have the ability to succeed in a given behavior. However, it is important to keep in mind the social learning theory distinction between efficacy expectations about one's ability to carry out a specific behavior, and outcome expectations—beliefs about how likely the specific behavior is to have the intended outcome. Bandura's theory states that four sources of information develop efficacy for a given behavior: performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal. Because performance accomplishments are based on one's own experiences, mastery with a behavior can be achieved via modeling, desensitization of interfering emotions, continued exposure, and self-instructed performance processes. If an individual has the technological aptitude to know how to cause harm online, self-efficacy toward cyberbullying should increase, leading to subsequent cyberbullying behavior. To date, no published work has tested the application of self-efficacy theory to the study of cyberbullying. Specific to our research, we will conceptualize self-efficacy beliefs as technological ability to cause harm (or harmful online power).

Hypothesis 3: Theoretical Integration

The two aforementioned hypotheses are not mutually exclusive. It is possible that both BI-MOB and harmful online power efficacy may predict cyberbullying attitudes and/or behaviors. In other words, higher online power scores juxtaposed with the belief that physical stature means little in the online bullying world may enhance cyberbullying behaviors. Consistent with the first hypothesis, we predict that cyberbullying attitudes will mediate the relation between BI-MOB and cyberbullying behavior. We also hypothesized that BI-MOB and harmful online power will be positively related to each other, based on the related work showing that computer self-efficacy is related to attitudes toward the Internet ($r = .28$, $p < .05$; Durndell & Haag, 2002). Furthermore, online power (especially harmful) may be another learned byproduct of continued experiences with cyberbullying, which may directly or indirectly predict cyberbullying behavior through cyberbullying attitude formation.

Overview of the Current Research

Two studies tested the general hypothesis that BI-MOB and online power will be related to cyberbullying directly and indirectly through the development of positive cyberbullying attitudes. Study 1 employed a cross-sectional design to test these relations in a general population sample. Study 2 tested these relations by using a short-term longitudinal design with a college-student sample. The purposes of the current research were:

1. Examine whether harmful online power and/or the belief that physical strength is irrelevant in the online world predict cyberbullying behavior and attitudes.

2. Test whether cyberbullying attitudes mediate the relation between these two predictors (i.e., harmful online power and BI-MOB) and cyberbullying behavior.

3. Examine whether the aforementioned relations are robust to study design and heterogeneity of the sample.

4. Examine the scale measurement characteristics of a newly developed online power differential questionnaire.

Study 1

Study 1 had several purposes. The first was to examine reliability and validity evidence for a new measure of online power specific to doing benign (e.g., create a new email address) and harmful (e.g., hacking into another person's online account) online behaviors. The second was to investigate correlations among cyberbullying behavior, BI-MOB, and online power. Finally, we used regression techniques to test how power is most appropriately defined in the online world.

Method

Participants. One hundred and 47 participants (63% female) were sampled through the online data collection website: Psychological Research on the Net (PRN; http://psych.hanover.edu/research/exponnet.html). This website collects online data from participants all over the world of varying ages. The average age of the sample was 26.06 ($SD = 11.66$; range = 18–70) years. The majority of participants lived in the United States ($N = 113$; 77%), although some participants hailed from Australia, Singapore, Spain, India, Greece, and others (There were no significant main effects of whether participants were from the United States vs. other countries on any of the primary variables except that U.S. participants scored significantly higher on the BI-MOB measure than those outside the United States, $t(128) = 2.14$, $p < .05$. The majority of participants were Caucasian (57%). One hundred and one (69%) of the sample reported being enrolled in college classes at the time of data collection, and of those students, the majority reported being in their first or second year of undergraduate education (65.7%). Fifty percent of participants self-reported as being in middle socioeconomic status.

Materials. The following questionnaires were administered:

Cyberbullying behavior. Three items from Ybarra, Diener-West, and Leaf (2007) had participants rate how often in the last year they cyberbullied others on a 1 (*never*) to 6 (*everyday/almost everyday*) rating scale ($\alpha = .65$). A sample item includes, "Made rude comments or mean comments to anyone online." These items were summed such that higher scores indicated higher reported frequency of cyberbullying. This measure has shown adequate validity (see Berne et al., in press, for a review).

Cyberbullying attitudes. To measure positive attitudes toward cyberbullying, the Barlett and Gentile (2012) Positive Attitudes Toward Cyber-Bullying Questionnaire was used. This nine-item questionnaire asks participants to rate their level of agreement on a 1 (*strongly disagree*) to 5 (*strongly agree*) rating scale ($\alpha = .61$).

A sample item is, "It is acceptable to send mean emails to others when they deserve it." Two items were reverse coded before summing such that higher scores indicated more positive attitudes toward cyberbullying. Data has supported the validity of this measure by showing that scores on this measure predict cyberbullying perpetration (e.g., Barlett et al., in press; Barlett & Gentile, 2012).

Belief in the irrelevance of muscularity in online bullying (BI-MOB). To measure the degree to which participants believe that the physical stature of an individual is irrelevant to online bullying—that is, that the online environment is an equalizing arena to be aggressive for people of varying physical strengths—the Barlett and Gentile (2012) strength differential subscale was used. This scale consists of five items, for which participants rate their level of agreement using a 1 (*strongly disagree*) to 5 (*strongly agree*) rating scale. Two sample items are "The only way for smaller, weaker people to get even against bullies is to attack them online" and "I can send mean e-mails or text messages to anybody no matter how big or small they are." All items were summed, such that higher scores indicate less concern about physical strength differences when cyberbullying (α = .62). Barlett and Gentile (2012) showed validity evidence for this measure by showing significant positive correlations between BI-MOB and (a) cyberbullying frequency and (b) cyberbullying attitudes. Note that this is not a direct measure of strength differential, but rather the belief of the importance of physical strength of the bully as it applies to cyberbullying.

Online power. An online power questionnaire was developed to assess participants' perceived ability to complete several online behaviors. Participants rated their level of agreement with the items on a 1 (*not at all*) to 5 (*extremely*) rating scale. Participants were instructed that their answers indicated their perceived ability to engage in these behaviors, rather than the frequency by which these behaviors were enacted. An exploratory factor analysis with a Varimax rotation was conducted to test the factor structure of this new scale. Two factors yielded eigenvalues greater than one, and the scree plot also suggested a two-factor solution, accounting for 62.78% of the variance. Inspection of the rotated factor loadings showed that the first factor consisted of five items that assessed nonharmful online behaviors (α = .83). The second factor consisted of four items that assessed harmful online behaviors (α = .80). Sample items and factor loadings are shown in Table 1. One item, "Create my own webpage" loaded onto both factors and, thus, was not included in the final scale. In social learning theory terms, these two power scales are measures of efficacy expectations, that is, the perceived ability to carry out specific types of online behavior.

Table 1
Rotated Factor Structure of Online Power Questionnaire

Item	Nonharmful	Harmful
1. Create a computer virus		.88
2. Send or transmit a computer virus to others		.86
3. "Hack" into other's computers or accounts		.82
4. Write computer code		.67
5. Post a video online	.86	
6. Create a new email address	.82	
7. Create a new username (or "handle") for various websites	.69	
8. Create a personal blog	.70	
9. Transfer data (pictures, video) from my cellular phone to the Internet	.85	

Demographics. A demographic questionnaire assessed sex, age, ethnicity, SES, and living location.

Procedure. Data was collected as part of a larger study (participants also completed the following measures: cyberbullying [Ang & Goh, 2010], a researcher created online permanency and repeatability questionnaires, and anonymity perceptions [Barlett & Gentile, 2012]; however, these were not germane to our theoretical position and were not analyzed). Upon completion of the online informed consent, participants completed the various measures. Then participants were then thanked and debriefed. The order of these questionnaires pertaining to the current study was the same for all participants.

Results

Data analysis plan. First, zero-order correlations are presented to show simple relationships between variables of interest. Second, we present a path model to test whether positive attitudes toward cyberbullying mediate relations between: (a) harmful online power, (b) nonharmful online power, and (c) BI-MOB and cyberbullying behavior. Due to the expected (and obtained) skewed nature of the data, we present both Pearson and Spearman ranked order correlations and our path models used bootstrapping procedures, rather than traditional OLS regression techniques.

Correlations. Table 2 displays the correlations (Pearson and Spearman) and relevant descriptive information between relevant variables. Immediately apparent from these zero-order correlations are the strong positive associations among cyberbullying behavior, cyberbullying attitudes, and BI-MOB. In addition, harmful online power correlated positively with cyberbullying behavior and with cyberbullying attitudes.

Path models. Our hypothesized mediation model was tested using path analysis procedures in Mplus. This model had BI-MOB, harmful online power, and nonharmful power as correlated exogenous variables predicting both cyberbullying attitudes and behavior. Cyberbullying attitudes were a predictor of cyberbullying behavior. The paths between harmful and nonharmful online power differentials on cyberbullying behavior were constrained to be equal. We set these paths to be equal in order to have a degree of freedom remaining to estimate model fit. When this constraint was removed and all paths were free to vary, results were similar, except the direct path between BI-MOB and cyberbullying frequency was not significant (B = .09, 95% confidence interval [CI] [−.002, .19). Finally, we controlled for sex and age of the sample by having both predict every other variable in the model. We tested this model using 5000 bootstrapped iterations due to the skewed nature of the data (see Table 2). Results showed that the model fit the data well, $\chi^2(1)$ = .00, p = .99, root-mean-square error of approximation (RMSEA) = 0.00 (90% CI [0.00, 0.00]), comparative fit index (CFI) = 1.00, Tucker−Lewis Index (TLI) = 1.00, standardized root-mean-square residual (SRMR) = 0.00. Unstandardized regression coefficients with 95% confidence intervals are presented in Figure 1.

INDIRECT model statements were used in Mplus to test whether the exogenous variables indirectly predicted cyberbully-

Table 2
Correlations Between Variables in Study 1

Variable	1	2	3	4	5
1. Cyberbullying behavior	—	.08	.17	.46**	.50**
2. Nonharmful online power	.05	—	.27**	−.15	.08
3. Harmful online power	.20**	.24**	—	.13	.18*
4. Cyberbullying attitudes	.53**	−.14	.14	—	.51**
5. BI-MOB	.51**	.09	.20*	.54**	—
M	4.06	28.96	7.75	15.93	10.77
SD	1.85	7.06	5.12	5.05	4.11
Minimum	3.00	5.00	4.00	9.00	5.00
Maximum	11.00	35.00	26.00	33.00	21.00
Possible range	3–18	5–35	4–28	9–45	5–25
Skew	2.15	−1.67	1.72	0.99	0.44
SE (skew)	0.21	0.21	0.21	0.21	0.21

Note. Numbers below the diagonal are Pearson correlation coefficients and numbers above the diagonal are Spearman's rank order correlations. BI-MOB = belief of the irrelevance of muscularity in online bullying.
* $p < .05$. ** $p < .01$.

ing frequency through cyberbullying attitudes, our hypothesized mediator. Results showed that the relationship between BI-MOB and cyberbullying behavior was mediated by cyberbullying attitudes (indirect $B = .20$, 95% CI [.05, .35]). No other mediated effect was significant.

Discussion

Overall, results from Study 1 found that the belief that muscularity is irrelevant to online bullying (BI-MOB) predicted cyberbullying better than harmful online power. Indeed, the path analysis showed that while controlling for each other in the model, BI-MOB predicted positive attitudes toward cyberbullying and cyberbullying behavior. Furthermore, the results were consistent with a model in which the relation between BI-MOB and cyberbullying is mediated by cyberbullying attitude. However, online power was not as strong a predictor of cyberbullying attitudes and behavior. Finally, our results suggest that our newly developed online power measure consists of two factors (harmful and nonharmful) that both have adequate internal consistency and validity.

Study 2

One important characteristic of the Study 1 sample was the heterogeneous demographic characteristics of the sample, especially age. Research has shown that age is negatively related to computer efficacy, comfort on the computer, and feelings of autonomous control (Czaja & Sharit, 1998). Furthermore, research has shown that cyberbullying behavior is more common in youth than older samples (Ševčiková & Šmahel, 2009); although this is likely a reflection that aggression in general tends to decrease with age (e.g., Loeber & Hay, 1997). Indeed, additional analyses with our Study 1 sample showed that age was negatively correlated with cyberbullying attitudes ($r = -.20$, $p < .05$), cyberbullying behavior ($r = -.21$, $p < .03$), harmful online power ($r = -.22$, $p < .05$), and nonharmful online power ($r = -.25$, $p < .01$). This does not invalidate the results of Study 1, as it fits with existing theory and data about the relation between age and aggression. Nonetheless, this characteristic of Study 1 potentially adds some noise that may obscure relations among the variables of primary theoretical interest. For example, the fact that the correlations between harmful and nonharmful online power were larger in Study 1 than in Study 2 (see Tables 2 and 3) could be the result of the greater age variability in Study 1. Study 2 was conducted on a more homogeneous sample (an emerging adult sample). Of course, we expect there to be some variation in age for a college-based sample that could have ramifications for cyberbullying processes; however, this is expected to be less than the sample in Study 1 who had a much larger mean, variance, and range of ages than Study 2 (see Participants Section).

In addition, Study 1 is limited by its cross-sectional design. Of course, as we have noted elsewhere (e.g., Prot & Anderson, 2013) cross-sectional studies are useful in testing hypothesized associa-

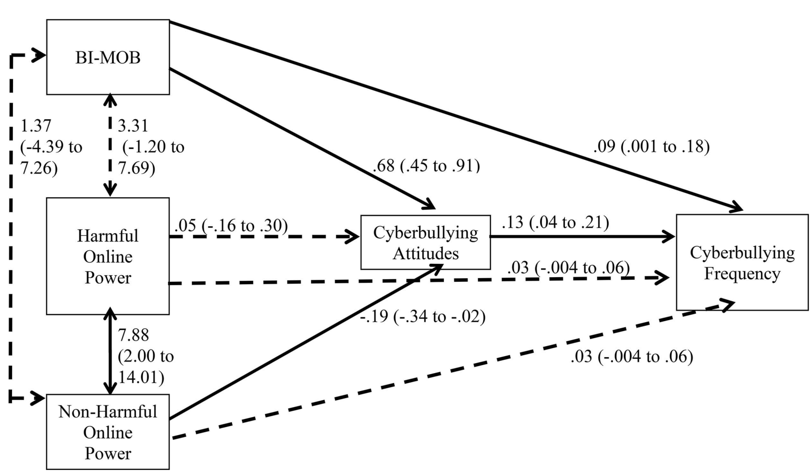

Figure 1. Unstandardized path weights for the mediated path model in Study 1. Numbers in parentheses represent 95% confidence intervals. Nonsignificant paths are denoted with dashed lines. Age and sex effects were not included in this figure. BI-MOB = belief of the irrelevance of muscularity in online bullying.

Table 3
Correlations Between Variables in Study 2

Variable	1	2	3	4	5	6	7	8	9	10
1. W1 CB behavior	—	.52**	.12	.12	.22**	.24**	.27**	.20**	.20**	.24**
2. W2 CB behavior	.56**	—	.01	−.03	.22**	.34**	.38**	.46**	.17*	.31**
3. W1 Non-harmful	.07	−.09	—	.65**	.17*	.15*	−.08	−.07	.13	.12
4. W2 Non-harmful	.08	−.15*	.66**	—	.10	.10	−.01	−.17*	.17*	.02
5. W1 Harmful	.20**	.19**	.13	.07	—	.58**	.17*	.10	.16*	.18*
6. W2 Harmful	.24**	.42**	.09	−.02	.62**	—	.23**	.31**	.09	.28**
7. W1 CB attitudes	.43**	.51**	−.12	−.08	.19**	.26**	—	.53**	.35**	.31**
8. W2 CB attitudes	.32**	.56**	−.12	−.26**	.15*	.42**	.58**	—	.24**	.41**
9. W1 BI-MOB	.23**	.17*	.15*	.16*	.15*	.11	.40**	.26**	—	.48**
10. W2 BI-MOB	.29**	.35**	.10	.01	.20**	.35**	.36**	.48**	.49**	—
M	3.82	3.78	28.45	28.30	5.92	6.93	14.91	15.75	10.25	10.18
SD	1.41	1.67	7.00	7.06	3.58	4.80	4.85	5.73	4.03	4.02
Minimum	3.00	3.00	5.00	5.00	4.00	4.00	9.00	9.00	5.00	5.00
Maximum	11.00	12.00	35.00	35.00	26.00	28.00	37.00	32.00	23.00	21.00
Possible range	3–18	3–18	5–35	5–35	4–28	4–28	9–45	9–45	5–25	5–25
Skew	2.27	2.77	−1.51	−1.22	2.57	1.85	1.06	.80	.53	.25
SE (skew)	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17

Note. Numbers below the diagonal are Pearson correlation coefficients and numbers above the diagonal are Spearman's rank ordered correlations. W1 = Wave 1; W2 = Wave 2; CB = cyberbullying; nonharmful = nonharmful online power; harmful = harmful online power; BI-MOB = belief of the irrelevance of muscularity in online bullying.
* $p < .05$. ** $p < .01$.

tions among measured variables based on causal theories, even if they cannot provide strong direct evidence of causality. Nonetheless, additional tests involving research designs with stronger causal features are needed. Thus, Study 2 used a short-term longitudinal study.

Method

Participants. Two hundred and 18 (66% female) undergraduate students from a large Midwestern University completed two waves of data collection for partial course credit for various psychology courses. The average age of the sample was 19.20 ($SD = 1.93$; range = 18–35) years. The majority were in their first or second year of undergraduate education (79.4%). The majority were Caucasian (78.3%), which is representative of the Midwest region of the country. Wave 1 included 434 (62% female) participants, but only 218 completed both waves of data collection. There was no significant difference between those who completed one versus two waves of data collection on sex ($\chi^2 = 2.09$, $p = .15$), age, $t(428) = 1.39$, $p = .17$; cyberbullying frequency, $t(430) = .77$, $p = .44$; strength differential, $t(424) = .45$, $p = .65$; or harmful online power, $t(427) = .54$, $p = .59$. However, participants who completed only Wave 1 had significantly more favorable cyberbullying attitudes, $t(418) = 3.12$, $p < .05$, and lower nonharmful online power, $t(420) = 3.04$, $p < .05$.

Materials. Data were collected as part of a larger study (in addition, the following questionnaires were included, but not analyzed for the current research: social competence [Robinson, Fetterman, Hopkins, & Krishnakumar, 2013], cyberbullying behavior [Ang & Goh, 2010], anonymity [Barlett & Gentile, 2012], a modified general media habits [Barlett, 2013], cyberbullying reinforcement [Barlett & Gentile, 2012], and a researcher created computer skills questionnaire; however, since these were not germane to our theoretical position, these data were not analyzed here). Of interest to the current study, the same cyberbullying behavior frequency ($\alpha s > .62$), cyberbullying attitudes ($\alpha s > .68$), BI-MOB ($\alpha = .70$), harmful online power ($\alpha s > .78$), nonharmful online power ($\alpha s > .82$), and demographics from Study 1 were used.

Procedure. At the beginning of the semester, participants completed an online informed consent document prior to completing all Wave 1 questionnaires. Approximately two months later, participants completed the same questionnaires again; however, the instructions and rating scales were changed to ask about behaviors and attitudes within the last two months.

Results

Data analysis plan. First, we present results from a confirmatory factor analysis to further test the factor structure of the online power questionnaire. Second, we present the Pearson and Spearman Rank Ordered correlations. Third, we present several hierarchical linear regression analyses to examine the possible interaction between Wave1 BI-MOB and online power on Waves 1 and 2 cyberbullying behavior and attitudes. Finally, we present our main analysis, a longitudinal path model testing whether cyberbullying attitudes mediates the relation between (a) harmful online power, (b) nonharmful online power, and (c) BI-MOB and cyberbullying behavior. Due to the likely skewed and obtained nature of the data, our path models used 5000 bootstrapping procedures rather than OLS regression techniques.

Confirmatory factor analysis. A confirmatory factor analysis was conducted in order to further validate the online power differential questionnaire used in Study 1 using the entire sample with Wave 1 items. Early model testing results suggested that several observed variables needed to be correlated. These are detailed in Figure 2, which shows the results. Overall, the model in which harmful and nonharmful online power is conceived as two separate factors yielded a good fit for the data, $\chi^2(23) = 80.79$,

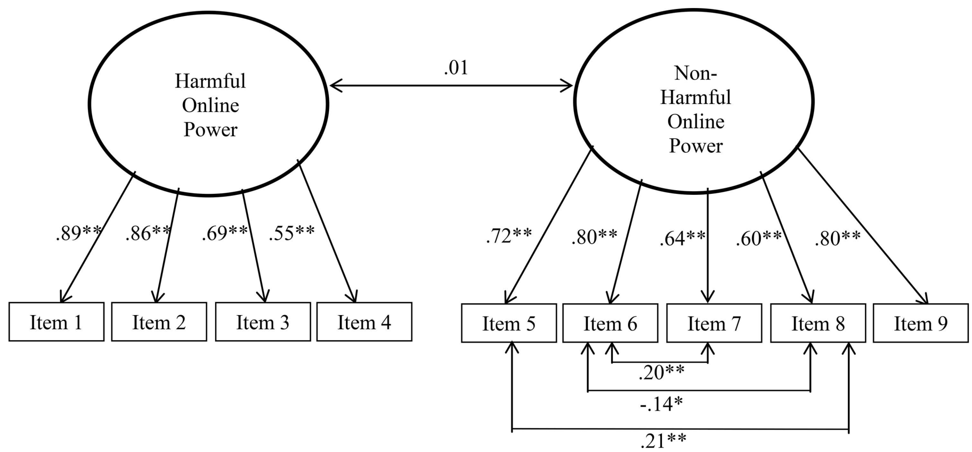

Figure 2. Confirmatory factor analysis for the Online Power Scale from Study 2. The item numbers align with the numbers in Table 1. * $p < .05$. ** $p < .01$.

$p < .01$, RMSEA = .08 (90% CI [.06, .10]), CFI = .97. TLI = .95, SRMR = .06.

Correlations. Table 3 displays the correlations between relevant variables. Cyberbullying behavior was positively correlated with cyberbullying attitudes and BI-MOB, both within each wave and across waves. Similar to Study 1, harmful online power correlated positively with cyberbullying behavior and attitudes, whereas nonharmful online power did not.

In addition to the correlational findings, we also used hierarchical linear regression procedures to test whether the Harmful Online Power × BI-MOB interaction would predict cyberbullying attitudes and behavior. In our first model, we regressed Wave 1 cyberbullying frequency onto Wave 1 harmful online power and BI-MOB in Step 1 and the two-way interaction in Step 2. Both predictors were centered prior to their entry into the regression model.

Results showed a significant moderated effect, $b = .01$, $SE = .006$, $t(211) = 1.99$, $p < .05$. A simple slopes analysis showed that the effect of BI-MOB on cyberbullying behavior was significant at high, $b = .11$, $SE = .03$, $t(211) = 3.65$, $p < .001$, but not low, $b = .03$, $SE = .03$, $t(221) = .83$, $p = .41$, levels of harmful online power (see Figure 3). When the same regression analysis was used to predict Wave 1 cyberbullying attitudes, results yielded a nonsignificant two-way interaction, $b = .02$, $SE = .02$, $t(204) = 1.18$, $p = .24$.

Additional hierarchical linear regression analysis revealed that when Wave 2 cyberbullying attitude was the outcome and Wave 1 variables were the predictors, the interaction was significant, $b = .05$, $SE = .03$, $t(197) = 2.05$, $p < .05$. Again, the relation between Wave 1 BI-MOB and Wave 2 cyberbullying attitudes was significant at high, $b = .52$, $SE = .13$, $t(197) = 4.02$, $p < .001$, but not low, $b = .15$, $SE = .14$, $t(197) = 1.11$, $p = .27$, levels of Wave 1 harmful online power (see Figure 4). It is interesting to note that when Wave 2 cyberbullying behavior was the outcome, the results showed a nonsignificant two-way interaction, $b = .01$, $SE = .007$, $t(205) = 1.20$, $p = .23$.

Longitudinal path models. To test our mediation hypotheses, cyberbullying attitudes at Waves 1 and 2 were averaged and used as the mediator. Our theory-based path model had all Wave 1 variables predict the cyberbullying attitude average, which subsequently predicted all Wave 2 outcomes. All Wave 1 predictors predicted all Wave 2 outcomes. In addition, all variables at Wave 1 were allowed to correlate as were the variables at Wave 2. Also, the paths between Wave 1 harmful and nonharmful online power expectations to cyberbullying behavior were constrained to be equal (akin to Study 1, when this restraint was removed, the results

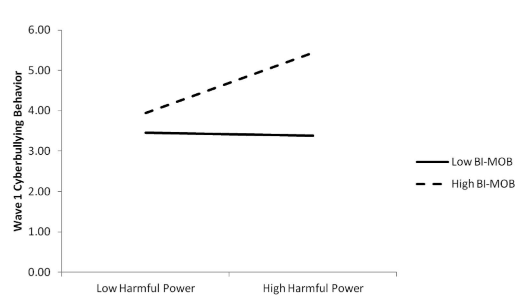

Figure 3. Significant Harmful Online Power × BI-MOB interaction for Wave 1 cyberbullying frequency in Study 2. BI-MOB = belief of the irrelevance of muscularity in online bullying.

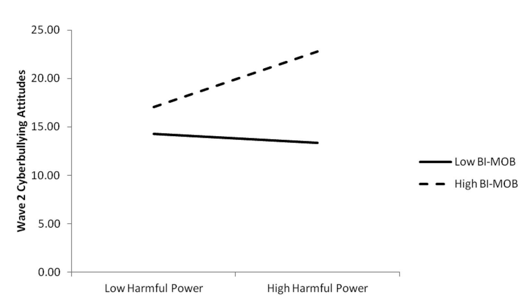

Figure 4. Significant Harmful Online Power × BI-MOB interaction for Wave 1 cyberbullying attitudes in Study 2. BI-MOB = belief of the irrelevance of muscularity in online bullying.

were similar). Finally, we controlled for age and sex in our model by having both variables predict all variables in the model. Results showed that the model fit the data well, $\chi^2(1) = 1.39$, $p = .24$, RMSEA = .04 (90% CI [.00, .19]), CFI = 1.00, TLI = .97, SRMR = .01. Table 4 shows the unstandardized regression coefficients with 95% confidence intervals.

We conducted tests of the hypothesized mediation effects by using INDIRECT model statements in Mplus, with cyberbullying attitudes (averaged across the two waves) as the mediating variable. Our main hypothesis was again supported by the data. Wave 1 BI-MOB was indirectly related to Wave 2 cyberbullying behavior through the averaged cyberbullying attitudes (indirect $B = .14$, 95% CI [.06, .22]), even after controlling for Wave 1 behavior and both harmful and nonharmful online power. We also found that Wave 1 nonharmful online power was indirectly related to cyberbullying behavior at Wave 2 indirectly through the averaged cyberbullying attitudes (indirect $B = -.09$, 95% CI [−.15, −.02]).

Discussion

Study 2 results showed that BI-MOB assessed at Wave 1 predicted cyberbullying attitudes (averaged across waves), which in turn predicted Wave 2 cyberbullying behavior longitudinally. This supports the Barlett and Gentile (2012) model and replicates results from Study 1. In addition, harmful online power did not affect cyberbullying behavior indirectly through cyberbullying attitudes. The replicated findings across both studies suggest that the relations observed are robust to the heterogeneity of the two different populations sampled and research design. Finally, we found that the two online power subscales had adequate internal consistency and validity, suggesting a usable questionnaire.

In addition to the longitudinal path model findings (discussed above), we also found two significant moderated effects. Namely, Wave 1 BI-MOB moderated the relation between Wave 1 harmful online power and (a) Wave 1 cyberbullying behavior and (b) Wave 2 cyberbullying attitudes. The simple slopes analyses showed that high BI-MOB coupled with high levels of harmful online power was related to high levels of cyberbullying attitudes (at Wave 2) and cyberbullying behavior at Wave 1.

General Discussion

The current research tested several hypotheses regarding the application of the strength differential hypothesis to cyberbullying. Although research in the traditional bullying domain has reliably shown that greater physical strength differential between bullies and victims predicts greater risk of traditional bullying behavior (e.g., de Bruyn et al., 2010; Unnever & Cornell, 2003), limited empirical work exists applying this hypothesis to cyberbehavior. However, the majority of research testing the strength differential hypothesis in the traditional bullying domain has used explicit measures of strength (de Bruyn et al., 2010) and/or popularity (Vaillancourt et al., 2003) to estimate the differential, we assessed "strength" both in terms of computer self-efficacy and the belief that the online environment is a equalizing place to cause harm (BI-MOB). Results from both our correlational (Study 1) and short-term longitudinal (Study 2) work found that BI-MOB in the cyberworld predicted cyberbullying behavior, and this relation was significantly mediated by procyberbullying attitudes, supporting the BGCM (Barlett & Gentile, 2012). It is interesting to note that at the zero-order correlation level, both studies showed that belief in one's ability to do specific types of harmful online behaviors was positively correlated with cyberbullying behavior and attitudes, supporting Bandura (1997). This type of efficacy expectation seems to combine with lack of concern about potential physical strength differences to create more positive attitudes toward cyberbullying behavior; however, this relationship was not found in our path models. Overall, our results support the idea that the belief that muscularity and physical stature matters little in the online world is a better predictor of cyberbullying attitudes and behavior compared to having harmful computer skills.

Findings from both studies seem to suggest that both BI-MOB and harmful online abilities both correlate with cyberbullying behavior, whereas benign computer abilities are not related with cyberbullying. From a theoretical lens, this suggests that multiple sources of "power" may be relevant online. Indeed, in their review, Vandebosch and Van Cleemput (2008) juxtaposed the lack of fear of physical attributes with anonymity, technology knowledge, and previous relationship status. This suggests that there are multiple relevant power sources that may enable online bullying. The current research elucidates the plausibility of fear of physical attributes, whereas past work has shown the importance of anonymity (Barlett et al., in press), online disinhibition (Udris, 2014), and technology knowledge (Walrave & Heirman, 2011). Although we are unaware of any research elucidating how having a previous relationship with a cyberbullying target, knowing another's insecurities and/or secrets could give ammunition for a provocateur to make available online to cause harm. Future work should continue to explore the interplay between the multiple possible sources of power, and we believe that the current research is a starting point

Table 4
Unstandardized Path Coefficients and 95% Confidence Intervals for the Mediation Model Shown in Study 2

	Outcomes				
Predictors	Cyberbullying attitudes	Time 2 BI-MOB	Time 2 nonharmful online power	Time 2 harmful online power	Time 2 cyberbullying behavior
Time1 BI-MOB	.38 [.21, .55]	.33 [.20, .47]	.20 [.01, .40]	−.12 [−.25, .02]	−.03 [−.09, .03]
Time1 nonharmful online power	−.13 [−.21 to −.05]	.03 [−.05, .11]	.63 [.48, .77]	.06 [−.02, .14]	−.01 [−.04, .02]
Time1 harmful online power	.10 [−.09, .28]	.11 [−.06, .27]	−.09 [−.34, .13]	.71 [.45, .93]	−.01 [−.04, .02]
Time1 cyberbullying behavior	1.14 [.63, 1.60]	.17 [−.16, .50]	.67 [.09, 1.32]	−.08 [−.57, .41]	.47 [.28, .65]
Cyberbullying attitudes	—	.28 [.16, .39]	−.34 [−.58 to −.12]	.30 [.14, .47]	.15 [.09, .21]

Note. BI-MOB = belief of the irrelevance of muscularity in online bullying.

at highlighting the importance of power at predicting online bullying.

Limitations and Future Work

Like all studies, limitations exist that necessitate additional research. First, the cross-sectional design of Study 1 makes causal conclusions risky at best. Study 2 used a longitudinal design to address this criticism partially; however, additional longitudinal research using more waves of data over longer periods of time would be useful. In addition, short-term experimental studies might also yield useful results.

Second, Studies 1 and 2 sampled participants from different populations. Study 1 used an online data collection website, which yielded a sample of participants who were older and more diverse than the undergraduate college students used in Study 2. Even though the relations found in Study 1 were conceptually replicated in Study 2, future work should continue to test the relations between BI-MOB, online power, and cyberbullying outcomes across various samples and ages in order to test whether these effects are robust. This is especially important, given the research that has suggested that cyberbullying frequency is highest in early to middle adolescents than emerging adults (Ševčiková & Šmahel, 2009); however, uncovering the psychological processes that predict cyberbullying in an emerging adult sample is an important step. In addition, the finding of similar results in different populations suggests that the phenomenon is fairly general.

Third, inspection of the reported Cronbach's alpha for the majority of the questionnaires show that the reliability is adequate, but not excellent. Indeed, all alphas are above .60; however, we caution readers in interpreting this assessment. As Clark and Watson (1995) argued, a better assessment of internal consistency is the average interitem correlation, which should range between .15−.50 for broad constructs. Results showed that all of our average interitem correlations for all questionnaires used in Studies 1 and 2 met this range criterion. Thus, we do not believe that the reported Cronbach alphas are problematic; however, researchers should continue to develop questionnaires used to assess cyberbullying related constructs and assess their reliability and validity. It is likely, for example, that adding similar items to the scales will improve alphas.

Fourth, the current study only focused on applying one's beliefs about power and technological knowledge to estimate strength differential in the online world, while ignoring social status as a key variable. This was done primarily because past work has shown that popularity does not predict cyberbullying behavior (e.g., Wegge et al., in press); however, future work should measure popularity and determine whether social status, as an index of perceived power, influences cyberbullying perpetration within the theoretical context of the Barlett and Gentile (2012) model. Additionally, since our research found that the BI-MOB was a key predictor of cyberbullying perpetration, future work should test this more explicitly by having participants report on their self-reported physical strength to determine if physically weaker individuals are more likely to cyberbully relative to physically stronger individuals. Indeed, beliefs and attitudes are not always the best predictor of behaviors. Further, future work should examine the interplay between one's perceived physical strength and the physical and/or technological strengths of the target of a cyberattack. Pieschl, Porsch, Kahl, and Klockenbusch (2013) showed that cybervictims would feel more sorrow, anger, and negative mood if the cyberbully was described as popular (compared to unpopular), suggesting a possible avenue for future extensions.

Finally, it would be useful to include additional belief and expectation measures in both correlational and experimental work. For example, one could more directly assess expectations about the likely outcomes of various types of online bullying behavior. Related, it would be useful to assess other, more general, measures of aggressive or proviolent attitudes (e.g., the Attitudes toward Violence Scale; ATV; Anderson, Benjamin, Wood, & Bonacci, 2006) that have been correlated with bullying (e.g., Eliot & Cornell, 2009) and aggressive behavior (e.g., Anderson et al., 2006), in addition to BI-MOB to see if our measure adds incremental validity beyond these more general concepts.

Research Implications

The findings from the current study have implications for the continued theoretical development of predicting cyberbullying. Two distinct theoretical underpinnings were tested in the current study. First, BGCM (Barlett & Gentile, 2012) highlights the importance of the belief that anyone, regardless of physical strength, can harm others online in the development of procyberbullying attitudes, which is a key mechanism that enables cyberbullying behavior. The BGCM proposes that after several successful cyberattacks, the aggressor likely learns that even physically weaker individuals have an outlet to harm others: online. Results from both studies show support for this model. First, results showed that BI-MOB predicted cyberbullying behavior and attitudes. Second, the relation between BI-MOB and cyberbullying behavior was mediated by cyberbullying attitudes. Finally, these results were found using two different research designs with two different populations. Thus, this effect appears robust and supports the work by Barlett and Gentile (2012) who found similar effects. This research, however, adds to this work by using a longitudinal design and different populations.

Second, we tested the application Bandura's (1997) self-efficacy theory to predict cyberbullying attitudes and behavior. We believed that the perceived ability to act aggressively online would predict cyberbullying behavior. Both Study 1 and Study 2 found significant relations between harmful online power and cyberbullying attitudes and behavior in the zero-order correlations. The path analyses, however, revealed that such online power did not significantly contribute unique variance to the prediction of cyberbullying behavior or attitudes. This likely results from the fact such efficacy beliefs indicate only whether a person believes that they can do the behavior, but does indicate whether they believe that the behavior would produce the desired outcome. Future studies should include a measure of harmful online behavior outcome expectations.

Clinical and Policy Implications

The continued study into the variables that predict cyberbullying is important for further altering, enhancing, or creating interventions aimed at reducing this form of bullying. Several intervention programs have been successful at reducing cyberbullying (e.g., Karna et al., 2011; Kowalski & Agatston, 2008, 2009); however, none that we are aware of focus on targeting online power differentials. Results from the current and past work (e.g., Barlett & Gentile, 2012) suggest that the belief that the physical strength differential is unimportant in the online world a strong predictor of cyberbullying behavior due to increases in procyberbullying attitudes. Perhaps informing individuals that cyberbullying (or any aggressive act) is not appropriate independent of how powerful (either online or physically) they perceive themselves to be would be one way of curbing the development of positive attitudes toward cyberbullying, and subsequent cyberbullying behavior; however, future work is needed to test the possible extension.

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