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The validation of the E-Victimisation Scale (E-VS) and the E-Bullying Scale (E-BS) for adolescents

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ABSTRACT

This study investigates the psychometric properties of the E-Victimisation Scale (E-VS) and E-Bullying Scale (E-BS) designed to assess Cyber Bullying among Chinese adolescents. Participants were 484 adolescents aged between 11–16 years randomly recruited from high schools within a region. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were applied to investigate the factorial structure of these scales. Reliability was examined by Cronbach's alpha coefficients by sex. The convergent validity was investigated by correlations among these scales and the Centre for Epidemiological Studies-Depression for Children as well as the Zung's Anxiety Scales. A single-factor model for the E-VS and a 2-factor model for the E-BS were resulted from the EFA with large factor loadings and about 47% and 56% of variance explained respectively. Cronhach's alpha values provided evidence for good internal reliability with values ranging from 0.55 to 0.96. Correlations between the E-VS and Depression as well as Anxiety scales showed positive and significant relationships, however, the E-BS was only related to Depression. Psychometric evidence has shown that both E-VS and E-BS are valid instruments for measuring Cyber bullying behaviour and victimisation. Further studies are required on the test–retest reliability, discriminate validity, responsiveness, as well as normative information for standardisation.

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1. Introduction

Bullying has first been formally defined as a wilful behaviour with a conscious desire of someone to hurt or put another person under stress (Tattum & Tattum, 1992). As the definition evolved through time, additional characteristics have been included to describe the behaviour. These included: repeated actions; systematic manner; a desire to harm; an imbalance of power or an abuse of power; enjoyed by the aggressor; and victim feels oppressed (Farrington, 1993; Rigby, 2002; Smith, Cowie, Olafsson, & Liefooghe, 2002; Smith & Sharp, 1994). With advancements of information technologies bullying behaviour, particularly among young people, has been manifested not just face-to-face but also through the cyber space. As a result, the new terms "Cyber-bullying" and "E-bullying" have been evolved (Patchin & Hinduja, 2006). In general, E-bullying is defined as threatening, intimidating, and harassing behaviour targeting others using the Internet and other digital devices such as emailing, texting, or instant messaging (Kowalski, Limber, & Agatston, 2008).

It has been suggested that bullying in young people should be considered a public health issue because of its immediate effects and long-term sequelae on the mental health of the victim (Feder, 2007). A growing number of studies suggesting the detrimental effects of bullying on the mental health of young people have been identified in the literature (Allison, Roeger, & Reinfeld-Kirkman, 2009; Arseneault, Bowes, & Shakoor, 2010; Fitzpatrick, Dulin, & Piko, 2010; Luukkonen, Räsänen, Hakko, & Riala, 2010; McMahon, Reulbach, Keeley, Perry, & Arensman, 2010; Rivers & Noret, 2010; Stassen Berger, 2007; Tharp-Taylor, Haviland, & D'Amico, 2009; Undheim & Sund, 2010). These studies found that victims of bullying were more susceptible to physical ill-health, severe mental health problems including depression, self-harm, and violent behaviour (Arseneault et al., 2010; Fitzpatrick et al., 2010; Luukkonen et al., 2010; McMahon et al., 2010). Young people victimised by psychological and physical bullying were also more likely to be involved in substance abuse (Tharp-Taylor, Haviland, & D'Amico, 2009). The effect of victimisation during childhood and adolescence might also be long-lasting and would impact on the health and quality of life later on in adulthood (Allison et al., 2009). Similarly, it has also been demonstrated that E-bullying has the same detrimental effect on the mental health of young people (Hinduja & Patchin, 2007; Wolak & Finkelhor, 2006; Ybarra, 2004).

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In terms of the prevalence of E-bullying among children and adolescents, a growing wealth of knowledge has been accumulating in developed countries (Ybarra, 2004; Ybarra & Mitchell, 2007). In the national study on health behaviour in school-aged children in the US, it was found that about 14% of the surveyed grade 6–10 children had experienced bullying electronically (Wang, Iannotti, & Nansel, 2009). In another recent survey study among middle and high school students in Canada, it was revealed that about half (49.5%) had been bullied online and nearly 34% had involved in online bullying behaviour (Mishna, Cook, Gadalla, Daciuk, & Solomon, 2010). However, in these studies information was elicited not using a standardised and validated tool. In fact, little information on well-designed and validated E-Bullying Scale has been provided from the literature.

In terms of developing countries, such as China, information on E-bullying is scarce. According to the most recent report by the China Internet Network Information Centre (CNNIC) CNNIC, 2010, there were 420 million net-citizens who are Chinese citizen at the age of 6 or above and had used the Internet in the first half year in 2010. Of these about 30.7% were young people still studying in high schools or universities (CNNIC, 2010). For the application of mobile Internet access, instant messaging has been identified as the most popular use of cyber technologies for all ages (CNNIC, 2010). This was followed by mobile search and music downloads. In terms of the magnitude and means of E-bullying among adolescents in China, little information has been revealed from the literature. Li (2006) reported that about 33% of children had experienced bullying through the digital media and a smaller percentage had engaged in E-bullying behaviour. A later study by the same author also suggested that most students experienced E-bullying through multiple digital sources with chatroom and text messaging being the most common means (Li, 2008).

One reason for the limited information is the lack of a suitable measuring instrument that has been properly developed and validated for assessing E-bullying and victimisation in the Chinese youth population. This results in a lack of systematic data collection in this important area of adolescent health. Moreover, a lack of proper assessment in the exposure to bullying or involvement in bullying behaviour posts a significant limitation on the possibility of good epidemiological studies on the aetiology, effects, and potential intervention of bullying behaviour. Furthermore, it renders international comparisons of results impossible. Hence, there is an urgent need for the development and validation of a measuring instrument for E-bullying and victimisation in the Chinese language.

This study aims to examine the psychometric properties, including the factor structure, reliability and validity, of the E-Victimisation Scale (E-VS) and the E-Bullying Scale (E-BS) developed for adolescents in the Chinese population.

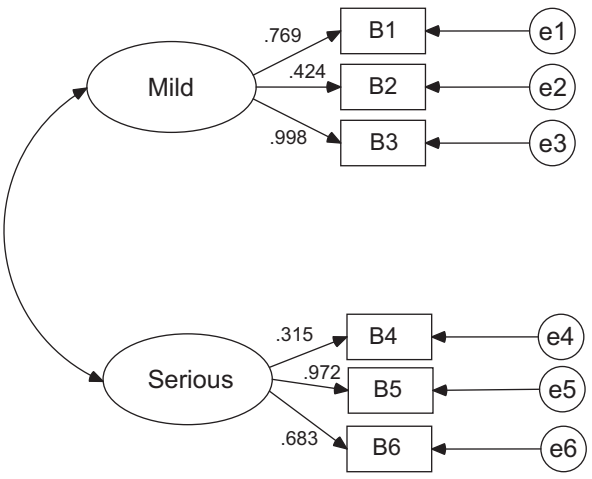

Fig. 1. Factor structure obtained from the confirmatory factor analysis using path analysis approach.

2. Material and methods

2.1. Sample and procedure

The sample was generated using a two-stage random clustering sampling technique. First, 5 different high schools were randomly selected from the list of high schools in the city of Kaifeng located in the Henan Province. Second, one or two classes were selected randomly from each school with all students in the class recruited in the sample. As a result, a sample of 484 adolescents aged between 11–16 years was included in this validation study. The sample consisted of 244 (50.4%) males and 240 (49.6%) females with a mean age of 13.5 years (s.d. = 0.9), and 67% (n = 325) aged younger than 14 years. The survey was conducted on campus at different schools within the same week. Selected students were invited to participate in the survey via school principals and their teachers, and were encouraged to fill in a self-reported questionnaire designed specifically for the study. Consent was implicated by a voluntarily response to the questionnaire. Institute ethics approval for the study was granted by the Human Ethics committee of the Henan University. For psychometric analytical studies two sub-samples, the experimental (for an exploratory study) and test (for a confirmatory study) samples, were generated randomly from the whole sample with similar age and sex distributions.

2.2. Materials

The conceptualisation of the scales and the formation of the item pool were based on the Aggression and Victimisation Scale (AVS) by Orpinas and Horne (2006). The AVS is a well-developed and validated short tool designed specifically to assess bullying behaviour and victimisation among adolescents. Items for the E-Victimisation and E-Bullying Scales were generated based on ideas obtained from the AVS. These items were then pooled together to form the initial item bank. Items in the bank were then further screened by the authors for their suitability to be included in the initial scales according to the situation in China. As a result 12 items, 6 for the E-VS and 6 for the E-BS, were included for psychometric analyses. As a self-reported instrument, these scales adopted the format of the original AVS which asks respondents to indicate the frequency of occurrences of certain situations to them or how often respondents perform certain behaviour in the last 7 days prior to the survey. As a 7-day time period was used in the original VAS, the E-VS and E-BS also employed the same time period for ease of international comparison. A response set with a rating from 0 to 6 corresponding to a range of 0 times to 6 times or more was used. These items were then incorporated in the survey questionnaire in conjunction with other measuring instruments. To examine the convergent validity of E-VS and E-BS, the Chinese version of the Centre for Epidemiological Studies Depression Scale for Children (Weissman, Orvaschel, & Padian, 1980), and the Zung Self-rating Anxiety Scale (Zung, 1965) were also included. All these instruments were properly translated using the forward and backward translation procedures, validated, and widely used among the Chinese adolescent population. Included in the questionnaire was demographic information, such as age and sex of students for sub-group analyses.

2.3. Psychometric analyses

The psychometric properties, including the validity and reliability, of both scales were examined in this study. To determine whether the items were suitable for factor analysis, Barlette's test of sphericity and the Kaiser–Meyer–Olkin (KMO) measure of sample adequacy were used. Factorial validity was investigated initially using Exploratory Factor Analysis (EFA) for each scale using the experimental sample. Data of the experimental sample were subject to the EFA using the Maximum Likelihood method for covariance structure analysis with Varimax rotation. A selection criterion of an Eigen value > 1.0 was used for the rejection of inappropriate factors. Furthermore, the acceptable number of factors was also determined empirically by the Scree Plot method (Cole, 1987). A factor loading value of 0.30 was used as selection criteria for the retention of items. Any items with a factor loading of 0.3 or larger on two or more factors were also deemed to be unacceptable. After removal of each item from the initial scales, the EFA was re-run to determine changes in the factor structure. These procedures were repeated until no more items were rejected. To further examine the factorial structure, Confirmatory Factor Analysis (CFA) was conducted using the path analysis approach with the Maximum Likelihood methods on the test sample for each scale. To examine the goodness-of-fit of the factorial model to the data, multiple criteria were used. These included the Reduced Chi-squared statistics (χ^2/df), Goodness-of-fit Index (GFI), the Adjusted GFI (AGFI), and the Root Mean-Square Residual (RMSR) with a GFI > 0.850, AGFI > 0.800, and RMSR < 0.06 (Jöreskog & Sörbom, 1986). To determine internal reliability, Cronbach's alpha coefficients for the E-VS and each sub-scale of the E-BS by sex in the test sample were calculated. Comparisons on internal reliability coefficients between males and females were conducted using Wald Chi-squared tests. Convergent validity was also examined with inter-instrument correlations between each of the two scales and CES-DC as well as SAS using the test sample. The rationale for using the CES-DC and SAS for the convergent validity assessment was based on the literature that there were significant associations between bullying victimisation and depression and anxiety (Fitzpatrick et al., 2010; McMahon et al., 2010). Data were analysed using the SPSS 18.0 and AMOS 17.0 softwares. A significance level of 5% was used for all tests of hypothesis.

3. Results

The experimental sample consisted of 231 young people with 113 (49%) males and 118 (51%) females and a mean age of 13.5 years (s.d. = 0.9). Results obtained on Barlett's test indicated a chi-squared value of 1365.62, $df = 15$ ($p < 0.001$) and a KMO value of 0.824 suggesting the items were suitable for Factor Analysis. Two EFA were conducted on items for the two separate scales. The results obtained from the EFA for the E-VS suggested a single-factor structure based on the Scree Plot methods in conjunction with the selection criteria of an Eigen value > 1.0. Of the 6 items, 1 attained a factor loading less than 0.3. After removal of the unqualified items and re-submission of the data for further EFA, 5 items remained in the scale yielding a single-factor structure with the factor loading ranged from 0.635% to 0.854% and 47% of variance explained (Table 1). The same approach was applied to the E-BS with the initial 6 items subjected to the EFA resulting in a 2-factor structure. As shown in Table 1, each factor was endorsed with 3 items. According to the contents of items extracted these factors were named as "Mild E-bullying" and "Serious E-bullying" with factor loading ranged from 0.315 to 0.998. This 2-factor structure explained 55.8% of the total variance in the data with no cross-loading of any items was observed.

To confirm the factorial validity of these scales, separate CFA were then conducted on each scale using the test sample of 234 adolescents with 121 (52%) males, and a mean age of 13.5 years (s.d. = 0.9). The single model of the E-VS with 5 items was then fitted to the data and the model was confirmed by the CFA. Similarly a 2-factor model of the E-BS with 6 items was also fitted to the data of the test sample (see Fig. 1). To further examine the goodness-of-fit of these models to the data, model diagnostics were obtained and results were presented in Table 2. The goodness-of-fit results on a single-factor model for the E-VS and a 2-factor model for the E-BS provided evidence for a satisfactory good-fit of these models to the data with most statistics successfully meeting the pre-set criteria (Table 2).

The internal reliability or consistency of the E-VS and each subscale of the E-BS and the total scales was examined by calculating the Cronbach's alpha values for males and females. The results were summarised in Table 3. As shown, on the whole these values were large, except for the Mild E-bullying subscale of the E-BS for females, ranging from 0.93 to 0.97 for males and 0.55 to 0.87 for females. There were no statistically significant differences in all values between males and females, except for the Mild E-bullying subscale, suggesting the internal reliability of these factors on the whole was not affected by sex. The inter-correlation between the two subscales of the E-BS was 0.02 ($p > 0.100$). Results on the convergent validity of the E-VS and E-BS were also presented in Table 3. The E-VS, subscales of the E-BS, and the total E-BS were positively and significantly correlated with CES-DC. The E-VS was positively and significantly related to SAS, but not E-BS subscales nor the total scale. There was a significant and positive correlation between E-VS and the total scale of E-BS ($r = 0.69$, $p < 0.001$).

4. Discussion

This study aims to examine the psychometric properties of the E-Victimisation Scale and the E-Bullying Scale developed to be used in the Chinese adolescent population. This is one of the few reports on the validation of a newly developed instrument for the measurement of the Cyber bullying. Hence, comparisons on the psychometric properties between different studies are difficult. The only study found in the English literature that reported on the psychometric validation of an instrument developed to assess Cyber bullying is the Revised Cyber Bullying Inventory by Topcu and Erdur-Baker initially designed for the Turkish population (Topcu & Erdur-Baker, 2010). The results obtained from this study are, by and large, compatible with that obtained in the Topcu and Erdur-Baler study.

The results of this study suggest a single-factor structure for the E-VS and a 2-factor structure for the E-BS that fit well with the original concept of the instruments with a unique factor for Cyber victimisation, a factor for mild bullying, and another for more serious Cyber bullying. The CFA results indicate good model fitting diagnostics for these two scales that can explain moderately large proportions of the total variance in the data set. Results also demonstrate good reliability of the E-VS, each subscale and the total scale of the E-BS that is not affected by sex.

It is worth noting that the E-VS correlated significantly and positively to depression and anxiety as assessed by the CES-DC and SAS. These results suggested that young people who had scored high on the E-Victimisation Scale had also scored high on the depression and anxiety scales. On the other hand, both sub-scales and the total scale of the E-BS were also significantly and positively correlated to depression but not anxiety. These results are consistent with that obtained from studies on the effect of bullying on the mental health of young people. Studies have demonstrated that victims of bullying have increased risk of depression as compared

Table 1
Factor loadings and other results obtained from the Exploratory Factor Analysis ($N = 231$).

Items	Description	E-VS	E-BS	
	In the last 7 days:		Factor 1	Factor 2
V1	How many times did someone tease you using emails, texting, short messages, on a website such as Renren*, etc.?	0.757		
V2	How many times did someone call you bad name using emails, texting, short messages, on a website such as Renren, etc.?	0.759		
V3	How many times did someone say mean things about you using emails, texting, short messages, on a website such as Renren, etc.?	0.854		
V4	How many times did someone say he/she was going to hit/hurt you using emails, texting, short messages, on a website such as Renren, etc.?	0.689		
V5	How many times did someone threaten you using emails, texting, short messages, on a website such as Renren, etc.?	0.635		
B1	How many times did you tease someone using emails, texting, short messages, on a website such as Renren, etc.?		0.769	
B2	How many times did you call someone bad name using emails, texting, short messages, on a website such as Renren, etc.?		0.424	
B3	How many times did you say mean things about someone using emails, texting, short messages, on a website such as Renren, etc.?		0.998	
B4	How many times did you say you are going to hit/hurt someone using emails, texting, short messages, on a website such as Renren, etc.?			0.315
B5	How many times did you threaten someone using emails, texting, short messages, on a website such as Renren, etc.?			0.972
B6	How many times did you make up something about someone to make others not like him/her anymore using emails, texting, short messages, on a website such as Renren, etc.?			0.683
Eigen value		2.82	1.82	1.53
Variance explained			30.35%	25.43%
Total Variance explained		47.01%	55.78%	

* Renren is a website commonly used by Chinese young people as a social-networking service. It has been called the Chinese Facebook.

Table 2
Goodness-of-fit statistic obtained from the Confirmatory Factor Analysis for the E-VS and E-BS.

Scale	χ^2	*df*	χ^2/df	RMSR	GFI	AGFI
E-VS (single model)	67.90*	5	13.580	0.034	0.918	0.752
E-BS (2-factor model)	28.19*	8	3.523	0.008	0.963	0.902

* $p < 0.0001$.

with their non-victimised counterparts (Fitzpatrick et al., 2010; McMahon et al., 2010). It is understandable that as a victim of E-bullying it would be a natural emotional response for the individual to feel distressed. This will, in turn, manifest as depression and anxiety. Others have also found a significant relationship between the involvement of bullying behaviour and depression among adolescents (Kaltiala-Heino, Frojd, & Marttunen, 2010; Menesini, Modena, & Tani, 2009). So far, little report has indicated a significant association between bullying behaviour and anxiety. It is also worth noting that the strength of correlations between E-VS, depression, and anxiety, as well as that between E-BS and depression are below 0.2. According to the suggested standard by Cohen (1988), these correlations are weak, although they are significant. These weak correlations could be due to the effects of other potential confounding factors not measured in the study. These factors may be influential in the associations between E-VS, E-BS, and CES-DC and SAS in a suppressive manner. The significant results obtained on the correlation between the E-VS and the E-BS also deserve attention. These results reflect another phenomenon, namely bullying-victimisation, which has been widely reported in the literature that a distinct group of young people who plays a dual role as bullying perpetrators and victims of bullying (McMahon et al., 2010; Undheim & Sund, 2010).

As in all studies, there are strengths and weaknesses in this study. This is a population-based study that included a random sample of students. Moreover, the sample size was sufficiently large to provide meaningful results. Some potential limitations have also been identified in this study. First, test–retest was not conducted within a reasonably short period of time thus no information on the test–retest reliability was provided. Second, as aforementioned, other potential covariates were not included in the analysis of the relationships between the developed scales and CES-DC as well as SAS. Should these potential covariates be included in the analysis using a regression approach, stronger evidence could be provided to demonstrate the association among these variables. Finally, studies should further be conducted to investigate the responsiveness (i.e. the ability to detect clinically meaningful changes) of the E-VS and E-BS as well as to obtain normative information for the standardisation of these scales.

For future studies, test–retest reliability should be examined as mentioned. Further studies on the discriminate validity of both scales should also be investigated. For the E-VS, individuals who have experienced cyber bullying, as well as who have never experienced bullying can be recruited possibly online to complete the E-VS. A significantly higher score on the E-VS obtained by the bullied group, in comparison to the controls, would render further evi-

Table 3
Internal reliability of the E-VS and E-BS by sex and inter-instrument correlations between these scales and CES, as well as SAS using the test sample ($N = 234$).

E-VS		E-BS		
		Mild	Serious	Total
Cronbach's alpha				
Male	0.93	0.94	0.96	0.97
Female	0.85	0.55*	0.87	0.79
Total	0.92	0.92	0.95	0.96
Correlation coefficient				
CES	0.19 ($p = 0.003$)	0.18 ($p < 0.001$)	0.16 ($p = 0.013$)	0.18 ($p = 0.006$)
Anxiety	0.15 ($p = 0.019$)	0.06 ($p = 0.353$)	0.05 ($p = 0.441$)	0.06 ($p = 0.376$)

* $p < 0.0001$.

dence for the validity of the scale. An online recruitment for the E-BS discriminate validity study may not be feasible since a self-disclosure of cyber bullying behaviour may not be welcomed by many. However, this may be achieved based on information obtained from a friend of family member of a cyber bully.

5. Conclusion

The validated E-VS and E-BS can make a positive contribution in providing a standardised instrument for the assessment of cyber bullying and victimisation among Chinese young people. These measurements are crucial in the identification of E-bullying and victimisation so that prevalence can be assessed precisely and, in turn, prevention strategies can be developed to tackle such public health problem.

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