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The Development of a Multi-dimensional Measure of Cyber Bullying

Lucy Griezel, Rhonda G. Craven, Alexander Seeshing Yeung, and Linda R. Finger
Centre for Educational Research, University of Western Sydney

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Abstract

Whilst literature on traditional bullying continues to grow, a paucity of research exists regarding its newest form: cyber bullying. The present study consisted of a sample of Australian secondary students (N = 803) and aimed to identify the underlying structure of cyber bullying. A previously validated measure of traditional bullying, the Adolescent Peer Relations Instrument - Bully and Target (APRI-BT; Parada, 2000), was extended to include cyber bully and target behaviours. Reliability analyses and Confirmatory Factor Analyses (CFA) demonstrated that the newly extended measure of traditional and cyber bullying behaviours was psychometrically sound. It was concluded that the current investigation provided a firm understanding of the nature and structure of cyber bullying, thus forming a sound base from which to conduct future bullying research. Moreover, potential limitations of the present investigation, and implications for theory, research, and practice were discussed.

The immense benefits of the technology available today cannot be disputed, however, a dark side has invariably surfaced as a by-product of such technological advances - the use of this technology for the purposes of bullying, termed 'cyber bullying' (Strom & Strom, 2005). Indeed, the problem of cyber bullying is made worse by the very nature of its existence in this electronic world. The new electronic playground of mobile phones and the internet ensures that adolescents can be potentially targeted continuously outside of the traditional schoolyard environment. Despite increasing anecdotal evidence, there exists a paucity of research about the nature and structure of cyber bullying, and its relation to traditional bullying.

What is Cyber Bullying?

Defining Bullying

Most researchers have asserted that bullying can be conceptualised as "repeated intimidation, over time, of a physical, verbal, and psychological nature of a less powerful person by a more powerful person or group of persons" (Slee, 1996, p. 64). Bullying behaviours are typically repetitive in nature, and have an inherent power imbalance between the bully and target whereby the targets are incapable of defending themselves from the bully (Lagerspetz, Björkqvist, Berts, & King, 1982; Olweus, 1997; Rigby, 1996, 2001). The fundamental issue is

that bullies take advantage of this imbalance of power for their own benefit. Simultaneously, the target does not desire this domination and is hurt or disadvantaged because of it (Parada, 2006; Parada, Marsh, & Craven, 2005). Cyber bullying extends on these processes by employing a new delivery medium of mobile phone and internet technology (Belsey, 2005; Williams, Cheung, & Choi, 2000).

The Nature of Traditional and Cyber Bullying

Empirical studies have demonstrated that traditional bullying can be conducted in multiple ways, which can be generally conceptualised as Physical (e.g., punching), Verbal (e.g., name calling), and Social (e.g., rumour spreading) (Crick, Nelson, Morales, Cullerton-Sen, Casas, & Hickman, 2001; Rigby & Slee, 1999; Salmivalli, Kaukiainen, & Lagerspetz, 2000). Parada (2000) developed the Adolescent Peer Relations Instrument - Bully and Target (APRI-BT), which measured the proposed structure with regard to bullying others and being a target. Confirmatory Factor Analysis (CFA) of the APRI-B/T items found support for the three types of bully and target behaviours (Physical, Verbal, and Social), thus providing rigorous support for the multidimensional nature of bullying (Marsh, Parada, Craven, & Finger, 2004). However, as yet it is unknown how cyber bullying relates to this structure.

It is not known whether cyber bullying is a distinct construct in and of itself, or is just a means of conducting more traditional forms of bullying. Cyber bullying is indeed a complex phenomenon that cannot be easily classified. Specific cyber bullying behaviours include: sending nasty text messages, emails, and instant chat messages; forwarding confidential emails, text messages, or instant chat messages to other students; bombarding a student with hurtful text messages; setting up a derogatory website or profile page about a student and inviting others to comment; or using a mobile phone camera to video or photograph another student to embarrass them (Beran & Li, 2005; Finkelhor, Mitchell, & Wolak, 2000; Smith, Mahdavi, Carvalho, & Tippett, 2006; Ybarra, Mitchell, Finkelhor, & Wolak, 2007). Conceptually, such forms seem to coalesce into two main methods, that is, visual and text. However, to date the existing cyber bullying literature is devoid of an underlying theoretical basis that can be tested empirically and accepted, refined, or refuted based on empirical research and measurement.

Cyber Bullying: Where Do We Go From Here?

Limitations of the Current Empirical Cyber Bullying Literature

Of a total of eight independent empirical studies that the authors are aware of to have investigated cyber bullying, none adequately addressed or capitalised on recent advances in traditional bullying research (e.g., Finger, Marsh, Craven, & Parada, 2005). One of the most vital problems that plagues the field of cyber bullying is that despite an abundance of competing theories and models attempting to explain traditional bullying behaviours, there is a paucity of validated theory and empirical research to encapsulate the experience of cyber bullying. More fundamentally, little is known about the nature of cyber bullying, its structure has not been theorised, and as such psychometrically sound measurement tools have not been developed to measure the construct. The available literature is also plagued with methodological weaknesses including: atheoretical approaches; small sample sizes; weak measurement instruments with one-item questions and; a lack of psychometric evaluation of instrumentation employed.

The Problem with Single Item Instruments

Traditional bullying and now the measurement of cyber bullying behaviour has relied upon the use of simple surveys that utilise single items (e.g., Li, 2005, 2007; Ybarra, & Mitchell, 2004a, 2004b; Ybarra et al., 2007) to define multidimensional bullying constructs (Olweus,

1989; Rigby & Slee, 1993; Smith & Sharp, 1994; Solberg & Olweus, 2003). Using one or two items to measure continuous bullying constructs is unacceptable for several reasons: (a) single items are unreliable; (b) single items can only discern moderate to large differences and cannot distinguish fine degrees of an attribute; and (c) individual items lack scope and the ability to uncover detail (McIver & Carmines, 1981; Nunally, & Bernstein, 1994; Spector, 1992). Indeed, the use of psychometrically strong, valid, and reliable measurement instruments in traditional bullying research and now cyber bullying research is the exception rather than the norm (Farrington, 1993; Finger, Craven, Marsh, & Parada, 2005; Smith, Schneider, Smith, & Ananiadou, 2004).

Rethinking Bipolar Classification Schemes and the Misuse of Dichotomous Variables

Cyber bullying research has inherited the historic tendency of traditional bullying research to classify students as bullies or victims. The utilisation of this classification system is founded on an intrinsic model in which being a bully and being a target were mutually exclusive patterns of behaviours. However, an emergent body of contemporary bullying research (Finger, Marsh et al., 2005; Ma, 2001; Marsh, Parada, Craven et al., 2004; Parada, Marsh, & Craven, 2005) has clearly demonstrated that the two variables have a tendency to be positively correlated. Whilst debate still remains regarding the magnitude, nature, and fundamental processes underlying this correlation, it is apparent that the correlation is not the -1.0 correlation that would be reflective of a mutually exclusive classification scheme (Finger, Marsh et al., 2005; MacCallum, Zhang, Preacher, & Rucker, 2002).

The Present Investigation

Scientific research within the traditional bullying arena has only recently begun to accurately enhance the knowledge base in this area, and there exists a paucity of research in the cyber arena. The present investigation attempted to address this issue by developing, testing, and thoroughly evaluating a strong theoretical model and the psychometric properties of a new multidimensional measure to assess levels of cyber bullying and being cyber bullied. Specifically, the study aimed to evaluate the psychometric properties of the Revised Adolescent Peer Relations Instrument – Bully and Target (RAPRI-BT) with regards to reliability and factor structure. It was hypothesised that: (1) the subscales of the RAPRI-BT, would be reliable measures of their latent structures; whereby the reliability estimates would be sound; and (2) CFA would support the hypothesised factor structure of the Bully and Target scales of the instrument (see Figures 1 and 2 respectively for a graphical representation of the proposed factor structure).

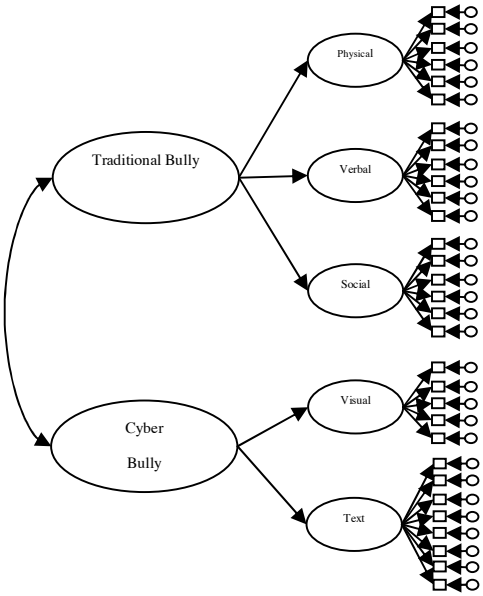

Figure 1. Hypothesised factor structure of the RAPRI Bully scale.

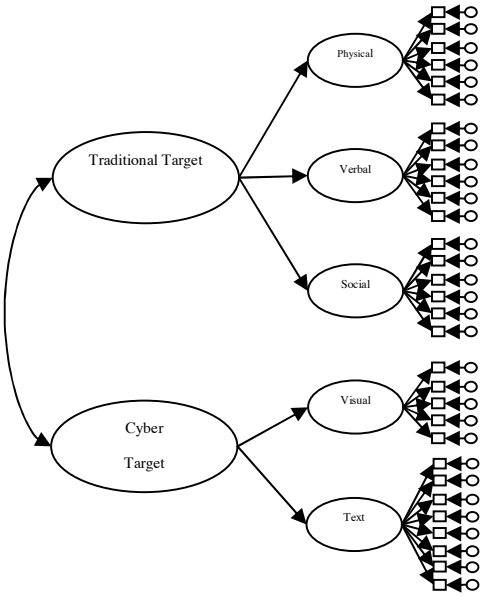

Figure 2. Hypothesised factor structure of the RAPRI Target scale.

Method

Participants

Students (N = 803) from one Western Sydney Catholic secondary school in Year 7 (n = 176), Year 8 (n = 186), Year 9 (n = 157), Year 10 (n = 156), and Year 11 (n = 128) participated in the study. Only those students who consented, and who had parental consent to participate were included in the study. Students' ages ranged from 12 to 17 years, with a mean age of 14.03 years (SD = 1.4). In total, 53% of students were males (n = 427) and 47% were females (n = 376). With regard to cultural background, 61% (n = 489) of respondents identified their culture

as Australian, 22% (n = 177) reported their culture as containing both Australian and another culture (e.g., Greek Australian), and 17% (n = 137) reported belonging to a culture other than Australian.

Measures

Revised Adolescent Peer Relations Instrument – Bully and Target (RAPRI-BT). The RAPRI-BT was specifically developed for the present study. The original Adolescent Peer Relations Instrument – Bully and Target (APRI-BT; Parada, 2000) was extended to include cyber bullying in its measurement of interpersonal relationships between secondary school students. The original APRI-BT contained two 18-item scales which measured three forms of traditional Bully and Target behaviours (Physical, Verbal, and Social). The APRI-BT has demonstrated excellent psychometric properties (Finger, Marsh et al., 2005; Marsh, Parada, Craven et al., 2004; Parada, 2006). The RAPRI-BT was extended to include an additional 13 items on each scale, which measured two forms of cyber Bully and Target behaviours (Visual and Text). The cyber bullying items were developed directly from the original APRI-BT items, and adapted to suit the cyber context. Thus, the first scale comprised 31 items which asked students to state how often, on a six-point Likert scale (1 = Never to 6 = Every day), they engaged in a series of behaviours. The second scale section also contained 31 items and asked how often students experienced behaviours occurring to them.

Procedure

Permission to conduct the study was obtained from the University of Western Sydney Human Ethics Panel, the Catholic Education Office, and the Principal of the participating school. Students with parental consent were instructed verbally of the purpose of the study, of their voluntary and anonymous participation, and their right to withdraw at any time with lack of penalty. Signed student consent was obtained prior to the commencement of the study. The questionnaire was read aloud to students in year groups and took approximately 45 minutes to complete.

Statistical Analyses

Data screening. Preliminary analyses using SPSS 14.0 involved screening the data for missing values, univariate and multivariate outliers, and assessing the assumptions of normality, linearity, and homoscedasticity. In dealing with missing data, the Expectation Maximization (EM) algorithm in SPSS, which predicts replacement values based on available information attained from data not missing for the particular item, was used in the present investigation. EM currently represents the most state-of-the-art method for the replacement of missing data (Schafer & Graham, 2002).

Univariate outliers were initially identified via the presence of extreme scores on stem-and-leaf plots. Following the recommendations of Tabachnick and Fidell (2007), raw scores were converted to standard scores (z-scores) in order to confirm the presence of outliers. *Z*-scores with values greater than +/-3.29 were modified by converting the raw score for the outlier to one unit more extreme than the next most extreme score (Tabachnick & Fidell, 2007). Multivariate outliers were identified by those observations that exhibited a large Mahalanobis distance score, and were subsequently removed from the analysis (Hills, 2005). Finally, the screening for assumptions of normality, linearity, and homoscedasticity was conducted through the examination of tests of normality, histograms, and scatter plots.

Reliability analyses. Reliability analyses, using Cronbach's alpha, were conducted for each of the subscales of the instruments utilised in the present study through SPSS 14.0. Although no universal consensus regarding acceptable reliability estimates exists, internal

consistency reliability estimates should be ideally above .70 or .80 (Anastasi & Urbina, 1997; Hills, 2005). Thus, for the present study, coefficients greater than .90 were deemed excellent, above .80 were considered good, and above .70 acceptable.

Confirmatory Factor Analysis. Confirmatory Factor Analysis (CFA) was conducted using PRELIS and LISREL 8.72 (Joreskog & Sorbom, 2004) to examine the factor structure and validity of all instrumentation used in the current study. Four CFAs were conducted to assess the psychometric properties of the first-order and higher-order structures of the RAPRI for both the Bully and Target models. CFA tests the extent to which indicator items reflect the a priori proposed factor structure and further assess whether the theoretically proposed model represents relationships actually observed in the data (Byrne, 2001). In order to assess model fit, the researcher must analyse the goodness-of-fit indices produced. Consistent with current practices (Holmes-Smith, 2000; Byrne, 2001; Marsh, in press; Marsh, Balla, & Hau, 1996), the following goodness-of-fit indices were emphasised: the Root-Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993), the Tucker Lewis Index (TLI; Bentler & Bonett, 1980), and the Comparative Fit Index (CFI; Bentler, 1990). For the RMSEA, values below .05 represent excellent fit and values as high as .08 indicates acceptable errors of approximation (Browne & Cudeck, 1993; Holmes-Smith, 2000). The TLI and CFI yield values that range from 0 to 1, with values greater than .95 indicative of excellent fit, and values greater than .90 indicative of good model fit (Hu, Bentler, & Kano, 1992**;** Marsh et al., 1996; Schumacker & Lomax, 1996).

Results

Reliability of the RAPRI-Bully

Reliability analyses were conducted on the five first-order and two higher-order scales of the RAPRI Bully scale (see Table 1). Cronbach's alpha estimates for the Physical, Verbal, Social, Visual, and Text subscales were good, ranging from .80 to .88. Additionally, sound reliability estimates were obtained for the higher-order Traditional Bully (α = .93) and Cyber Bully (α = .88) factors.

Table 1
Reliability Estimates for First-Order and Higher-Order RAPRI-Bully Scales

Higher-Order Factor	First-Order Factor	Cronbach's Alpha
Traditional Bully		.93
	Physical	.86
	Verbal	.88
	Social	.83
Cyber Bully		.88
	Visual	.84
	Text	.80

Factor Structure the RAPRI-Bully

A first-order CFA was conducted on the Bully scale in order to examine the structure of the five factors (Physical, Verbal, Social, Visual, and Text). The results of the CFA presented in Table 2 demonstrated a good fit with the data, as indicated by an RMSEA of .078, CFI of .96, and TLI of .96. Secondly, a higher-order CFA was conducted for the Bully model in order to identify the loadings of the five first-order factors onto two higher-order factors (Traditional

Bully and Cyber Bully). Again, goodness-of-fit indices showed good model fit with the data, as indicated by an RMSEA of .079, CFI of .96, and TLI of .95 (see Table 2).

Table 2
Goodness-of-fit Indices for RAPRI- Bully Scale First-Order and Higher-Order CFAs

	χ^2	*df*	CFI	TLI	RMSEA
First-Order CFA	2484.90	424	.96	.96	.078
Higher-Order CFA	2617.34	429	.96	.95	.079

Note. χ^2 = Chi-Square statistic, df = Degrees of Freedom, CFI = Comparative Fit Index, TLI = Tucker Lewis Index, RMSEA = Root Mean Square Error of Approximation.

Factor loadings (see Table 3) indicated that the factors were well defined by their corresponding items, and all loadings were significant, positive, and substantial in size ranging from .55 to .93. The intercorrelations between the five first-order factors (see Table 3) indicated that the factors which represented traditional bullying (Physical, Verbal, and Social) were more highly correlated with each other (*Mdn r* = .72) than with the two factors that represented cyber bullying (Visual and Text; *Mdn r* = .44). Similarly, the correlation between the two cyber bullying factors (r = .75) was substantially higher than the correlation between these cyber factors and the traditional factors (*Mdn r* = .44). These results supported the formation of two higher-order factors, namely Traditional Bully and Cyber Bully. In addition, the factor loadings of the five first-order factors onto the two higher-order factors were also sufficient for the higher order model. Physical, Verbal, and Social loaded onto the Traditional Bully factor with values of .91, .96, and .76 respectively, and Visual and Text loaded on the Cyber Bully factor with values of .80 and .95 respectively. Again, the higher-order factor loadings were highest among factors within each higher-order factor group than those between factor groupings. The correlation between the two higher-order factors was .56, and significant at the .001 level.

Table 3
Factor Loadings and Factor Correlations for the Subscales of the RAPRI-Bully Scale

	Physical	Verbal	Social	Visual	Text
			Factor Loadings		
Items					
1	.80	.77	.70	.93	.82
2	.73	.80	.73	.81	.59
3	.59	.72	.66	.59	.55
4	.71	.74	.70	.93	.62
5	.76	.62	.64	.57	.66
6	.69	.79	.63		.56
7					.57
8					.68
			Factor Correlations		
Physical	1				
Verbal	.87	1			
Social	.65	.72	1		
Visual	.43	.42	.45	1	
Text	.42	.48	.59	.75	1

Reliability of the RAPRI-Target

Reliability analyses were carried out for the five first-order and two higher-order scales of the RAPRI Target scale (see Table 4). Cronbach's alpha estimates for the Physical, Verbal, Social, Visual, and Text subscales were good to excellent, ranging from .80 to .91. Moreover, the higher-order Traditional Bully (α = .94) and Cyber Bully (α = .87) factors exhibited good to excellent reliability estimates.

Table 4
Reliability Estimates for First-Order and Higher-Order RAPRI-Target Scales

Higher-Order Factor	First-Order Factor	Cronbach's Alpha
Traditional Target		.94
	Physical	.84
	Verbal	.91
	Social	.87
Cyber Target		.87
	Visual	.80
	Text	.84

Factor Structure of the RAPRI-Target

A first-order CFA was conducted on the Target scale in order to examine the structure of the five target factors (Physical, Verbal, Social, Visual, and Text). The results of the CFA displayed in Table 5 demonstrated acceptable goodness-of-fit-indices, with an RMSEA of .062, CFI of .97, and TLI of .97. Secondly, a higher-order CFA was conducted for the Target model in order to identify the loadings of the five first-order factors onto two higher-order factors (Traditional Target and Cyber Target). Again, goodness-of-fit indices showed good model fit with the data, as indicated by an RMSEA of .066, CFI of .97, and TLI of .97 (see Table 5).

Table 5
Goodness-of-Fit Indices for RAPRI-Target Scale First-Order and Higher-Order CFAs

	χ^2	*df*	CFI	TLI	RMSEA
First-Order CFA	1704.66	424	.97	.97	.062
Higher-Order CFA	1943.20	429	.97	.97	.066

Note. χ^2 = Chi-Square statistic, df = Degrees of Freedom, CFI = Comparative Fit Index, TLI = Tucker Lewis Index, RMSEA = Root Mean Square Error of Approximation.

Furthermore, examinations of the factor loadings for the first-order model (see Table 6) revealed the factor structure was well defined, with all items loading significantly and positively onto their appropriate factors, and being substantial in size ranging from .54 to .85. Upon examination of the intercorrelations between first-order and higher-order factors (see Table 6), it could be seen that the factors which represented being a target of traditional bullying (Physical, Verbal, and Social) were more highly correlated with each other (*Mdn r* = .77) than with the two factors that represented being a cyber target (Visual and Text; *Mdn r* = .38). Correspondingly, the correlation between the two cyber target factors (*r* = .79) was substantially higher than the correlation between these cyber factors and the traditional factors (*Mdn r* = .38). Such results supported the formation of two higher-order factors, namely Traditional Target and Cyber Target. Moreover, the factor loadings of the five first-order factors onto the two higher-order factors (Traditional Target and Cyber Target) were also sufficient for the higher order model.

Physical, Verbal, and Social loaded onto the Traditional Target Factor with values of .84, .92, and .85 respectively, and Visual and Text loaded on the Cyber Target factor with values of .86 and .91 respectively. Again, the higher-order factor loadings were highest amongst factors within each higher-order factor group than those between factor groupings. The correlation between the two higher-order factors was .50, and significant at the .001 level.

Table 6
Factor Loadings and Factor Correlations for the Subscales of the RAPRI-Target Scale

	Physical	Verbal	Social	Visual	Text
			Factor Loadings		
Item					
1	.81	.85	.80	.76	.63
2	.68	.81	.68	.71	.71
3	.73	.77	.79	.66	.55
4	.54	.74	.69	.75	.54
5	.68	.78	.68	.81	.75
6	.68	.77	.71		.66
7					.68
8					.58
			Factor Correlations		
Physical	1				
Verbal	.77	1			
Social	.71	.78	1		
Visual	.36	.39	.36	1	
Text	.38	.41	.38	.79	1

Discussion

The present findings supported the prediction that the newly extended RAPRI-BT was a psychometrically reliable, robust, and valid measure of the bullying constructs it was specifically designed to measure. Specifically, reliability analyses demonstrated that each of the factors had excellent internal consistency. Moreover, CFA supported the hypothesised a priori five factor first-order and two factor higher-order factor structure of the RAPRI for the Bully and Target models. These findings were consistent with previous traditional bullying research which postulated the multidimensional three factor structure of bullying (i.e., Physical, Verbal, and Social) (Crick et al., 2001; Parada, 2000; Rigby & Slee, 1999). Furthermore, whilst researchers had postulated the existence of cyber bullying (Beran & Li, 2005; Finkelhor et al., 2000; Smith et al., 2006; Ybarra et al., 2007), it was as yet unknown how it related to traditional bullying. The current investigation psychometrically verified the proposed underlying constructs (i.e., Visual and Text) through the use of strong statistical methods. This is the first step to creating a sound knowledge from which to inform effective intervention.

The present study provided a rigorous investigation of a newly developed measure of cyber bullying; however, potential limitations need to be considered. The sample utilised in the current study was drawn from one Catholic secondary school, which may affect the generalisability of the results to the wider population. Although the sample was quite varied culturally and schools do not deny enrolments from families who are unable to pay school fees,

the students would be a more homogenous group with reference to their value system. For this reason, students may have been less representative of the wider population, and this may have been influenced even further by the fact that the sample comprised only one school. Future research should include a variety of students from different schools in order to add further support to and extend upon the findings of the current study.

The present study was the first that the authors are aware of to propose and evaluate the theoretical structure of cyber bullying through the use of rigorous statistical methods. In addition, given that there is a paucity of reported reliability and validity information for numerous measurement tools utilised in psychology, and in particular for measures of bullying (Hamby & Finkelhor, 2001), the findings of the present study made a significant contribution to advancing psychological research through the use of strong multidimensional measures. Specifically, the design of the present study attempted to redress many of the problems inherent in the bullying literature by empirically validating the developed measure, and avoiding the use of a single item instruments and bipolar classification schemes. From such measurement tools that address within-construct issues, the present investigation enables future exploration of a rich tapestry of between-construct relations for traditional and cyber bullying. Indeed, by offering a firm understanding of the nature and structure of cyber bullying and its relation to traditional bullying, the current study has formed the beginning of a sound research base in the field of cyber bullying research.

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