Conference Paper

Development of a Student Bullying Scale Using the Rasch Model

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Abstract

Student bullying scales have been developed based on Western cultures, however these are not necessarily applicable to non-Western cultures, and there is a need for a scale to measure bullying behaviours that is adaptable to individual national cultures. This would not only be useful for students undergoing bullying, but also useful from the perpetrator's side. The Rasch model can be used in this fashion, and this study seeks to develop a student bullying scale by applying the psychometric properties of the Rasch model. The dimensions of the bullying scale consisted of power imbalance, intent to harm, and cyberbullying, and the bullying indicators are defined as verbal, physical, visual, and relational. A total of 1200 public junior high school students in Bogor Regency took part in the study divided of 500 students in phase 1 and 700 students in phase II. The study concludes that the proposed instrument to evaluate bullying has significant validity and reliability in both phase 1 and phase 2.

Keywords: rasch model, bullying scale, validity and reliabilty

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1. Introduction

Bullying is still a crucial problem in Indonesia. According to Child Protection Commission (KPAI), cases of child abuse and bullying are the most common in 2018. Of 161 cases of violence, 41 of them are cases of child abuse and bullying. Likewise, in 2011 based on Child Protection Commission (KPAI), child violence amounted to 171 cases and increased to 6006 cases in 2015. [1]

Bullying will damage the psychological, social, academic and physical development of the victim. Besides bullying also increases depression and unhappiness in school. Furthermore, students who are exposed to harassment will be vulnerable to committing criminal acts in the future. So the impact of bullying on students is very complex not in the present but also in the future. [2]

Bullying will also affect the learning process of students in the classroom. Students find it difficult to concentrate and pay attention to the lessons delivered by the teacher

in class so that students have difficulty understanding the teacher's explanation, and in the end their academic grades will decline and bad. [3]. Schools should be a fun and safe place for children to learn and socialize with their friends. Schools must be a protective, safe, healthy environment and free from various acts of violence against children. [4]. Many bullying behaviors are hidden from observations of teachers and other students. Therefore, an instrument is needed that is able to measure student's bullying behavior in school.

Several countries including the United States, Norway, China, Brazil, Turkey, Iran have conducted research on the development of bullying instruments for school students. The instruments are in the form of adaptation or re-validation of existing instruments from other scholars. Indonesia still needs the development of a suitable student's bullying instrument that consider Indonesian's social and cultural context.

The difference between this study and other studies is that it uses a second order while many foreign researchers apply first order [5, 6]. The second order selection was carried out to reinforce the criteria that the behavior of harassment, especially traditional ones, had different criteria from other violent behaviors, namely the presence of impaired power and intention to harm. In addition, research on the instrument of bullying behavior in other countries are also influenced by the context and culture of each which is different from Indonesian culture. Although some violent behaviors are universal but still on statement items need to consider the cultural context so that what is being asked is really harassment behavior. In addition, the validity and reliability tests of stages one and two use the Rasch approach which has been done rarely by many other researchers.

2. Methods

The development of student's bullying scale as a research process adapt Research and Development (R&D) approach that produce the instrument as well as testify that product.

The procedure for developing student's bullying instrument can be described as follows:

1. Development of constructs based on theories or concepts about bullying behavior.

2. Development of conceptual and operational definitions of bullying behavior for secondary school students, as a tendency to respond based on the construct built by the researcher.

3. Determine a scale that is relevant to the bullying behavior that will be measured on each of the characteristics of bullying behavior.

4. Arranging specification tables of instrument containing dimensions, indicators, and number of items.

5. The instrument are examined by experds and panelists judments to see the accuracy and inaccuracy between the indicators with dimensions, indicators and items.

6. Empirical testing of bullying instrument for secondary school students is carried out in two stages, then determining the valid and reliable bullying behavior instrument with the Rasch approach.

7. Establish guidelines and scoring techniques of student's bullying instrument.

Scoring in the construction of psychological scales is determined by the scale used. Scale selection is the process of determining the location of stimulation and response to a psychological continuum. This research uses rating scale. The like-likert rating scale can be used to measure student's bullying behavior. The assessment is carried out by expert judgment or experts including practitioners or experts in the field of psychology, education measurement experts, lecturers in Psychology and Indonesian Language. These experts are required to provide estimates of the favourable degrees of each statement according to a psychological continuum rather than giving consent or not agreeing individually. Scores range from 1 to 5, namely if the positive degree of statement is very high or very suitable between dimensions and indicators given a score of 5. On the contrary, if the positive degree of statement is very low or very inappropriate between dimensions and indicators then it is given a score of 1.Furthermore, validity test of measuring student's bullying instrument is done in two steps. Firstly, To test the validity of the theory and secondly test the validity empirically. Validity testing theoretically involves experts, while empirical trials involve respondents that are students of public secondary school.

3. Results

3.1. Unidimensionality Analysis

The Rasch model analysis uses Principal Component Analysis of residuals, which measures the extent to which the diversity of instruments measures what should be measured. In this case to see the validity of the construct through the item unidimensionality with the analysis results as follows:

TABLE 1: Item Unidimensionalty of 500 Students

Table of STANDARDIZED RESIDUAL variance (in Eigenvalue units)					
– Empirical		– Modeled			
Total raw variance in observations	=	67.7	100.0%	100.0%	
Raw variance explained by measures	=	19.7	**29.1%**	37.9%	
Raw variance explained by persons	=	2.1	3.1%	4.1%	
Raw Variance explained by items	=	17.6	26.0%	33.9%	
Raw unexplained variance (total)	=	48.0	70.9%	100.0%	62.1%
Unexplned variance in 1st contrast	=	3.4	**5.0%**	7.0%	
Unexplned variance in 2nd contrast	=	2.2	**3.3%**	4.6%	
Unexplned variance in 3rd contrast	=	1.8	**2.7%**	3.8%	
Unexplned variance in 4th contrast	=	1.8	**2.6%**	3.6%	
Unexplned variance in 5th contrast	=	1.7	**2.5%**	3.5%	

TABLE 2: Item Unidimensionality of 700 Students

Table of STANDARDIZED RESIDUAL variance (in Eigenvalue units)					
– Empirical		– Modeled			
Total raw variance in observations	=	65.7	100.0%	100.0%	
Raw variance explained by measures	=	19.7	**29.9%**	38.7%	
Raw variance explained by persons	=	2.7	4.1%	5.3%	
Raw Variance explained by items	=	17.0	25.9%	33.5%	
Raw unexplained variance (total)	=	46.0	70.1%	100.0%	61.3%
Unexplained variance in 1st contrast	=	2.8	**4.2%**	6.0%	
Unexplained variance in 2nd contrast	=	2.0	**3.0%**	4.3%	
Unexplained variance in 3rd contrast	=	1.5	**2.4%**	3.4%	
Unexplained variance in 4th contrast	=	1.5	**2.3%**	3.4%	
Unexplained variance in 5th contrast	=	1.4	**2.2%**	3.1%	

From two tables above shown that the measurement results of 500 students for raw variance data is 29.1% meanwhile for 700 students is about 29.9%. These show that the minimum 20% unidimensionality requirement is exceeded. According to Sinnema [7] The criterion for establishing Unidimensionality is that the raw variance explained by the size must explain at least 20 percent of the test variance.

3.2. Reliability Analysis

Reliability testing is an important aspect in developing bullying instruments. The reliability test was measured by Alfa Cronbach using Winstep 4.0 software which is a good software in applying the Rasch model. The Rasch model includes an analysis of mean in logit, reliability for person and item as well as joint reliability between person and item. Following is a summary of the results of the reliability tests in phase 1 and 2 each with 500 students and 700 students.

TABLE 3: Measurement Summary of 500 Students

	Mean (Logit)	SD	Reliability	α Cronbach
Person	-2.23	0.71	0.78	0.88
Item	0.00	7.70	0.98	

TABLE 4: Measurement Summary of 700 Students

	Mean (Logit)	SD	Reliability	α Cronbach
Person	-3.11	0.87	0.77	0.87
Item	0.00	0.89	0.99	

Rasch's analysis contains the reliability of people and items. From the table 1.3 is shown person reliability of 0.78 including good categories and item reliability of 0.98 including very good categories, while the combined reliability of person and items of 0.88 including excellent category as well as in in the phase 2 with 700 students the reliabilty is about 0.87.

3.3. Outfit Item

The first phase of the test analysis was carried out by applying fit criteria according to Adam and Kho [8] criteria between 0.75 to 0.3 and 0.5 <MNSQ <1.5 [9] and thus obtained items that were misfit / outlier, namely N44 (2.04) and N14 (1.61). If based on MNSQ outfit criteria (> 1.5) the value is also outside the specified criteria. So invalid items are items N44, N14. Meanwhile in the second phase ot the Rasch analysis with the same oufit criteria at phase 1 obtained item that were misfit/outlier namely N30 (1,77) dan N38 (1,73), dan N43 (1,59).

4. Discussion

The results of testing in stage 1 with 500 respondents obtained the overall quality of respondents can be seen from the value of MNSQ Infit and MNSQ Outfit with an ideal value of 1.00 or getting closer to 1 the better, while the criteria for the value of ZSTD Infit and ZSTD Outfit should ideally be close to 0.0 or more close to 0, the respondent's quality is getting better. So the ideal value is 0.0. The average logit of participants -2.23 means that it shows the average value of respondents in the Bullying instrument. The average value of less than logit 0.0 indicates the tendency of respondents who more answered disagree or never in various items.

The overall quality of respondents can be seen from the value of MNSQ Infit and MNSQ Outfit which get closer to 1.0, the better. Also the value of ZSTD Infit and ZSTD Outfit must be close to 0.0. Where in person the MNSQ Infit value is obtained: 1.11 and the MNSQ Outfit value is 0.95 while in the ZSTD Infit value: 0.2 and the ZSTD Outfit: 0.00 then both of these data indicate that the overall quality of respondents is good. Important information from the table above is the value of the reliability of the person 0.78 indicates good criteria. The overall quality of items of statement items can be seen from the value of MNSQ Infit and MNSQ Outfit which get closer to 1.0, the better. Also the value of ZSTD Infit and ZSTD Outfit must be close to 0.0. Where in the item table the MNSQ Infit value is obtained: 1.08 and the MNSQ Outfit: 0.95, while the ZSTD Infit value: 0.7 and ZSTD Outfit: -0.1. then both of these data indicate that all items are good. The results of the item reliability of 0.98 indicate the quality of the instrument item in terms of reliability is very good. The results of the model fit test on the phase 1 with 500 students obtained the raw variance was 29.1%, and the value of the Unexplained variance did not exceed 10% (6%, 3.7%, 3.4%, 2.9% and 2.7%). Thus in the first phase test the instrument of bullying behavior was able to measure what should be measured. In the test of phase 2 with 700 respondents result raw variance of 29.9%, and the value of the Unexplained variance did not exceed 10% (4.2%, 3%, 2.4%, 2.3%, and 2.2 %).

These findings are in line with research conclusions of Ying-Yao Cheng [11] who developed the Buly Scale harassment instrument which is valid and reliable where the reliability value is 0.86. Likewise the results of other studies that measure the validation of the Cyberbullying Perpetration (CBP) scale instrument that produces a value of reliability α 0.93 [12]. Besides that, the unidimensionality value of the research confirmed the research of Goncalves [13] who tried to validate the famous instrument The Revised Olweus Bully / Victim Questionnaire (OBVQ) in the Brazilian version with

an alpha cronbach value of 0.87 and unidimensional analysis revealed that the scale of 31.05% could be explained by the variance.

Thus the developing of bullying behavior scale has met the criteria of validity and reliability so as to produce a valid and reliable instrument. The development of the Bullying instrument is expected to be able to help school principals, teachers, or anyone who needs this instrument to measure bullying behavior more validly, reliably, and accountably.

The development of bullying scale is directed to be able to map student harassment behavior more comprehensively, both traditional and cyberbullying harassment. Measurement of student bullying is important for the school because the behavior is often hidden from the observations of the teacher or other students. The results of these measurements can be utilized by schools or teachers to determine appropriate intervention, mentoring or coaching programs for students in accordance with the level of student harassment behavior that ultimately the school is safe, free of violence and students can be manifested.

5. Conclusion

The instrument of bullying behavior for secondary students has met significant validity and reliability criteria. From 48 items, 43 items are valid and reliable. Bullying behavior has three dimensions: (1). power imbalance, (2). Intent to harm (3). Cyberbullying. Each dimensions has indicators, namely: Power imbalance: verbal, phisycal, relational. Intent to harm: verbal, phisycal, relational. Cyberbullying: verbal, visual, relational.

The instrument of student bullying are able to measure the bullying bevahiour according to his or her experinces in school life. Bullying measurement is students' responses to various statements in instruments related to bullying behavior that students have done. The measurement results can be used to determine the extent of bullying occurring in students in school. Furthermore, the measurement results can be used to provide further programs in an effort to overcome bullying behavior in school. Various treatment programs can be adjusted to the level of bullying behavior done by students in each school.

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Conflict of Interest

The authors have no conflict of interest to declare.

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