Physical and psychological violence victimization scale in adolescents dating: Confirmatory factor analysis and Rasch model

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Article Info

ABSTRACT

This study aimed to assess the psychometric properties of physical and psychological violence victimization (PPVV) scales in adolescent dating. The PPVV scale consists of 37 items (17 items of physical violence and 20 items of psychological violence), with a 4-point Likert rating scale. A total of 682 students met the inclusion criteria as respondents (88.56% female, 11.44% male). Respondents are in the age range of 15-24 years and from the first year of college to the fourth year. The results showed that two items did not fit statistically, and six were biased toward the respondent's attributes. The average difficulty level of the item is higher than the respondent's ability level. The PPVV instrument developed shows unidimensionality. Meanwhile, the four rating scales used have not shown satisfactory performance. They need to be simplified into three scales. However, analysis of the confirmatory factor analysis (CFA) and Rasch model shows that the PPVV scale has a good factor structure and psychometric properties as a measuring tool. So, the PPVV instrument can be used by future researchers by eliminating PhyV11 and PhyV16 and using a three-level rating scale.

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1. INTRODUCTION

There has been an increase in violence in various countries in this decade. Violence does not only occur in low and middle-income countries [1]–[4] but also occurs in developed countries [5]–[7]. Besides adult intimate partners [5], [8]–[12], violence also occurs in dating adolescents [13]–[17]. Dating violence (DV), as a sub-section of intimate partner violence (IPV), is a term that describes threats or concrete actions taken by an unmarried couple in a dating relationship in the form of physical, sexual, or verbal abuse [18]. DV is a mental health problem that is a severe phenomenon among adolescents today and is proven to have severe adverse effects in the short and long term for victims, even causing death [19].

Dating violence often occurs in adolescents, both girls, and boys. The inability of men to control themselves, especially their anger, and want those who are strong to dominate and control their partners have a strong relationship with violence that occurs in dating [20]. Even more, aggravating the situation is that they perceive their behavior as normal and protective of their partner [21]. The most highlighted and the most reported (41%) were physical violence such as scratching, punching, kicking, throwing objects, pulling hair,

pushing, and pulling clothes. Physical violence like this causes psychological wounds and physical injuries, sometimes even leading to death. Apart from physical violence, violence recorded was sexual violence (31%), psychological violence (15%), and economic violence (13%).

The high rate of violence makes the Ministry of Women's Empowerment and Child Protection collaborate with the Central Statistics Agency [22]. The two institutions conducted a National Women's Life Experience Survey (SPHPN) in 2016 to map the life experiences of women who experience violence at the age of 15 and over. It is known that 33.4% of women aged 15-64 years have experienced physical violence and sexual violence during their lifetime, with the number of physical violence being 18.1% and sexual violence at 24.2%.

In the last three years, National Commission on Violence Against Women (NCVAW/*KOMNAS Perempuan*) has noted a new form or pattern of violence against women, namely online gender-based violence. Based on the annual report of National Commission on Violence Against Women (CATAHU) 2020, the number of online gender-based violence increased. Throughout 2019 there were 281 cases reported directly to National Commission on Violence Against Women (*KOMNAS Perempuan*). Cyber violence has increased by 300% from previous years. National Commission on Violence Against Women (*KOMNAS Perempuan*) findings show that girls and women are often victims of the distribution of pornographic videos and photos from their boyfriends or their closest people. Generally, women victims of online gender-based violence often experience re-victimization [23].

National Commission on Violence Against Women annual note in 2020 [24] reported that 239 forms were submitted, or 35% of the 672 forms circulated to several partner institutions or came directly to National Commission on Violence Against Women. The result is an increase in the number of cases reported in 2019 by 6% (431,471 cases). This number increased compared to the previous year, which amounted to 406,178. Based on these data, the most dominant type of violence against women is domestic violence in the private domain, reaching 75% (11,105 cases). The private domain was the most reported, and many of them experienced sexual violence. The second position is violence against women in the community/public sphere at 24% (3,602), and the last is violence against women in the realm of the state at 0.1% (12 cases). In the private realm of domestic violence, the most prominent violence was physical violence in 4,783 cases (43%), then sexual violence in 2,807 cases (25%), psychological 2,056 cases (19%), and economy in 1,459 cases (13%) [24].

So far, there are still limited standard instruments for viewing dating violence. Many researchers think that violence prevention in dating is essential, so there needs to be an evaluation related to measuring violence in dating [25]. Although it does not have a standard measuring tool for dating violence, the psychometric characteristics of the existing instruments are very good. Still, they cannot be used directly in Indonesia because they have different cultural backgrounds [26]. It takes a cross-cultural adaptation process. We have conducted research related to measuring physical and psychological violence in dating. Therefore, the researcher is interested in assessing the scale of dating violence in adolescents. The combination of factor analysis and the Rasch model is considered necessary to provide comprehensive information on the psychometric properties of dating violence. To provide insight into the psychometric properties that are more in-depth and complimentary. Therefore, the researchers aimed to assess the psychometric properties of the physical and psychological violence victimization (PPVV) scales in adolescents dating.

2. RESEARCH METHOD
2.1. Participants
The inclusion criteria used in this study were adolescents aged 15-24 years, who had or are currently dating, are not married, and are actively registered as students. Respondents came from students of one of the universities in Indonesia and were selected using snowball and accidental sampling. A total of 774 students were involved in this study. 94 people did not meet the inclusion criteria (86 people were not dating and eight were alumni) and 682 respondents were considered sufficient to obtain data stability [27]–[29]. Table 1 provides respondents' socio-demographic characteristics. The PPVV scale developed consists of two factors: physical violence (PhyV) and psychological violence (PsyV). The PPVV scale consisted of 37 items, 17 items for PhyV, and 20 items for PsyV. PPVV uses a Likert rating scale response ranging from 0 (Never) to 3 (Often).

Table 1. Socio-demographic characteristics

Variable		N	%
Gender (Symbol)	Female (P)	604	88.56
	Male (L)	78	11.44
Age group (Symbol)	17-19 years (A)	337	49.41
	20-24 years (B)	345	50.59
College year (Symbol)	First (P)	267	39.15
	Second (Q)	154	22.58
	Third (R)	119	17.45
	Fourth (S)	142	20.82

Age: M=19.7; SD=1.44

2.2. Data collection

This research has received approval from the Ethics Committee of Universitas Ahmad Dahlan with the number 012008037. Data collection was carried out online through Google Forms considering the conditions of the COVID-19 pandemic. The questionnaire was given personally and through student groups by enumerators. Respondents were asked to fill in the informed consent on the first page of the questionnaire to ensure that respondents volunteered to participate in the study. Respondents who do not meet the inclusion criteria and are unwilling to become respondents cannot continue to fill out the questionnaire. If the students states that they are willing to be a respondent, they will continue to fill in the next stage, filling out all the questionnaire items provided. The Google Form used has a response back facility sent automatically to an email when the respondent has submitted the questionnaire. Respondents also have the right to retract statements that have been given to researchers via email and available contacts. Any objections from respondents to being the research sample will be excluded from the research sample.

2.3. Data analysis

The confirmatory factor analysis (CFA) model evaluates the relationship between unobserved variables and latent variables. The relationship between the observed and latent variables is considered using the standardized factor loading value. The loading factor and goodness-of-fit (GOF) values were estimated using the maximum likelihood model with the help of the Lisrel 8.80 statistical application. The standard index for testing model fit refers to the GOF. GOF shows the level of goodness of the model in reproducing the covariance matrix observed in the items [29]. Ratio values χ^2/df, comparative fit index (CFI) or total lymphoid irradiation (TLI), adjusted goodness of fit index (AGFI), and root mean square error of approximation (RMSEA) have been proposed to assess model suitability in the last decades [30].

Rasch model analysis allows ordinal data from questionnaires to be transformed into interval data [31]. By modeling measurable items, this model can expose people's behavior [32]. Cronbach's alpha coefficient, person reliability coefficient, and item reliability are all indicators of instrument reliability. The MNSQ Infit and Outfit statistical values assessed the measurement model's appropriateness. The model fit interval must be between 0.5 and 1.5 MNSQ [31]. The Cronbach alpha coefficient is used to determine the level of internal consistency. Differential item functioning (DIF) is used to detect bias in PPVV items. If the probability value is less than 5%, the item is biased toward the respondent's characteristics [33], [34]. The rating scale's validity is tested to ensure that the ratings of options utilized in the PPVV are accurate. A decent rating scale allows each respondent to tell the difference between the ratings given. Five criteria are used to assess the rating scale's validity. First, the observed counts had a unimodal distribution. Second, each rating must have a minimum of 10 frequencies. Third, the Observed Average rises in a straight line. MNSQ Outfit <2.0 is the fourth. Finally, step calibration rises consistently [34], [35].

3.   RESULTS AND DISCUSSION
3.1. Confirmatory factor analysis

Item loading on the PPVV scale is 0.27-0.77 as shown in Table 2. Item or factor loading represents the correlation between items (unobserved variables) and their factors (latent variables). This value determines which items are valid on the PPVV scale. An item is considered valid if it has a loading value >0.30 [29]. PhyV16 "My partner stepped on my toes" has a weak correlation with physical violence. Meanwhile, the other 36 items had a good correlation with each factor at the significance level of p<0.05. The suitability of the PPVV factor structure to the model was investigated based on the GOF index. The results of the overall model fit analysis are presented in Table 3. Based on the fit index values in Table 3, all indices are used to meet the cut-off values used. Thus, the results of this study indicate that the PPVV scale has a good fit for the model.

Table 2. Items statistics in PPVV

Item	CFA model	Rasch model				Item	CFA model	Rasch model			
	Item loading	Measure	SE	Infit MNSQ	Outfit MNSQ		Item loading	Measure	SE	Infit MNSQ	Outfit MNSQ
PhyV1	0.71	1.26	0.19	1.00	0.73	PsyV1	0.72	-1.66	0.07	0.87	0.86
PhyV2	0.61	1.55	0.22	0.90	0.40	PsyV2	0.70	-2.08	0.07	0.79	0.76
PhyV3	0.54	2.82	0.39	0.98	0.57	PsyV3	0.69	-1.60	0.07	0.92	0.89
PhyV4	0.77	1.15	0.18	1.04	0.40	PsyV4	0.39	1.05	0.18	1.13	0.76
PhyV5	0.59	2.56	0.34	1.08	0.28	PsyV5	0.57	-2.07	0.07	1.04	1.02
PhyV6	0.76	0.45	0.14	0.94	0.68	PsyV6	0.49	-2.54	0.06	1.18	1.24
PhyV7	0.52	-0.26	0.11	1.35	1.35	PsyV7	0.64	-0.29	0.11	1.10	1.19
PhyV8	0.61	2.35	0.31	0.98	0.44	PsyV8	0.53	-0.87	0.09	1.47	1.41
PhyV9	0.46	0.20	0.13	1.25	1.19	PsyV9	0.58	-0.32	0.11	1.12	0.84
PhyV10	0.45	1.55	0.22	1.11	0.37	PsyV10	0.72	-1.01	0.09	0.97	0.82
PhyV11	0.30	-0.29	0.11	1.74	1.87	PsyV11	0.71	-2.43	0.06	0.81	0.80
PhyV12	0.41	1.70	0.23	1.07	0.69	PsyV12	0.76	-1.44	0.08	0.88	0.79
PhyV13	0.50	0.85	0.16	1.01	0.75	PsyV13	0.76	-0.63	0.10	1.14	0.73
PhyV14	0.34	2.82	0.39	0.93	0.35	PsyV14	0.77	-0.64	0.10	1.04	0.55
PhyV15	0.31	3.17	0.46	1.01	0.43	PsyV15	0.63	-0.80	0.09	1.08	0.98
PhyV16	**0.27**	0.75	0.16	1.68	1.28	PsyV16	0.65	-0.24	0.11	1.28	0.76
PhyV17	0.36	-0.15	0.11	1.53	1.26	PsyV17	0.58	-2.52	0.06	0.99	1.18
						PsyV18	0.55	0.70	0.15	1.14	0.51
						PsyV19	0.65	-0.77	0.09	1.10	0.77
						PsyV20	0.75	-2.32	0.06	0.72	0.75

Table 3. Overall goodness-of-fit

	Chi-squared/df	CFI	AGFI	RMSEA	p-value
Cut off	≤5.00	≥0.95	>0.80	<0.08	<0.05
2 Factor models	2138.00/573=3.73	0.96	0.82	0.063	0.00

3.2. Rating scale evaluation

The diagnostic rating scale was conducted to evaluate the rating scale functionality of the PPVV questionnaire. The summary results of the diagnostic rating scale PPVV functionality are shown in Table 4. Based on Table 4, about 78% of responses fall into the first category (Never). There is a disturbance in the threshold value in the third category (Sometimes). Analysis of the function of the rating scale provided is fundamental. There is a disturbance in the threshold value in the third category (Sometimes). However, the Infit and Outfit sizes are in the range of 0.5-1.5.

Table 4. Rating scale functionality of PPVV

Category	Counts (%)	Observed average	Andrich threshold	Infit	Outfit
Never	13724 (78)	-3.89	-	1.10	1.07
Rarely	2707 (15)	-1.48	-0.94	0.98	0.72
Sometimes	555 (3)	-0.34	0.75	1.07	1.00
Often	589 (3)	0.71	0.19	1.04	1.16

Figure 1 shows a probability distribution curve. The "Sometimes" rating scale has a peak below the other ratings. Based on this information, we conclude that the rating scale in the PPVV questionnaire is not yet functioning optimally. A good rating scale is if the given choices function well and do not confuse respondents [36].

3.3. Dimensionality

The PPVV instrument used here shows a single dimension (Unidimensionality) because the Raw variance explained by the measure is 55.1% as presented in Figure 2. Ensuring that a one-dimensional measuring instrument is one of the most important aspects of constructing measurements. This is done to see whether the measuring instrument measures what should be measured, in other words, whether the instrument measures a single ability [37], [38]. According to the principal component analysis of residuals (PCAR), a test only measures one dimension when the variance explained by the measure >30% [39], [40]. This finding further strengthens the factor structure model obtained in the CFA results.
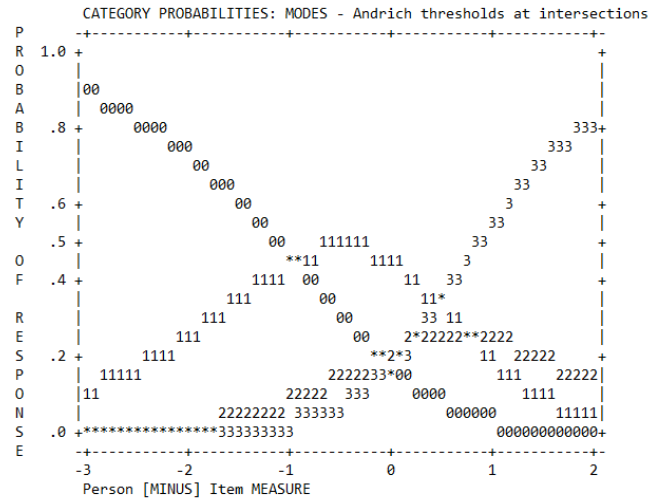
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           CATEGORY PROBABILITIES: MODES - Andrich thresholds at intersections
    P   -+-----------+-----------+-----------+-----------+-----------+-
    R  1.0 +                                                                    +
    O   |                                                                       |
    B   |00                                                                     |
    A   | 0000                                                                  |
    B  .8 +    0000                                                        333+
    I   |       000                                                  333      |
    L   |         00                                             33          |
    I   |          000                                         33            |
    T  .6 +           00                                     3            +
    Y   |             00                                  33                 |
       .5 +              00    111111                   33                +
    O   |              **11       1111               3                     |
    F  .4 +             1111  00             11   33                    |
       |              111        00            11*                         |
    R   |           111            00         33 11                       |
    E   |          111              00    2*22222**2222                   |
    S  .2 +       1111                **2*3       11  22222           +
    P   | 11111             2222233*00          111   22222|
    O   |11                  22222  333      0000        1111    |
    N   |            22222222 333333         000000      11111|
    S  .0 +***************333333333               000000000000+
    E   -+-----------+-----------+-----------+-----------+-----------+-
           -3          -2          -1           0           1           2
           Person [MINUS] Item MEASURE
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Figure 1. The curve of the probability distribution rating scale in PPVV

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        Table of STANDARDIZED RESIDUAL variance in Eigenvalue units = Item information units
                                                Eigenvalue   Observed    Expected
  Total raw variance in observations      =      82.4939   100.0%        100.0%
  Raw variance explained by measures      =      45.4939    55.1%         56.9%
    Raw variance explained by persons     =      11.6030    14.1%         14.5%
    Raw Variance explained by items       =      33.8909    41.1%         42.4%
  Raw unexplained variance (total)        =      37.0000    44.9% 100.0%  43.1%
    Unexplned variance in 1st contrast =          2.7265     3.3%   7.4%
    Unexplned variance in 2nd contrast =          2.1330     2.6%   5.8%
    Unexplned variance in 3rd contrast =          1.9148     2.3%   5.2%
    Unexplned variance in 4th contrast =          1.6756     2.0%   4.5%
    Unexplned variance in 5th contrast =          1.5910     1.9%   4.3%
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Figure 2. Raw variance explained by the measure of PPVV

3.4. Statistical summary of PPVV

Table 5 shows that the person measure value is lower than 3.25 logit than the item measure, and the item's difficulty level is higher than the person's ability. This indicates that respondents tend to disagree more with various statements in the PPVV. In the Rasch rating scale model (RSM), reliability is estimated for both persons and items. The reliability of the person and item are 0.84 and 0.99, respectively. This reliability value shows the consistency of respondents' answers in the good category and the quality of the items in the excellent category. While Cronbach's Alpha value was obtained at 0.93, indicating a very good interaction between the person and the item [27]. The separation index is viewed from person and item and is usually 0 to infinity [41]. Person separation indicates the ability of the instrument to identify groups of respondents. The person separation value <2 indicates that the scale does not distinguish between respondents who scored low and high in the construct being measured [42], [43]. Person separation instrument of 2.29, showing a good separation capability. Item separation of 8.44 suggests that the psychometric characteristics of the PPVV questionnaire are excellent [27].

Table 5. Statistical summary based on Rasch

	Persons	Item
N	475	37
Mean	11.8	150.9
Measure	-3.25	0.00
SD	1.34	1.61
SE	0.06	0.27
Separation	2.29	8.44
Reliability	0.84	0.99
Cronbach's Alpha	0.93	

3.5. Item fit

Based on the findings in Table 2, the items PhyV11, PhyV16 and PhyV17 indicated they were not fit. However, the PhyV17 item was retained because the outfit MNSQ was still within the acceptance range. The statistical value of infit and outfit MNSQ was used to measure the suitability of individual items in PPVV. In Rasch modeling, the ideal infit and outfit MNSQ value is 1.00. The value of 0.5-1.5 is a reasonable acceptance range that shows the productive value for measurement [33], [44], [45].

3.6. Differential item functioning (DIF)

In this section, we have explained the existence of item bias in PPVV through the DIF graph. DIF is used to identify whether items on the PPVV scale have a bias towards certain attributes of respondents. The items in PPVV are said to have a bias if the probability value is <5% [34]. Figure 3 shows DIF items in PPVV by gender, age group, and year of study.

On the physical violence scale, it appears that the PhyV9 item "Spouse attracts me by force" is biased towards gender attributes and is more difficult for "women" to agree on as shown in Figure 3(a). PhyV11 item "My partner pinches me" has a bias towards attributes year of college, and respondents with the second year of college find it difficult to agree as presented in Figure 3(c). The PhyV12 item "My partner kicked a certain part of my body" was biased against the age group and college year attributes. Ages 15-19 (early adolescents) have a harder time agreeing and, in the fourth year of college, have a harder time agreeing with their statements as shown in Figures 3(b) and 3(c).

Psychological violence scale, it appears that items PsyV6 "My partner limits my male friends", PsyV10 "My partner screams and yells at me," and PsyV17 "My partner brings up my past with my old partner," are biased toward gender attributes. Men had more difficulty agreeing to PsyV6 and PsyV10 items as shown in Figure 3(a). Meanwhile, women found it more difficult to agree with the PsyV17 item as presented in Figure 3(a). PsyV14 item "My partner is rude to me" bias towards college year, and respondent fourth year of college has a harder time agreeing with this statement as shown in Figure 3(c).

(a)

(b)

(c)
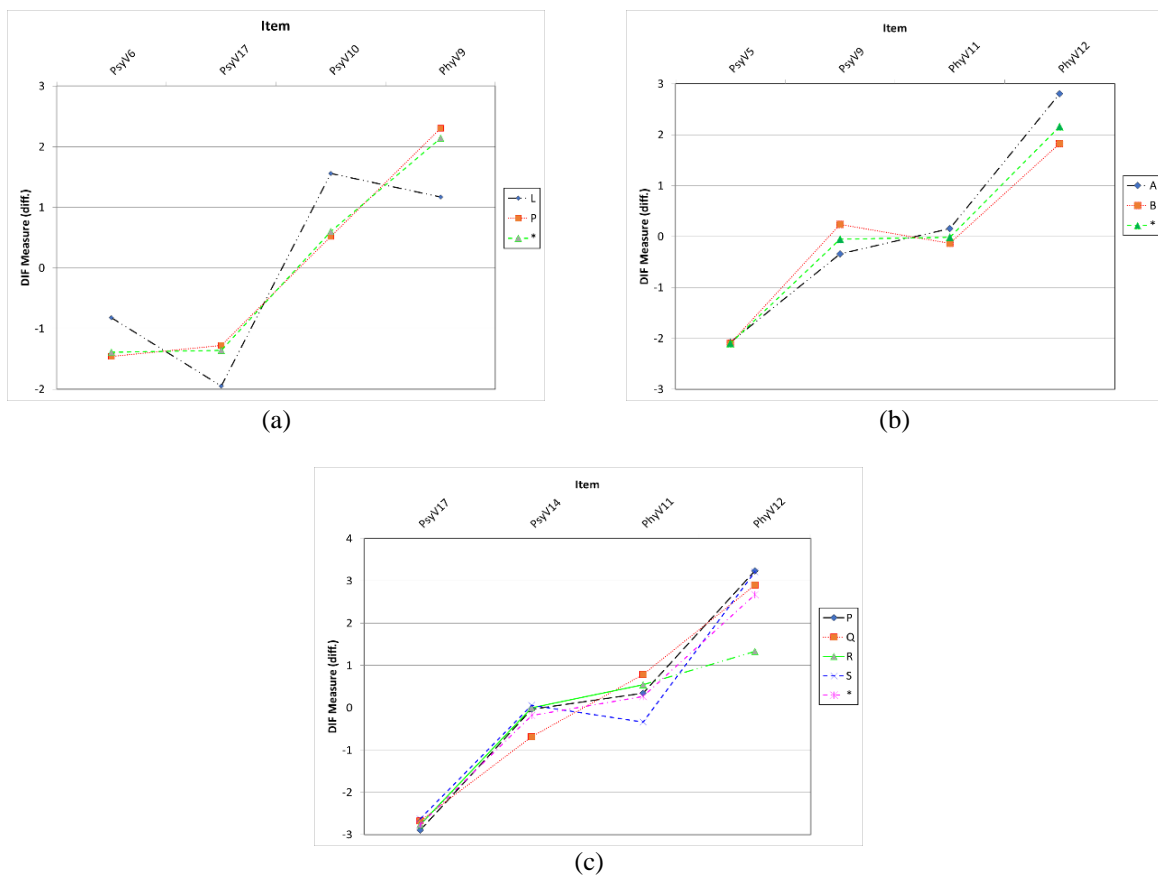
Figure 3. DIF PPVV based on the respondent's (a) gender, (b) age, (c) college year

3.7. Wright map

The Wright map is also known as the person-item map [46]. The Wright map depicts the interaction between a person and 37 PPVV items, and this visualization makes it easy for us to compare between person and item [47]. The person's ability and item difficulty in this map have been calibrated in the same logit scale unit. The Wright map is divided into four areas. The upper-left area shows the respondent's location who has experienced relative violence. Meanwhile, the lower-left area shows the respondent's location who has relatively not experienced violence. The top-right area shows the types of violence that respondents did not widely experienced. Meanwhile, the lower-right area shows the types of violence experienced by many respondents.

Based on Figure 4, it is clear that the item PhyV15, "My partner tore the clothes I was wearing", is a type of violence that many respondents do not experience. On the other hand, the PsyV6 item "My partner restricts my male friends" is a type of violence that many respondents experience. The average measure person value is -3.25, indicating that the mean chance of respondents experiencing physical and psychological violence is lower than the difficulty level of the items in the PPVV.

```
MEASURE     Person - MAP - Item
               <more>|<rare>
   3               +T PhyV15
                    |
                    |  PhyV14  PhyV3
                    |
                    |  PhyV5
                    |  PhyV8
   2               +
                    |
                    |
                    |S PhyV10  PhyV12  PhyV2
                    |
   1               +  PhyV1
                    |  PhyV4    PsyV4
                    |  PhyV13
                 .  |  PhyV16  PsyV18
                    |
                    |  PhyV6
   0            .  +  PhyV9
                .  |M
                #  |  PhyV17
                #  |  PhyV11  PhyV7    PsyV16  PsyV7    PsyV9
              .# T|
                .  |  PsyV13  PsyV14
  -1            .  +  PsyV15  PsyV19  PsyV8
                #  |  PsyV10
              .#  |
              ##  |  PsyV12
             .##  |S PsyV3
  -2        ####  +  PsyV1
          .####  S|
         ######   |  PsyV2    PsyV5
           ####   |  PsyV20
           .###   |  PsyV11  PsyV17
         .#####   |  PsyV6
  -3       .###   +
       .########  |
          .####   |T
       .###### M|
        .######  |
  -4  .#########  +
                    |
         .#######   |
                    |
       .#########   |
                  S|
  -5   .#########  +
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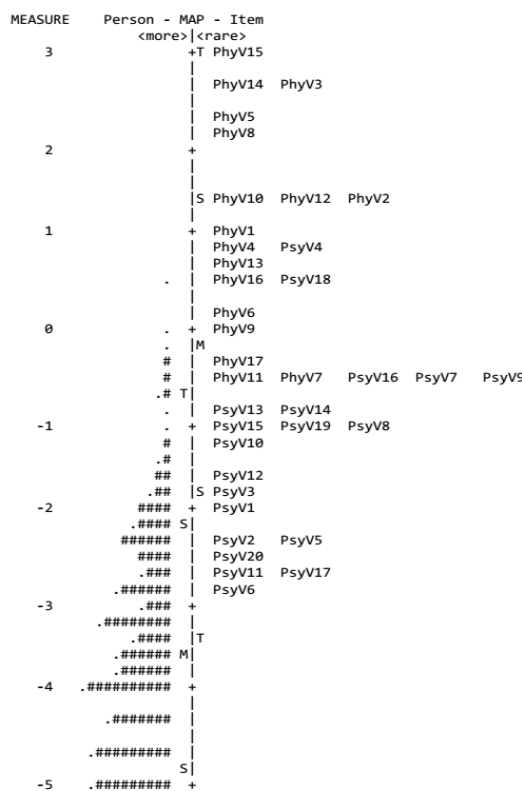
Figure 4. Wright map of PPVV scale that represents the relationship between person and item

4. CONCLUSION

The psychometric properties of PPVV scales in adolescent dating have been carried out. A total of 35 out of 37 items show good performance and have the property of measuring a single dimension. There were six of them had a bias toward the respondent's attributes. The 4-point Likert rating scale used needs to be simplified and reduced to 3-point. However, measurements using the CFA and Rasch models show that the PPVV instrument has adequate psychometric properties to measure physical and psychological violence experienced by students.

This study has proven that the PPVV instrument has good psychometric properties from the classical test theory (CFA) and modern test theory (Rasch). However, mapping of experiences of violence experienced by students has not been carried out. This becomes important in designing various promotive, preventive, curative, and rehabilitative programs. Therefore, future research needs to map the incidence of violence in adolescent dating.

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