A RELIABILITY GENERALIZATION META-ANALYSIS OF TRADITIONAL AND CYBER BULLYING VICTIMIZATION SCALES*

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Abstract

The main aim of this study was to review the constructs of traditional and cyber bullying victimization scales. A reliability generalization meta-analysis was accomplished to estimate the average reliability of TBVS and CBVS total scores and to search for the characteristics of the studies that can explain the variability among reliability estimates. An exhaustive literature search enabled to select 21 studies (63 independent samples) that reported alpha coefficients with the data at hand for TBVS and CBVS total score and subscales. An acceptable average coefficient alpha was found for the TBVS total score (α = .75, 95% CI = .69 - .80) and for CBVS total score (α = .78, 95% CI = .76 - .81). Furthermore, the subscales of both TBVS and CBVS were also found to have acceptable average coefficient alpha. Moderator analyses showed a significant statistical relationship with the reliability coefficients with the continuous variables of mean age and gender (male %) and with the substantive characteristics such as sample size. The discussion of the results and suggestions for future studies are described in this study.

Keywords: Meta-analysis, reliability generalization meta-analysis, traditional bullying victimization, cyber bullying victimization

Introduction

Bullying, including cyber bullying, is a worldwide problem and high prevalence among people until now. Generally, there are two types of bullying; traditional and cyber bullying. It is a subset of aggression and can be explained as repeated acts over time and unpleasant behaviour by one or more person directed against a person with direct (traditional) or indirect (cyber) ways. Physical and verbal aggression are direct forms of bullying and indirect bullying primarily consists of relational aggression, which includes social exclusion of victims through the manipulation of social relationships by bullies or injuring the reputation of the victims.

Cyber bullying is one of the indirect ways of bullying and victims of this type of bullying often do not know who is cyber bullying them. Researches have primarily focused on studying bullying and victimization in both children and adolescents. Nowadays, most of people have experienced bullying on social media in various ways. Therefore, it needs to be measured on how they experienced or in which ways they have experienced bullying. Although there were a lot of different tools to assess bullying victimization in various countries, there was no systematically developed bullying victimization scale or inventory in Myanmar. Therefore, this study intends to review the constructs of traditional and cyber bullying victimization scales that are relevant with Myanmar culture via reliability generalization meta-analysis technique.

Purpose of the Study

The main aim of this study is to review the constructs of traditional and cyber bullying victimization scales via Reliability Generalization meta-analysis (RG meta-analysis) technique. The specific objectives of this study are:

(a) to estimate the average reliability of test scores (for the total scale and subscales), in terms of internal consistency found in the empirical studies that applied each of the tools and reported reliability estimates with the data at hand;

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* Best Paper Award Winning Paper in Educational Psychology (2021)

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(b) to examine the variability among the reliability estimates; and
(c) to search for substantive and methodological characteristics of the studies that can be statistically associated with the reliability coefficients

Definition of Key Terms

Traditional Bullying Victimization: Traditional bullying victimization is the process of being victimized, when a person is exposed, repeatedly and over time, to negative actions on the part of one or more other persons, and he or she has difficulty in defending himself or herself (Olweus, 1993).

Cyber Bullying Victimization: Cyber bullying victimization is defined as an individual or a group willfully using information and communication involving electronic technologies to facilitate deliberate and repeated harassment or threat to another individual or group by sending or posting cruel text and/or graphics using technological means (Baele, 2007).

Meta-analysis: Meta-analysis is a set of techniques used to combine the results of a number of different reports to create a single, more precise estimate of an effect (Ferrer, 1998).

Reliability Generalization (RG): Reliability generalization (RG) is a method for meta-analysis of reliability coefficients to estimate average score reliability across studies, determine variation in reliability, and identify moderator variables influencing score reliability (Holland, 2015).

Literature Review

The literature review for this RG meta-analysis is based on 21 studies for traditional and cyber bullying victimization scales.

Measurement Tools to Assess Bullying Victimization

There were 10 studies for traditional bullying victimization scale and 11 studies for cyber bullying victimization scale as follows:

Peer Victimization Scale (PVS): consisted of 10 items measured on a four-point Likert scale. It was carried out in Florida with the sample (n = 64). The internal consistency of the scale was 0.89 (Williams 2007).

Illinois Bullying Scale (IBS): consisted of 18 items measured on a five-point Likert scale. It was conducted in Lahore & Sargodha with the sample (n = 536). The internal consistency of the scale was 0.88 (Shujja & Atta, 2011).

The Forms of Bullying Victimization Scale (FBVS): consisted of 10 items measured on a three-point Likert scale. It was conducted in Australia with the sample (n = 3496). The internal consistency of this scale was 0.87 (Shaw et al., 2013).

Multidimensional Peer-Victimization Scale-I (MPVS-I): consisted of 27 items measured on a five-point Likert scale. It was conducted in United States with the sample (n = 286). The internal consistency of the scale was 0.95 (Lee, Abell & Holmes, 2015).

Olweus Victim Questionnaire (OVQ): involved 23 items measured on a four-point Likert scale. This study was conducted in Brazil with the sample (n = 703). The internal consistency of the questionnaire was 0.85 (Gonçalves et al., 2016).

The Multidimensional Bullying Victimization Scale (MBVS): consisted of 25 items measured on a four-point Likert scale. This study was conducted in Michigan with the sample (n = 273). This study demonstrated strong internal consistency α = 0.93 (Harbin, 2016).

Bullying, Harassment, and Aggression Receipt Measure (BullyHARM): involved 22 items measured on a four-point Likert scale. It was conducted in Carolina with the sample (n = 275). This measure showed a strong internal consistency α = 0.93 (Hall, 2016).

Multidimensional Peer-Victimization Scale (MPVS): involved 16 items measured on a three-point Likert scale. It was conducted in Florida with the sample (n = 385). The internal consistency of this scale was 0.70 (Joseph & Stockton, 2018).

California Bullying Victimization Scale (CBVS): consisted of 9 items measured on a five-point Likert scale. This study was conducted in California with the sample (n = 1855). The internal consistency of the scale is 0.80 (Esteller-Cano et al., 2021).

The Zurich Brief Bullying Scales (ZBBS): consisted of 10 items measured on a six-point Likert scale. It was carried out in Zurich with the sample of (n = 1304). The internal consistency of this scale was 0.77 (Murray et al., 2021).

An Aggression Questionnaire (AAQ): consisted of 29 items measured on a five-point Likert scale. This study was conducted in Austin with the sample (n = 1253). The internal consistency of the scale was 0.89 (Buss & Perry, 1992).

Cyber Victim Scale (CVS): involved 22 items measured on a five-point Likert scale. This study was conducted in Sakarya with the sample (n = 404). The internal consistency of the scale was 0.89 (Çetin, Yaman & Peker, 2011).

Cyberbullying Experience Survey (CES): involved 44 items measured on a six-point Likert scale. It was conducted in Mid-Atlantic area with the sample (n = 538). The internal consistency of the scale was 0.63 (Doane et al., 2013).

E-Victimization Scale (E-VS): involved 6 items measured on a seven-point Likert scale. It was conducted in Turkey with the sample (n = 163). This scale showed a strong internal consistency α = 0.96 (Başaran & Cikrikci, 2015).

Cyber Bullying Victimization Experience Questionnaire (CBVEQ): consisted of 12 items measured on a five-point Likert scale. It was carried out in Greece with the sample (n = 1097). The internal consistency of the questionnaire was 0.80 (Antoniadou, Kokkinos & Markos, 2016).

The Greek Cyber Victimization Experience Questionnaire (CVEQ-G): involved 24 items measured on a five-point Likert scale. It was carried out in Greece with the sample (n = 1097). The internal consistency of this questionnaire was 0.89 (Antoniadou et al., 2016).

Cybervictimization Questionnaire (CYVIC): consisted of 19 items measured on a four-point Likert scale. This study was carried out in Spain with the sample (n = 3159). The internal consistency of the questionnaire was 0.74 (Álvarez-García et al., 2017).

European Cyberbullying Intervention Project Questionnaire (ECIPQ): consisted of 22 items measured on a five-point Likert scale. It was conducted in Spain with the sample (n = 3830). The internal consistency of the scale was 0.97 (Herrera-López et al., 2017).

Cyber Bullying Victimization Scale (CBVS): involved 9 items measured on a four-point Likert scale. It was carried out in Malaysia with the sample (n = 120). The internal consistency of the scale was 0.86 (Hua, Heng-Hwa & Chong, 2019).

Cyberbullying Victimization Inventory (CVI): consisted of 11 items measured on a four-point Likert scale. It was carried out in Ankara with the sample (n = 635). The internal consistency of the inventory was 0.75 (Tanrikulu & Erdur-Baker, 2020).

Cyberbullying Scale (CBS): involved 12 items measured on a five-point Likert scale. It was conducted in Yohyakarta with the sample (n = 339). The internal consistency of the scale was 0.71 (Husna, Tentama & Purwadi, 2020).

Reliability Generalization Meta-analysis

Reliability is one of the most important psychometric properties in developing instruments. There are a number of different approaches to estimating the reliability of test scores: (a) temporal stability (test-retest reliability), (b) internal consistency (alpha coefficient), (c) parallel forms, and (d) inter-rater or intra-rater agreement. The methods based on internal consistency and test-retest are the most widely used (Flake et al., 2017). RG meta-analysis allows researchers to characterize the average reliability of scores obtained by a test across multiple studies and situations and estimate the degree of variability in reliability coefficients across different types of measures, samples, and contexts. Furthermore, when reliability coefficients are heterogenous, RG meta-analysis allows the researchers to explore which characteristics of the studies may be statistically related to the reliability estimates (Rodriguez & Maeda, 2006). In this way, it is possible to ascertain which measures tend to produce the most reliable scores for what types of people, and in what contexts.

Method and Procedure

In conducting the RG meta-analysis on each of the scales developed to assess bullying victimization, this study is based on the guidelines for conducting and reporting reliability generalization meta-analyses (REGMA) of Sanchez-Meca et al., (2017), on each of the scales developed to assess bullying victimization.

Selection Criteria of the Studies

The studies had to meet the following inclusion criteria: (a) the study had to be an original, quantitative investigation; (b) it had to assess bullying victimization using measurement instruments; (c) it had to report both the reliability values of total scale and subscales; (d) it had to measure the participants of the age range between 16-19; (e) the paper could be published; and (f) the paper had to be written in English. There were no limits on the date of the study. The following exclusion criterion was applied: the studies that only described the reliability of total scale and not described the reliability of subscales.

Search Strategy

Electronic searches were carried out in the Google Scholar, Research Gate, Academia, PsycInfo, PubMed, JSTOR, ProQuest, and Web of Science databases, using the following terms in all fields: bullying victimi* (i.e., victimization or victimisation), bullying victimization scales, validity and reliability of bullying victimization scales, and questionnaire development for bullying victimization. Furthermore, manual searches of lists of references from the retrieved studies were conducted to identify additional studies that met the selection criteria. In addition, lists of references from previous reviews and meta-analyses were screened to find studies that met the inclusion criteria for the present meta-analysis.

Data Extraction

A protocol for extracting the characteristics of the studies was established and applied to each study. The characteristics coded were as follows: (a) the reliability coefficients of the total scores on the measurement instruments and on each of the subscales; (b) the mean age of the participants on each of the instrument; (c) gender distribution of the sample (% male); (d) sample size; (e) standard deviations of the participants; (f) target population (adolescents); (g) year of the study; and (h) study language.

Reliability Estimates

Given that all the studies reported the alpha coefficient to assess the internal consistency reliability of the measures, the reliability coefficients were taken into account in this meta-analysis. This study conducted 21 studies with eight subscales; three total constructs for traditional bullying victimization and five total constructs for cyber bullying victimization. Thus, they were extracted for the total score and for each subscale of the measurement instruments. In order to normalize their distributions and stabilize their variances, the total reliability coefficients for each subscale were performed. The first source of variability between the proposed RG methods is whether or not to apply a transformation of coefficients. Most RG studies to date have analyzed untransformed coefficients alpha (Bachner & O'Rourke, 2007). In this RG meta-analysis, the data were applied with the untransformed coefficients alpha.

Statistical Analysis

Meta-analyses were conducted for the reliability coefficients obtained from the total scale and for each subscale of each measurement instrument. In all cases, random-effects models were assumed in the statistical calculations (Borenstein, Hedges, Higgins, & Rothstein, 2009). In each meta-analysis, the heterogeneity of the reliability coefficients was investigated by constructing a forest plot and by calculating the Q statistic and the I^2 index. I^2 values about 25%, 50%, and 75% can be interpreted as reflecting low, moderate, and large heterogeneity (Higgins, Thompson, Deeks, & Altman, 2003). When the effect size exhibited heterogeneity, then sub-group analysis and moderator analyses were performed in order to identify the study characteristics statistically associated to the effect size. All statistical analyses were carried out with the programs *Meta-Essentials* (Suurmond, Rhee & Hak, 2017).

Data Analysis and Findings

Selection Process

Figure 1 shows a flow chart of the study screening and selection process. The search strategy produced a total of 64 studies. Only 21 of them reported some type of reliability coefficient. Thus, this RG meta-analysis study included 21 studies. The flow diagram of the study is as follow:

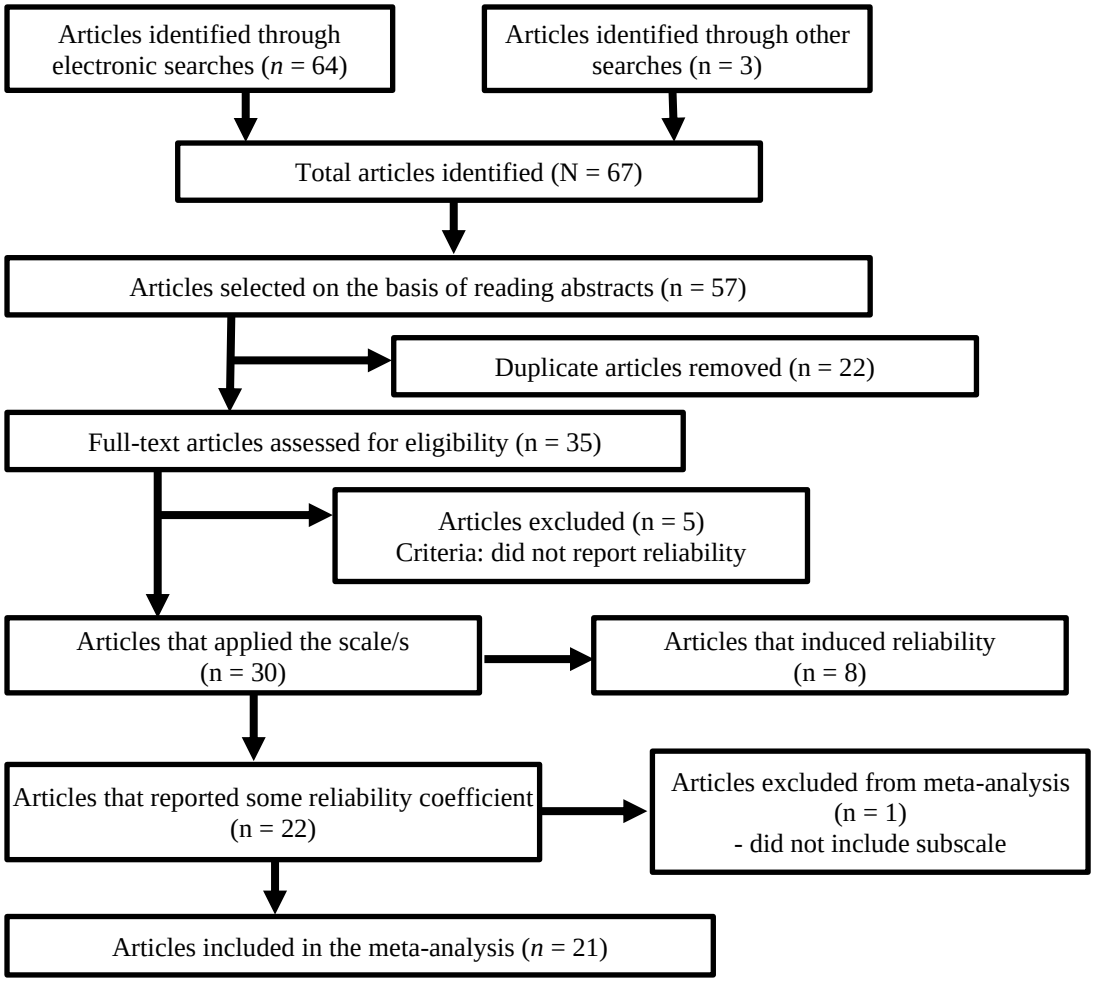

Figure 1 REGEMA Flow Diagram of Study Selecting Process

Mean, Reliability and Heterogeneity

Separate meta-analyses were conducted for each of these measurement instruments' total score reliability and for each of the subscales. In addition, different meta-analyses were performed for alpha coefficients. Table 1 and Figure 2 show the means and their respective confidence limits of coefficient alpha for the purpose of facilitating their interpretation.

Table 1 presents the main summary statistics for the alpha coefficients obtained for the traditional and cyber bullying victimization total scores and for each subscale, and figure 2 displays a forest plot of the alpha coefficients for the TBVS and CBVS total scores in each study. For TBVS, the 10 estimates reported for the total scale ranged from 0.30 to 0.92, with a mean coefficient alpha of 0.75 (95% CI [0.69, 0.80]). The subscale of RBV shows the largest estimates (*M* = 0.78, 95% CI [0.67, 0.89]), followed by the subscales of VBV (*M* = 0.73, 95% CI [0.64, 0.82]) and PBV (*M* = 0.73, 95% CI [0.60, 0.86]) yielding the poorest average reliabilities.

Table 1 also shows the main summary statistics for the alpha coefficients obtained for CBVS. The 7 estimates reported for the total scale range from 0.59 to 0.97, with a mean coefficient alpha of 0.78 (95% CI [0.76, 0.81]). The subscale of WVV shows the largest estimates (*M* = 0.82, 95% CI [0.74, 0.90]), followed by HI (*M* = 0.81, 95% CI [0.77, 0.84]) and

VSCV (*M* = 0.79, 95% CI [0.69, 0.90]) with OE (*M* = 0.76, 95% CI [0.74, 0.79]) and IP (*M* = 0.76, 95% CI [0.69, 0.82]) subscales yielding the poorest average reliabilities.

Table 1 Average Alpha Coefficients, 95% Confidence Intervals, and Heterogeneity Statistics for the TBVS and CBVS Total Score and Eight Subscales

TBVS			95% CI			
Total scale/subscale	*k*	α_+	LL	UL	*Q*	I^2
Coefficient alpha						
Total scale	10	0.75	0.69	0.8	546.78****	94.88
PBV	10	0.73	0.6	0.86	298.09****	96.98
VBV	10	0.73	0.64	0.82	148.51****	93.94
RBV	9	0.78	0.67	0.89	38.91****	79.44
CBVS			95% CI			
Total scale/subscale	*k*	α_+	LL	UL	*Q*	I^2
Coefficient alpha						
Total scale	7	0.78	0.76	0.81	527.91****	94.13
OE	5	0.76	0.74	0.79	2.04	0.00
VSCV	7	0.79	0.69	0.9	123.58****	95.15
IP	6	0.76	0.69	0.82	20.65****	80.63
WVV	11	0.82	0.74	0.9	334.44****	97.01
HI	5	0.81	0.77	0.84	1.49	0.00

Abbreviations: TBVS, Traditional Bullying Victimization Scale; PBV, Physical Bullying Victimization subscale; VBV, Verbal Bullying Victimization subscale; RBV, Relational Bullying Victimization subscale; CBVS, Cyber Bullying Victimization Scale; OE, Online Exclusion subscale; VSCV, Visual Sexual Cyber Victimization subscale; IP, Impersonation subscale; WVV, Written Verbal Victimization subscale; HI, Hidden Identity subscale; *k*, number of studies; LL and UL, lower and upper limits of the 95% confidence interval for as; I^2, heterogeneity index; *Q*, Cochran's heterogeneity *Q* statistic.

****p<.0001**

According to the results, it can be seen that there were high levels of variability, I^2=94.88 for TBVS and I^2=94.13 for CBVS, among the values of Cronbach's Alpha for all respective studies. Therefore, meta-regression analysis was taken in order to know which study characteristics can affect the values of Cronbach's Alpha.

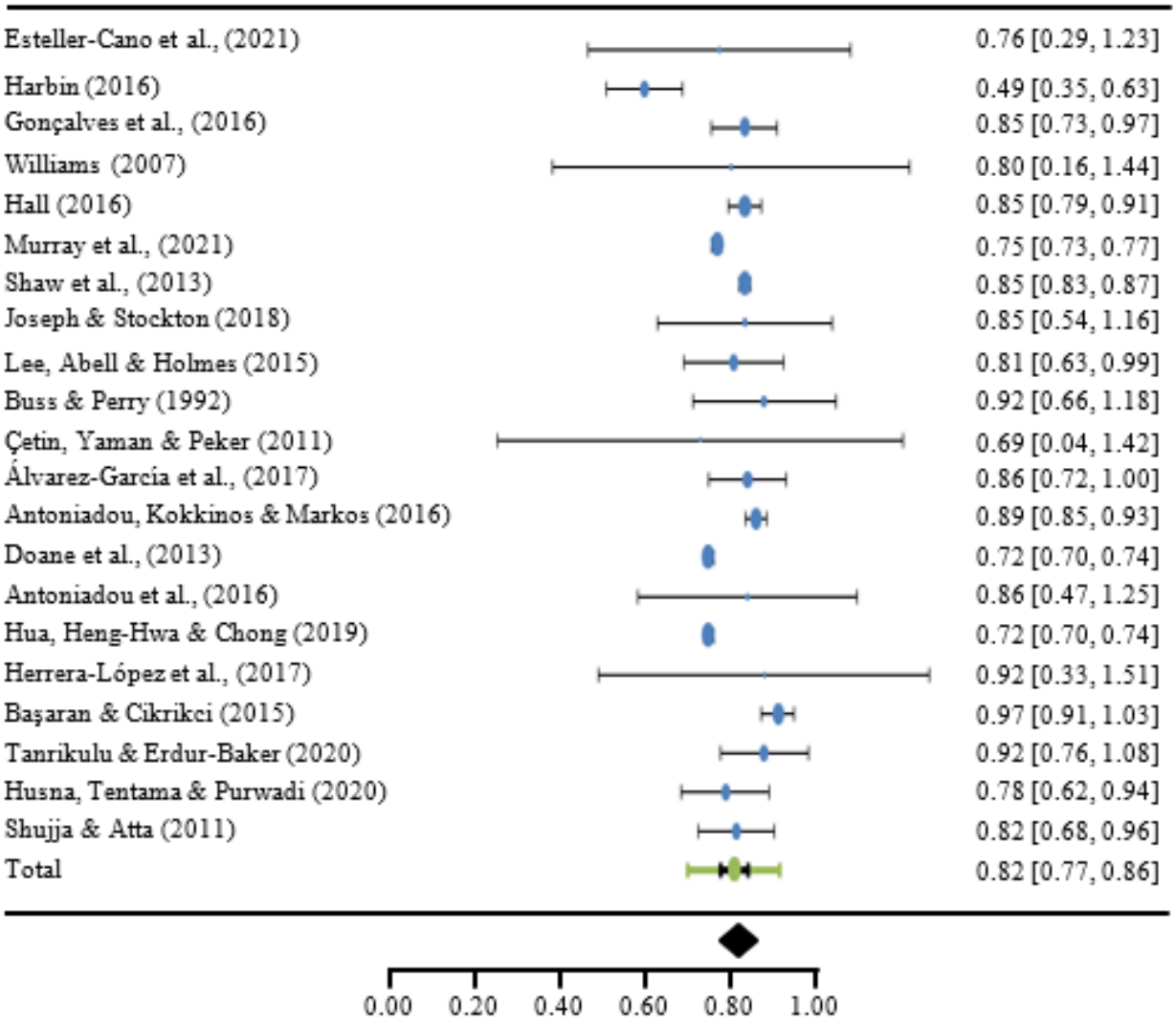

Figure 2 Forest Plot Displaying the Alpha Coefficients (and 95% Confidence Intervals) for the TBVS and CBVS Total Scores

Analysis of Moderator Variables

As a result of I^2 index, the moderator analyses were performed. Specifically, simple meta-regression was performed for continuous variables; gender (% male), age, and methodological characteristics such as sample size respectively, on alpha coefficients for the total scale, assuming mixed-effects models.

Table 2 shows the results of the simple meta-regression applied to alpha coefficients for the total scores of the TBVS and CBVS. Note that the sign of the regression slope, *bj*, is obtained by taking the alpha coefficients transformed using Bonett's (2002) formula as the dependent variable. Therefore, the direction of the true association between the alpha coefficients and each moderator is the inverse of what is represented by the sign of the slope in Table 2.

For the TBVS score, the total score of the mean showed a positive, statistically significant association with the alpha coefficient ($p < 0.05$), accounting for the variance of 45%. Furthermore, only the mean age of the participants showed a negative statistically significant association with the alpha coefficient ($p < 0.001$), accounting for 53% of the variance. The other

two moderator variables; gender (% male) ($p < 0.001$, accounting for 47% of variance and sample size ($p < 0.05$), accounting for 34% variance showed a positive statistically significant associations with the alpha coefficient.

For the CBVS score, the mean age of the participants ($p < 0.05$), 17% variance and sample size ($p < 0.05$), 20% variance showed a positive statistically significant association with the alpha coefficient. The gender (% male) moderator do not show a relationship with the alpha coefficient.

Table 2 Results of the Simple Meta-Regression Applied on Alpha Coefficients for the TBVS and CBVS Total Scores, Taking Continuous Moderator Variables as Predictors

Predictor Variable	***k***	***b_j***	***F***	***p***	***Q_E***	***R^2***
TBVS Total Score						
Mean Total Score	29	0.61	12.74	0.012	309.37*	0.45
Mean age (years)	29	-0.07	0.31	0.000	255.59****	0.53
Gender (% male)	29	1.29	24.26	0.000	288.00****	0.47
Sample Size	29	0.00	13.65	0.012	363.15*	0.34
CBVS Total Score						
Mean Total Score	11	0.34	4.72	0.136	468.69	0.10
Mean Age (years)	11	0.41	5.94	0.021	440.60*	0.17
Gender (% male)	11	0.16	0.81	0.376	514.08	0.02
Sample Size	11	0.45	7.41	0.011	423.29*	0.20

Abbreviations: TBVS, Traditional Bullying Victimization Scale; CBVS, Cyber Bullying Victimization Scale; k, number of studies; *bj*, regression coefficient of each predictor; *F*, Knapp-Hartung's statistic for testing the significance of the predictor, *p*, probability level for the *F* statistic; Q_E, statistic for testing the model misspecification; R^2, proportion of variance accounted for by the predictor.

****p<.0001, *p<.05**

Conclusion, Discussion and Suggestion

This RG meta-analysis was based on a total of 21 studies that reported internal consistency with the data at hand. All of the articles that extracted the estimated reliability of test scores to assess bullying victimization, only one type of reliability was reported is Cronbach's alpha for internal consistency.

Regarding average reliability estimates, Ciccheffi (1994) suggested the following guidelines: unacceptable for coefficients lower than 0.7, fair for the range from 0.7 to 0.8, good for 0.8 to 0.9, and excellent for values over 0.9. Following these guidelines the average internal consistency reliability of the total scores on all instruments analyzed, both TBVS and CBVS total scores can be considered fair.

Furthermore, all of the subscales of TBVS can also be considered fair internal consistency reliability (0.73 – 0.78). For CBVS subscales, WVV (0.82) and HI (0.81) can be considered good internal consistency reliability and the other three subscales; OE (0.76), VSCV (0.79), and IP (0.76) can be fair internal consistency reliability which are in the range of acceptable reliability for use in developing instruments.

On the other hand, analyses of moderator variables were conducted on total scores for the TBVS and CBVS. These moderator analyses allowed to know which characteristics of the studies exhibited a statistical relationship with the reliability coefficients for the TBVS and CBVS total scores. For TBVS, all of the moderator variables (mean age, gender; male %, and sample size) showed a significant statistical relationship with the reliability coefficients, which means that the mean age, gender (% male) and sample size affect the reliability of TBVS measure. Furthermore, only the mean age of the participants showed positive statistically significant relationship with reliability estimates (b_j = -0.07, p < 0.001), which means that samples with older participants exhibited better average reliability than samples with younger participants.

For the moderator variable of gender (% male), there was negative statistically significant relationship with reliability estimates (b_j = 1.29, p < 0.001), which means that smaller male % exhibited better average reliability than the larger ones. On the other hand, the larger the percentage of female, the better the average reliability for measure.

For the moderator variable of sample size, there was also negative statistically significant relationship with reliability estimates (b_j = 0.00, p < 0.05), which means that the smaller sample size exhibited better average reliability than the larger ones.

With regard to the CBVS, except gender (% male), the other two moderator variables showed negative statistically significant relationship with reliability estimates and did not show a statistical relationship with gender (% male). For the moderator variable of mean age, there was a negative statistically significant relationship with reliability estimates (b_j = 0.41, p < 0.05), which means that samples with younger participants exhibited better average reliability than samples with older participants.

For the moderator variable of gender (% male), there was no statistical relationship with the reliability coefficients (b_j = 0.16, p > 0.05), which means that the gender (% male) does not affect the reliability of CBVS measure. For the moderator variable of sample size, there was also negative statistically significant relationship with reliability estimates (b_j = 0.45, p < 0.05), which means that the smaller sample size exhibited better average reliability than the larger ones. Therefore, the results can be reasonably generalized to all the studies that applied the TBVS and CBVS measures.

For the above reasons, all of the subscales in both TBVS and CBVS are reliable and can be applied by the instrument developers according to their country, culture and society. In some case of variability with these subscales, the instrument developers have to apply with caution. Finally, the instruments can be developed for traditional bullying victimization with the subscales of physical, verbal, and relational and for cyber bullying victimization with the subscales of online exclusion, visual-sexual cyber victimization, impersonation, written verbal victimization and hiding identity.

To sum up, this study should be applied to qualitative study and confirm the reliability of constructs by interview technique. By interviewing these constructs to Myanmar youths, the researchers will be able to decide which constructs are to be relevant with Myanmar culture and which are not relevant and to be omitted them. By doing so, the systematic questionnaires for TBVS and CBVS will be able to be developed for Myanmar youths.

Acknowledgements

We would first like to acknowledge our respectful gratitude to Pro-rectors; Dr. Myat Myat Thaw, Dr. Khin Hnin Yee, and Dr. San San Lwin from Sagaing University of Education for giving the opportunity to conduct this study. In addition, we would also like to give special thanks to Dr. Myo Ko Aung (Professor & Head of Department, Department of Educational Psychology, Sagaing University of Education) for energizing to do this research.

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