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Longitudinal Relations among Cyber, Physical, and Relational Bullying and Victimization: Comparing Majority and Minority Ethnic Youth

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Abstract Findings from myriad studies have shown that cyberbullying perpetration is significantly positively correlated with relational and physical bullying perpetration in youth. Furthermore, similar trends have been found for victimization type. Despite the wealth of research testing the predictors of both cyberbullying perpetration and victimization, few studies have tested whether belonging to an ethnic minority moderates these effects. The current study sampled 828 youth in the United States. All participants completed measures of cyber, relational, and physical bullying perpetration and victimization two times during the school year. We classified youth into majority (Caucasian) and minority (non-Caucasian) groups based on the ethnicity makeup of the sample. Results showed that majority participants reported less physical bullying, more physical victimization at Time 1, more cyberbullying perpetration at Time 1, more frequency cyberbullying victimization at both data collection times, and higher relational victimization at Time 1. Subsequent longitudinal grouped path model results showed that participant group status (majority vs. minority ethnicity) moderated the relation between Time 1 physical bullying and Time 2 cyberbullying perpetration, the relationship between Time 1 cybervictimization and Time 2 cyberbullying, and the relationship between Time 1 relational victimization and cyber victimization We believe these results highlight the importance of testing ethnicity as a potential moderator in the literature

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examining predictors of both cyber bullying perpetration and victimization.

Increased Internet accessibility and connectivity have undoubtedly advanced our ability to communicate with others all over the world. A recent survey found that 24% of US teens, aged 13–17 years, are online almost constantly (Lenhart 2015) – a finding that is similar for US adults, aged 18–29 years (36%; Perrin 2015). We believe that such communication has many positive social and educational benefits; however, individuals have used the Internet to cause repeated harm to others, termed cyberbullying (c.f. Tokunaga 2010). There has been a recent burgeoning of research that has (a) examined the variables that predict cyberbullying perpetration (see Kowalski et al. 2014 for a meta-analysis), (b) uncovered the negative psychological and behavioral consequences felt by cyber-victims (see Kowalski et al. 2014 for a meta-analysis), (c) developed new theoretical models (e.g., Barlett and Gentile 2012; Lowry et al. 2017), or applied previously existing theoretical postulates (Doane et al. 2014; Heirman and Walrave 2012), to understand cyberbullying behavior, and (d) validated interventions aimed at reducing cyberbullying behavior (Scultze-Krumbholz et al. 2016; Ortega-Ruiz et al. 2012). Although the recent wealth of research studies in this area is encouraging, the majority of the studies are conducted on primarily Caucasian participants, which limits the generalizability of this body of research. Therefore, the current study compared the longitudinal relations between cyberbullying, cyber-victimization, and other forms of bullying/victimization between majority (Caucasian) and minority (non-Caucasian) youth from the United States.

Ethnicity and Cyber-Behaviors

Myriad sociological and psychological factors contribute to possible differences in cyberbullying or cyber-victimization related to ethnicity. First, research has shown differences in Internet connectedness/accessibility by age, education, income, and ethnicity within the same culture (Jung et al. 2001). Indeed, Kim et al. (2007) found that even while controlling for income, education, age, participant sex, and immigration history, participant's ethnicity significantly predicted Internet connectivity (i.e., context and history of Internet connection) in a diverse sample of Caucasian, Hispanic, Asian, and Black adult participants in the U.S., such that (a) Hispanic participants had the lowest Internet connectivity, (b) Caucasian and Asian participants had the most Internet access, and (c) Black participants had less connectivity than Caucasian and Asian participants, but more than Hispanic participants. Moreover, Lin et al. (2015) showed that racial affiliation (Caucasian vs. non-Caucasian) predicted Internet efficacy, such that Caucasian participants felt more skilled on the Internet, which predicted subsequent time spent on the Internet. Time spent online (e.g., Twyman et al. 2010) and Internet connectivity (e.g., Topcu et al. 2008) have been shown to significantly correlate with cyberbullying and cyber-victimization. Therefore, minority youth may be less likely to cyberbully or be cyber-victimized than their majority peers.

Second, Mesch (2012) proposed and found evidence for his Social Diversification Hypothesis, which posits that minority (or disadvantaged) groups use the Internet primarily as a method to expand their social capital and meet new people whereas majority (or advantaged) groups use the Internet to maintain their social relationships (Arie and Mesch 2016). Indeed, research has shown that disadvantaged youth (in terms of ethnicity or education) are more likely to have weaker connections with their online contacts than advantaged youth (Gonzalez 2017). Extrapolating this theory to the current study, one could argue that ethnic minority youth, because of their weaker online connections with others, may not know who they are connected with compared to their majority peers. Although neither a necessary or sufficient condition, this suggests that minority youth may have a similar number of online contacts as their majority peers, but be less connected to them (e.g., may not know the contact as well). Indeed, Harris and Aboujaoude (2016) showed that minority adults participants scored higher on the Online Relationship Initiation Scale, which measures the extent to which one will use the Internet to find new contacts to make a) new friends, b) new romantic relationships, and c) new sexual relationship, than majority participants, suggesting that an online contact for an ethnic minority participant may be less known to the participant.

Finally, Mazur and Richards (2011) showed that African American participants had significantly more online friends than their Hispanic or Caucasian peers, but had significantly fewer comments posted by these online friends. This suggests that the online friendship quality and knowledge about online contacts are lower for minority participants. Due to the nature of these online contacts and friendships, ethnic minority youth may perceive themselves to be more anonymous to these contacts, which has been shown to increase the likelihood of cyberbullying (e.g., Barlett and Gentile 2012). Cyberbullying may be likely if an individual has a superficial relationship with another online.

Testing Ethnicity's Effect on Cyber-Behaviors

Two primary methods exist for determining the plausibility of an individual's ethnicity predicting cyberbullying perpetration or victimization. A common method is to compare cultures that differ on ethnic majority. For instance, Barlett et al. (2014) showed that American college students (where the majority culture is Caucasian) were more likely to cyberbully others compared to Japanese college students (where the majority culture is Asian). However, one limitation with this research is that several cross-culturally based alternative explanations exist that better explain differences in cyberbullying victimization or perpetration beyond ethnicity. For instance, individuals from individualistic and collectivist cultures differ on the role of the self in emotional experiences, attributions, and group values (e.g., Markus and Kitayama 1991). Although not a comprehensive list of possible relevant cultural differences, aspects of the culture itself may confound observed ethnic differences in mean occurrence of cyberbullying-related behaviors, which may limit claims related to ethnicity's relation to such behaviors.

A less common method of testing ethnicity's influence on cyber-behaviors is to examine ethnic differences within the same culture – the approach we have taken in the current study. Assessing differences between ethnic groups within the same country minimizes the country-level or cultural-level extraneous variables likely confounding tests of ethnicity differences described previously. However, a paucity of research has examined such differences using this method (c.f. Zych et al. 2015), and the results from the work that has been conducted have been mixed. Kupczynski et al. (2013) showed that Caucasian participants (the majority ethnicity in their sample) cyberbullied more than certain minority participants. Smith et al. (2012) showed a non-significant main

effect of ethnicity on cyberbullying perpetration (see also Bauman et al. 2013; Goebert et al. 2011). Finally, Wang et al. (2009) showed that cyberbullying perpetration was higher for US minority (Black and Hispanic) youth than majority (Caucasian) participants, whereas cyber-victimization was unrelated to ethnicity.

Overview of the Current Study

In their review, Hong and Espelage (2012) argued that the relationship between ethnicity and bullying is complex, and the few studies that have examined bullying/victimization differences across ethnic background test mean level differences in both victimization and perpetration. There is a paucity of research examining whether ethnicity within the same culture moderates the relations between cyber-bullying, cyber-victimization, and various other forms of bullying and victimization. Individuals can use several tactics to bully others, such as cyber, physical, and/or relational methods. Research has shown that cyberbullying perpetration significantly correlates with perpetration of other forms of bullying (e.g., Bonanno and Hymel 2013), and cyber-victimization frequency correlates with the frequency of other victimization forms (e.g., Wigderson and Lynch 2013). Indeed, the findings from two independent meta-analyses (Kowalski et al. 2014) showed that the best predictors of cyberbullying were cybervictimization ($r = .51$) and traditional bullying ($r = .45$); whereas the best predictors of cyber-victimization were physical victimization ($r = .40$) and traditional bullying ($r = .25$).

Therefore, the purpose of the current study was to examine the longitudinal relationships between several forms of bullying and victimization (i.e., cyber, physical, and relational) in a sample of American youth, and whether ethnicity moderated these relationships. Further examination of the variables that predict cyberbullying perpetration and victimization is needed to better understand this form of harm. The aims of the current study are to: (a) examine the longitudinal stability in cyberbullying/physical/relational perpetration and victimization, (b) test the longitudinal relationships between these various forms of bullying and victimization, and (c) test whether ethnicity status (i.e., majority or non-majority) moderated the aforementioned relations. Overall, the results of the study should provide additional evidence for the longitudinal predictors of cyberbullying perpetration and victimization and examine whether ethnicity moderates these relations – two important yet understudied endeavors. Youths in our study completed measures to assess various forms of victimization and bullying (i.e., cyber, physical, relational) twice during the school year. We grouped participants into majority (Caucasian) and minority (non-Caucasian) ethnicity, a common method for testing ethnicity differences when the sample is largely Caucasian (e.g., Schneider et al. 2015), to examine the moderating influence of ethnicity.

Method

Participants

Participants were 828 youths (age range 12–14 years old; 51% female) in the 7th grade from a Midwestern city in the United States, with an average age of 12.30 years ($SD = .47$). The majority of participants identified as Caucasian (68%) and the rest identified as non-Caucasian (32%; e.g., Latino, Asian, Black). Youths were recruited from seven middle schools, located in suburban, middle class neighborhoods. All schools had between 500 and 600 students in grades 6th through 8th, and the number of participating students was similar, around 110 to 130 students in each school participated in the study.

Procedure

After receiving IRB approval from the university, a number was assigned to 153 middle schools in the suburbs of a large Midwestern city. Ten random numbers, from 1 to 153, were electronically "picked" using an online, random dice rolling program. Emails were sent to school principals to introduce them to the study, to explain how their students could participate in the research, and what students would do if they were to participate. Seven school principals expressed interest in having their students participate in the study, two school principals explained that they were committed to other projects, and one school principal never responded to the email request. Meetings were arranged with school principals, 7th grade homeroom teachers, and the study's personnel. The purpose of the meeting was to explain the study's purpose, what youths would do, and how youths could participate. After the meeting, a brief classroom announcement was made and letters describing the study and parental permission slips were passed out to students. The purpose of the announcement was to answer any questions that youths might have about their participation in the study. Approximately 953 letters and parental permission slips were sent home with youths. Nine hundred and one parental permission slips were returned to youths' homeroom teachers. Forty-one parents did not provide permission for their child to participate in the study and fifty-two parental permission slips were never returned. This resulted in a sample size of 860 at Time 1, during the fall of 7th grade.

Before completing the questionnaires, youths completed an assent document and agreed to participate in the study. Participants completed self-report questionnaires on their demographics information (e.g., sex, age, ethnicity), face-to-face physical bullying perpetration and victimization, face-to-face relational bullying perpetration and victimization, and

cyberbullying perpetration and victimization. At Time 2, during the spring of 7th grade, a letter was sent home to the parents of participating youths from Time 1. Parents were reminded of the study and they were asked to write their child's name on the letter if they no longer wanted their child to participate in the study. Two parents recorded their child's name on the letter and wrote on the sheet that their child no longer wanted to participate. Five students had moved away during the spring of 7th grade and twenty-five students were unavailable during the first and second days of data collection at their school for various reasons (e.g., field trip, in-school suspension, absent). Youths also completed assent at Time 2, and all agreed to continue participating in the study. The same questionnaires were administered at Time 2 as were administered at Time 1.

Measures

Demographics A demographic questionnaire was used to assess sex, age, and ethnicity. We used the ethnicity information to separate participants into majority (Caucasian) and minority (non-Caucasian) groups.

Physical Bullying Perpetration This questionnaire assessed youths' self-reported physical bullying perpetration on a scale of 1 (*Never*) to 5 (*All the time*) (Wright et al. 2014). Before completing the questionnaire, youths were asked to circle how often they engaged in the following behaviors during the current school year. There were four items included for this questionnaire. Sample items included: "How often do you hit others at your school?" and "How often do you push or shove your peers at school?". This questionnaire was administered at Time 1 and Time 2, with adequate Cronbach's Alphas ($\alpha = .72$ for Time 1; $\alpha = .71$ for Time 2).

Physical Bullying Victimization Similar to the previous questionnaire on face-to-face physical bullying perpetration, youths answered four questions about their experience or victimization by face-to-face physical bullying victimization on a scale of 1 (*Never*) to 5 (*All the time*) (Wright et al. 2014). The directions for this questionnaire asked youths to answer the four items according to what has happened to them during the current school year. Sample items included: "How often has a peer at your school hit you?" and "How often has a peer at your school pushed or shoved you?". This questionnaire was administered at Time 1 and Time 2. Cronbach's alphas were .73 for Time 1 and .71 for Time 2.

Relational Bullying Perpetration Youths self-reported how often they perpetrated face-to-face relational bullying on a scale of 1 (*Never*) to 5 (*All the time*) (Wright et al. 2014). Before completing this questionnaire, youths were instructed to answer the seven items according to the current school year.

Sample items included: "How often do you leave a peer out of a group because you are mad at him/her?" and "How often do you ignore or stop talking to a peer when you are mad at him/her?". This questionnaire was administered at Time 1 and Time 2, with acceptable Cronbach's Alphas ($\alpha = .77$ for Time 1; $\alpha = .71$ for Time 2).

Relational Bullying Victimization Similar to the previous questionnaire, youths self-reported how often they experienced or were victimized by face-to-face relational bullying on a scale of 1 (*Never*) to 5 (*All the time*) (Wright et al. 2014). The directions of this questionnaire asked youths to answer seven items according to what has happened to them during the current school year. Sample items included: "How often does a peer leave you out of a group because he/she is mad at you?" and "How often does a peer ignore you or stop talking to you when he/she is mad at you?". This questionnaire was administered at Time 1 and Time 2. Cronbach's alphas were .89 for Time 1 and .86 for Time 2.

Cyberbullying Perpetration This questionnaire asked youths to self-report how often they engaged in bullying online or through text messages on a scale of 1 (*Never*) to 5 (*All the time*) (Wright and Li 2013). Similar to the previous questionnaires, youths were asked to report on their behavior during the current school year. Nine items were included in this questionnaire. Sample items included: "How often do you spread bad rumors about another peer online or through text messages?" and "How often do you insult other peers online or through text messages?". This questionnaire was administered at Time 1 and Time 2. Cronbach's alphas were .89 for Time 1 and .87 for Time 2.

Cyberbullying Victimization Youths answered this questionnaire according to how often they were victimized by bullying online or through text messages on a scale of 1 (*Never*) to 5 (*All the time*) (Wright and Li 2013). Youths answered the nine items according to what they have experienced within the current school year. Sample items included: "How often has another peer spread bad rumors about you online or through text messages?" and "How often has another peer insulted you online or through text messages?". This questionnaire was administered at Time 1 and Time 2. Cronbach's alphas were .93 for Time 1 and .92 for Time 2.

Results

Data Analysis Plan

In order to test our hypotheses, first we presented zero-order correlations between the measured variables of interest. Second, we compared Caucasian (majority) to non-

Caucasian (minority) participants on the measured outcomes to assess mean level differences. Finally, we presented two sets of multi-group longitudinal path models. The first tested Time 1 variables predicting Time 2 cyberbullying perpetration and whether those relations were moderated by majority ethnicity status. The second set tested the longitudinal cross-lagged relations between Time 1 predictors of Time 2 outcomes and whether majority ethnic background moderated these relations. For all path models, we presented unstandardized regression coefficients from 5000 bootstrapped samples with 95% confidence intervals due to the likely skewed nature of the data. Because we made no a priori hypotheses regarding the longitudinal relations tested in our path models, no paths were constrained to be equal across the two groups (therefore the model will be a perfect fit for the data rendering model fit indices inappropriate).

Correlations

Parametric (Pearson) and non-parametric (Spearman) correlations are reported in Table 1. Results showed significant stability in the same variables over time (rs > .22, ps < .01; rhos > .30, ps < .01). In addition, all variables within each time were positively correlated with each other (rs > .17, ps < .01; rhos > .18, ps < .01). Finally, the correlations between all variables across time were significant (rs > .09, ps < .01; rhos > .12, ps < .01). Table 1 also shows the descriptive information for the variables and results show that all variables were significantly skewed (all Zs > 1.96: skew/SE).

Group Differences

Table 2 displays the results from several parametric (independent t-tests) and non-parametric (Mann-Whitney U) statistical tests examining mean-level differences between minority and majority participants. Results showed that those in the majority scored higher on physical victimization at Time 1 and Time 2, cyberbullying perpetration at Time 1, cyberbullying victimization at Time 1 and Time 2, relational victimization at Time 1 than minority participants.

Grouped Longitudinal Path Analysis Predicting Cyber Behaviors

Two longitudinal group path analyses were conducted to predict cyberbullying perpetration and cyber victimization. Maximum likelihood estimation using MPLUS was used to address missing data. Our first model had cyberbullying perpetration, relational bullying, and

physical bullying at Time 1 as correlated exogenous variables predicting cyberbullying perpetration at Time 2. Our second model was identical, except that bullying variables were replaced by their respective victimization frequency estimates. Because all paths were estimated and no relationships were constrained to be equal across the two groups, the models were a perfect fit for the data and, thus, we do not include model fit indices.

Results showed that for majority youth, Time 1 cyberbullying perpetration (B = .13, 95% CI: .001 to .27) and Time 1 relational bullying perpetration (B = .16, CI: .03 to .28) were significant predictors for Time 2 cyberbullying perpetration, whereas Time 1 physical bullying was not (B = −.02, 95% CI: −.19 to .19). However, for minority youth, only Time 1 physical bullying perpetration (B = .17, 95% CI: .01 to .32) significantly predicted Time 2 cyberbullying.

When Time 2 cyber victimization was the outcome, results showed that for majority youth, Time 1 cyber victimization (B = .21, 95% CI: .09 to .33) and Time 1 relational victimization (B = .15, 95% CI: .05 to .26) were significant predictors, whereas Time 1 physical victimization was not (B = .02, 95% CI: −.10 to .16). For minority youth, however, results showed that neither Time 1 cyber victimization (B = .21, 95% CI: −.03 to .47), Time 1 physical victimization (B = −.002, 95% CI: −.22 to .22), nor Time 1 relational victimization (B = .09, 95% CI: −.10 to .29) predicted Time 2 cyber victimization.

Grouped Longitudinal Cross-Lagged Path Analysis

Five longitudinal cross-lagged panel group path analyses were conducted in order to test the (a) stability in the variables over time, (b) correlations between variables within each time, and (c) the cross-lagged relations between variables over time. We grouped the sample by majority (Caucasian) and minority (non-Caucasian) participants.

Inspection of Figs. 1, 2, 3, 4 and 5 shows that the correlations within each time between the variables in the model were positive and significant for both majority and minority participants. Also, as expected, the stability coefficients were significant in all models. Despite these reported consistencies between group statuses, key theoretical differences emerged between the two groups for the cross-lagged relations. Results showed significant relations between Time 1 cyber victimization and Time 2 cyberbullying perpetration and between Time 1 relational victimization and Time 2 cyber victimization for majority youth, but not minority youth. Conversely, the relation between Time 1 physical bullying and Time 2 cyberbullying was only significant for minority, and not majority, youth. Finally, the same positive significant relationship was found between minority and majority youth for the relation between Time 1 relational bullying perpetration and Time 2 cyberbullying.

Table 1   Correlations between Variables

	1	2	3	4	5	6	7	8	9	10	11	12
1: Time 1 physical bullying	----	.31	.51	.24	.46	.20	.35	.16	.54	.23	.32	.17
2: Time 2 physical bullying	.30	----	.25	.40	.14	.26	.16	.18	.16	.45	.10	.19
3: Time 1 physical victimization	.47	.26	----	.30	.36	.16	.50	.20	.41	.20	.62	.25
4: Time 2 physical victimization	.22	.42	.33	----	.12	.25	.19	.30	.15	.25	.20	.48
5: Time 1 cyberbullying perpetration	.52	.14	.35	.09	----	.30	.68	.26	.54	.22	.44	.16
6: Time 2 cyberbullying perpetration	.19	.32	.17	.24	.22	----	.26	.45	.24	.35	.18	.31
7: Time 1 cyberbullying victimization	.34	.17	.54	.22	.59	.24	----	.31	.44	.20	.65	.27
8: Time 2 cyberbullying victimization	.11	.17	.21	.30	.18	.35	.33	----	.18	.27	.30	.48
9: Time 1 relational bullying	.56	.17	.40	.14	.58	.23	.46	.19	----	.29	.51	.21
10: Time 2 relational bullying	.25	.19	.24	.26	.25	.39	.26	.22	.29	----	.21	.32
11: Time 1 relational victimization	.29	.15	.61	.22	.37	.18	.70	.31	.47	.26	----	.36
12: Time 2 relational victimization	.15	.22	.30	.53	.09	.25	.33	.48	.20	.31	.42	----
Mean	1.35	1.41	1.57	1.52	1.41	1.46	1.60	1.65	1.67	1.69	2.00	1.86
Standard Deviation	0.53	0.51	0.70	0.63	0.56	0.56	0.75	0.75	0.54	0.50	0.83	0.72
Minimum	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Maximum	5.00	4.75	5.00	5.00	5.00	5.00	4.67	5.00	4.14	5.00	5.00	5.00
Skewness	2.31	2.22	1.67	1.61	2.14	2.18	1.51	1.61	1.06	1.40	1.02	1.24
SE (Skewness)	0.09	0.09	0.08	0.09	0.08	0.09	0.08	0.09	0.08	0.09	0.08	0.09

Note: Numbers below the diagonal are Pearson correlations and values above the diagonal are Spearman rank ordered correlations. All correlations are significant ($p < .05$)

Discussion

The current study was conducted to fill an important gap in the literature regarding the role of ethnicity in the variables that predict cyberbullying perpetration and cyber-victimization frequency. Using a two-time longitudinal study of youth in the United States, participants were partitioned into tw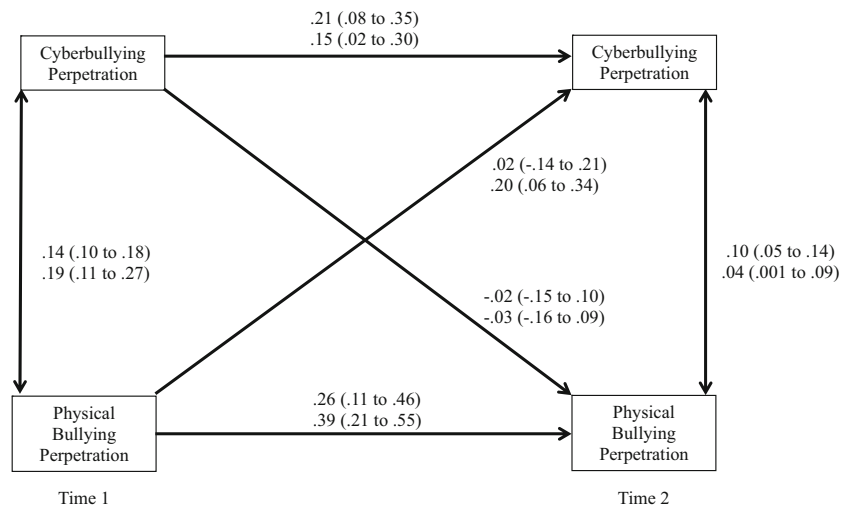o groups based on their self-reported ethnicity: majority (Caucasian) and minority (non-Caucasian). To date, the research on mean level ethnicity differences in cyberbullying have been mixed. Indeed, some research indicates that majority (Caucasian) participants cyberbully more than their minority peers (Kupczynski et al. 2013), whereas other work has found the opposite effect (Wang et al. 2009) or no statistical relationship between ethnicity and cyberbullying (Smith et al. 2012; Bauman et al. 2013; Goebert et al. 2011). Results from

Table 2   Group Differences on Relevant Outcomes

Variable	Majority		Minority		t	d	Z
	Mean (SD)	N	Mean (SD)	N			
Time 1 Physical bullying	1.31 (0.50)	568	1.42 (0.58)	235	−2.68**	−.19	−2.17*
Time 2 Physical bullying	1.37 (0.51)	567	1.48 (0.52)	234	−2.56*	−.18	−3.55**
Time 1 Physical victimization	1.59 (0.70)	570	1.51 (0.72)	237	1.51	.11	−2.27*
Time 2 Physical victimization	1.54 (0.63)	563	1.49 (0.64)	233	0.96	.07	−1.77
Time 1 Cyberbullying perpetration	1.41 (0.52)	568	1.40 (0.64)	237	0.28	.02	−2.30*
Time 2 Cyberbullying perpetration	1.46 (0.56)	562	1.48 (0.57)	233	−0.58	−.04	−0.87
Time 1 Cyberbullying victimization	1.65 (0.76)	568	1.50 (0.74)	236	2.49*	.18	−3.31**
Time 2 Cyberbullying victimization	1.69 (0.73)	560	1.62 (0.81)	234	1.14	.08	−2.50*
Time 1 Relational bullying	1.65 (0.52)	569	1.69 (0.59)	236	−0.95	−.07	−0.51
Time 2 Relational bullying	1.68 (0.51)	565	1.71 (0.46)	233	−0.84	−.06	−1.30
Time 1 Relational victimization	2.04 (0.84)	569	1.92 (0.84)	237	1.93	.14	−2.28*
Time 2 Relational victimization	1.88 (0.73)	562	1.82 (0.70)	233	1.10	.08	−1.18

* $p < .05$, ** $p < .01$

Fig. 1 Grouped cross-lagged panel design between physical and cyber bullying perpetration Note: Upper values represent the 5000 bootstrapped unstandardized coefficients (and 95% CI) for majority youth and lower values are for minority youth

Cyberbullying Perpetration — .21 (.08 to .35) / .15 (.02 to .30) — Cyberbullying Perpetration

.14 (.10 to .18) / .19 (.11 to .27)

.02 (-.14 to .21) / .20 (.06 to .34)

-.02 (-.15 to .10) / -.03 (-.16 to .09)

.10 (.05 to .14) / .04 (.001 to .09)

Physical Bullying Perpetration — .26 (.11 to .46) / .39 (.21 to .55) — Physical Bullying Perpetration

Time 1   Time 2

the current study show that Caucasian participants reported higher levels of cyber-victimization frequency at Times 1 and 2 and cyberbullying perpetration at Time 1, but not Time 2; results that are in line with Kupczynski et al. (2013). Although it was beyond the scope of this paper to attempt to empirically explain why such differences were not observed, future work should design studies to test several plausible mediators, such as time spent using technology (Twyman et al. 2010), trait aggression (Putallaz et al. 2007), and others.

Despite the importance of identifying whether ethnicity influences mean level bullying and victimization frequencies, we focused on whether ethnicity (majority vs. minority) moderated the longitudinal relations between early bullying/victimization and later outcomes. We pitted two hypotheses against each other. First, due to increased Internet connectivity and accessibility for Caucasian versus minority individuals (e.g., Jung et al. 2001) the relationships between the various bullying and victimization frequencies should be stronger for Caucasian participants, because of the high correlation between time spent online and cyber-behaviors (cyberbullying

perpetration and victimization; Twyman et al. 2010). Second, because of the correlation between social network connectivity and cyber-behaviors, the relations between bullying and victimization frequencies may be stronger for minority participants because minority participants have weaker online connections than their majority peers (Gonzalez 2017). To examine these untested hypotheses, we exploited the strong correlations between various forms of victimization/bullying and later cyberbullying and cyber-victimization (see Kowalski et al. 2014) and used longitudinal multi-group path modeling to test these effects. Figs. 1, 2, 3, 4, and 5 show the results of our hypothesis tests. For the relation between cyber and physical bullying perpetrations, results show that the relationship between Time 1 physical bullying and Time 2 cyberbullying was moderated by ethnicity status – minority participants had a significant positive relation not found for their majority peers. This finding was not found when relation bullying was the predictor. Interesting, the opposite pattern was found for the relation between Time 1 cyberbully victimization and Time 2 cyberbullying

Fig. 2 Grouped cross-lagged panel design between relational and cyber bullying perpetration Note: Upper values represent the 5000 bootstrapped unstandardized coefficients (and 95% CI) for majority youth and lower values are for minority youth
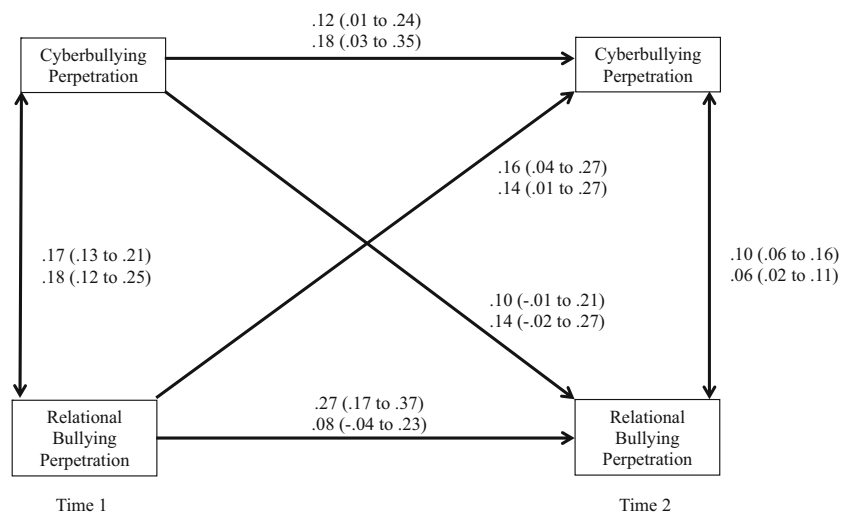

Cyberbullying Perpetration — .12 (.01 to .24) / .18 (.03 to .35) — Cyberbullying Perpetration

.17 (.13 to .21) / .18 (.12 to .25)

.16 (.04 to .27) / .14 (.01 to .27)

.10 (-.01 to .21) / .14 (-.02 to .27)

.10 (.06 to .16) / .06 (.02 to .11)

Relational Bullying Perpetration — .27 (.17 to .37) / .08 (-.04 to .23) — Relational Bullying Perpetration

Time 1   Time 2

Fig. 3 Grouped cross-lagged panel design between cyber bullying perpetration and cyberbullying victimization Note: Upper values represent the 5000 bootstrapped unstandardized coefficients (and 95% CI) for majority youth and lower values are for minority youth
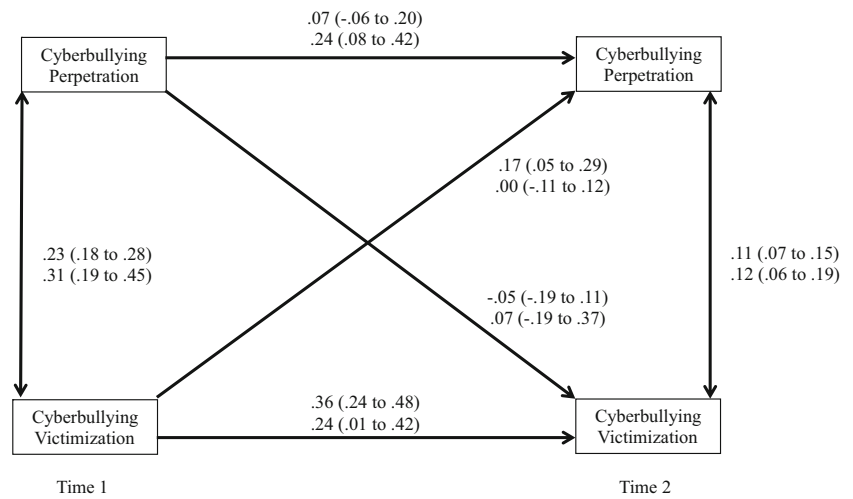
perpetration – majority participants had a significant positive relation not found for their minority peers. These differential results strongly support the Internet connectivity hypothesis (Jung et al. 2001). If majority participants have more accessibility to the Internet, then the relations observed between cyberbullying and cyber-victimization should be stronger for majority compared to minority youth – a finding observed in the current study. Finally, examining the multi-group longitudinal path model results for cyberbullying victimization, results showed that the relation between Time 1 relational bullying victimization and Time 2 cyber victimization was significant and positive for majority youth, but not for their minority peers. No moderated effects were found between early and later physical and cyber victimization frequencies.

Limitations and Future Directions

Several limitations exist that necessitate additional research. First, we collapsed all non-Caucasian participants into our

"minority status" group, rather than treating each reported ethnicity as separate groups. We fully understand that there are myriad differences between non-Caucasian participants that may influence cyber-behaviors; however, we made this distinction purely for statistical power issues. Indeed, examination of the frequency distributions of all reported ethnicities showed that Caucasians were the overwhelming majority group and no other ethnicity was large enough to warrant its own group and have enough power to statistically test the longitudinal relations imperative for our work. Future work should increase the sample size for the non-Caucasian (minority) youth and attempt to test the longitudinal relations between various forms of bullying and victimization while treating each ethnicity as its own group.

Second, the sample sizes for the majority and minority groups were unequal. Although this limitation is related to the previous issue, we feel that future work should attempt to create a more balanced sample size between majority and minority youth. Indeed, the samples sizes for the majority group were double that of the minority group in our study.

Fig. 4 Grouped cross-lagged panel design between relational and cyber bullying victimization Note: Upper values represent the 5000 bootstrapped unstandardized coefficients (and 95% CI) for majority youth and lower values are for minority youth
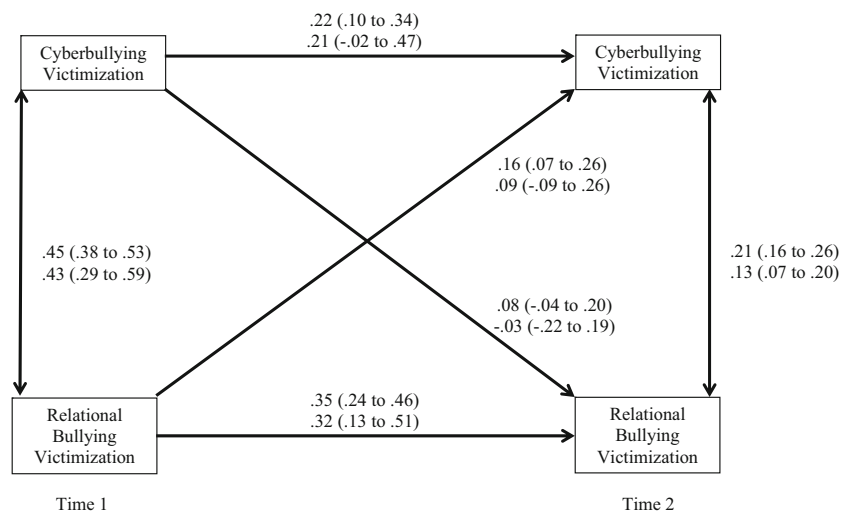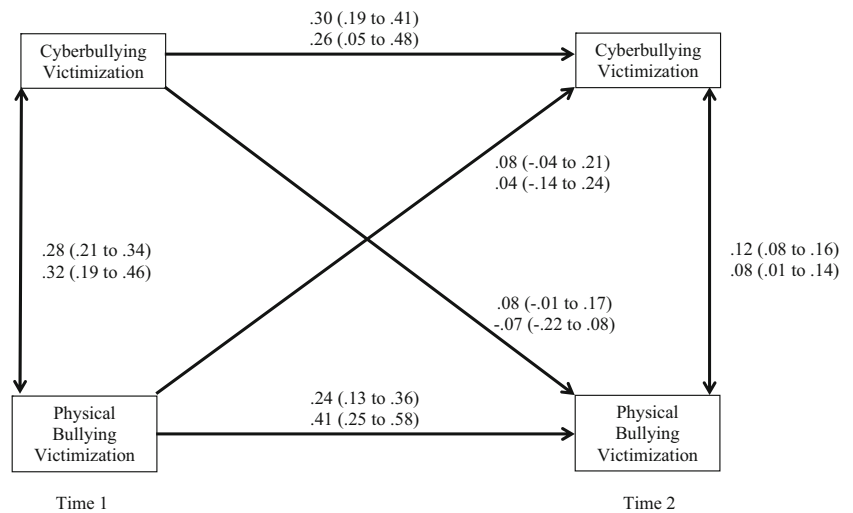
Fig. 5 Grouped cross-lagged panel design between physical and cyber bullying victimization Note: Upper values represent the 5000 bootstrapped unstandardized coefficients (and 95% CI) for majority youth and lower values are for minority youth

Because sample size is integral in the computation of the error terms for all the statistics we used to test our hypotheses, our results may have been stronger had we had a similar number of majority and minority youth. Despite this limitation, the sample size for the minority group was still substantial ($N > 200$); however, compared to the majority group ($N > 500$), the minority student numbers seemed underwhelming. Future works should attempt to replicate our study while sampling a similar number of majority and minority youth.

Third, the time lag between both phases of data collection was approximately six months. Future work should attempt to replicate these effects while either using longer time lags between data collection (e.g., one year) or use more than two time lags. This latter suggestion would allow us to examine the possible Time 2 mediators in the relation between Time 1 predictor and Time 3 outcome moderated by ethnicity status. Although we note this as a limitation, the fact that we conducted a longitudinal study testing the moderating effect of ethnicity status on the longitudinal relations is an important step in examining the importance of ethnicity above and beyond looking at mean level changes.

Fourth, as we have already argued, additional predictors of cyberbullying perpetration and/or victimization frequency should be tested beyond physical and relational bullying and victimization. We selected these variables because of the strong relations observed between various forms of bullying and victimization (c.f., Kowalski et al. 2014); however, future work should test anonymity perceptions (Barlett and Gentile 2012), time spent online (Jung et al. 2001), and others (see Kowalski et al. 2014 meta-analysis for several plausible variables).

Basic and Applied Implications

The emergence of cyberbullying perpetration and its deleterious effect on the victim as societal issues has corresponded with the continued need to (a) derive and apply theory to predict cyberbullying perpetration and (b) design intervention efforts to reduce cyberbullying perpetration. With both these goals in mind, we believe that the results of the current study offer conclusions that advance both endeavors. There have been several theories applied to the understanding of why certain variables predict cyberbullying perpetration, including the theory of reasoned action (Doane et al. 2014), theory of planned behavior (Heirman and Walrave 2012), General Aggression Model (Kowalski et al. 2014), the Barlett Gentile Cyberbullying Model (Barlett and Gentile 2012), and others (see Barlett 2016 for a review). Although these theories offer diverse theoretical insights into cyberbullying perpetration process, none of them incorporate postulates that describe if, and how, ethnicity can play a role in cyberbullying perpetration. Our results clearly show that there are ethnicity differences in cyberbullying perpetration and victimization and that the relations between various forms of bullying and victimization are moderated by ethnicity. Taken together, these conclusions suggest that future theoretical tests should examine the influence of ethnicity (if ample sample sizes can be obtained for majority and minority participants).

The current findings also offer insights into the creation and/or modification of cyberbullying interventions aimed at reducing cyberbullying perpetration. From a clinician point of view, if one can effectively reduce cyberbullying perpetration then cyberbullying victimization should hopefully decrease accordingly. Myriad interventions have been created and shown effective at reducing cyberbullying behavior, such as Media Heroes (Scultze-Krumbholz et al. 2016), ConRed (Ortega-Ruiz et al. 2012), and others. Although these interventions differ widely in their curriculum, sample targeted, and degree of success, no intervention that we are aware of has incorporated ethnicity into the intervention lessons. Our results suggest that the longitudinal relations between early forms of bullying and victimization predict cyberbullying

perpetration differently for majority and minority students. For instance, Fig. 1 shows that Time 1 physical bullying perpetration predicted Time 2 cyberbullying perpetration for minority, but not majority, youth. Therefore, if an intervention's lesson plan includes a unit on attempting to prevent youth from bullying using multiple forms (i.e., in person and online), then that lesson may only be applicable for minority youth. Although these assertions are speculative and more research is needed, findings from the current study suggest that certain intervention curriculum may only be applicable for specific classes of youth.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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