Developing an Instrument to Safeguard Future Generations from Drug Addiction Among Students using Rasch

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Abstract: Drug addiction is a chronic disease that attacks the brain and becomes a problem that threatens future generations if it cannot be prevented and overcome. To encourage students to reduce the threat of drugs, an instrument is needed to map students who have high and low resilience. In this case, it is an effort to find out which treatment is appropriate and can prevent the younger generation from being exposed to drugs. So, this research aims to develop a drug addiction instrument and test the validity and reliability of the instrument. This quantitative research uses the RASCH Model to test its validity and reliability. The sample in this study was 2763 junior high school students in Surabaya, East Java, Indonesia. The results of the Rasch model show that in the content validity of the 23 statement items, 11 items were declared valid, 12 items had to be changed, and none of the items were discarded. Meanwhile, the instrument's reliability is 1, which is in the particular category. From the results of the analysis that has been carried out, it can be concluded that the drug addiction instrument can be used to measure adolescents' resistance to the threat of drugs.
Keywords: drug addiction; rasch model; assement

Introduction

Drugs, specifically, are illegal substances that are smoked or injected to provide pleasant or exciting feelings (N & Anwuri, 2017). Apart from that, illegal drugs or narcotics can be defined as chemicals that are not usually needed for physiological activities and can affect the body when consumed (Bernstein et al., 2006). It can be said that narcotics are illegal substances in the form of illegal drugs that are not needed by the body but are constantly and excessively consumed so that they damage the brain and body. Meanwhile, addiction is defined by the American Society of Addiction Medicine as a chronic medical disease that can be treated and involves complex interactions between brain circuits, genetics, the environment, and a person's life experiences. People with addiction use substances or engage in behaviors that become compulsive and often continue despite adverse consequences (Jokhio & Soomro, 2022).

Drug addiction or drug addiction is a chronic disease that attacks the brain (Ramsey, 2015; Singh & Gupta, 2017). Drug addiction is a disorder that involves excessive seeking and use of drugs, resulting in fundamental changes in cognition and emotional processes (Zilverstand et al., 2018). Drug addiction is also often associated with disorders that are correlated with dysfunction in physical, psychological, and social aspects.

Adolescents are at high risk of experiencing drug addiction (Kusumawaty et al., 2021), and this is a severe and ongoing problem (Chessor, 2013; Sani, 2010). Nowadays, it can also be said that drugs are one of the worst humanitarian problems that can weaken the foundations and foundations of teenagers in society (Parsian et al., 2015). This is because drug addiction is a compulsive inability to refuse the use of illegal drugs even though there are negative consequences seen by the user (Colman, 2003). This statement confirms that people experiencing drug addiction find it difficult to refrain from consuming drugs, which can cause physiological, psychological, and social harm to teenagers (N & Anwuri, 2017). The effects of drug addiction in teenagers encourage someone to do antisocial or criminal things (theft, robbery, rape, murder, etc.). Besides that, the adolescent population shows that adolescents tend to have less intrinsic motivation to change their alcohol and drug-consuming behavior compared to adults and often enter rehabilitation facilities due to pressure from family, friends, or the law (Chessor, 2013). This shows that special attention is needed from the family, the surrounding environment, and related power holders.

The prevalence of child and adolescent drug users in Indonesia is in a reasonably high category and has been quite worrying over the last five years (Latief & Solli, 2020). The results of a survey conducted by the University of Indonesia Health Research Center in collaboration with the National Narcotics Agency (BNN) 2015 showed that the prevalence of drug users reached 2.2%, consisting of 1,599,832, increasing yearly. Based on data from the National Narcotics Agency, East Java Province in 2016 rehabilitated 1,270 drug abusers from children and teenagers. Of the 1,270 abusers, 60% of the abusers had an age range of 10-30 years (Anandayudha et al., 2020).

The impact of drug addiction on an individual is not only physical but also medically can change the individual's cognitive and emotional state (Zilverstand et al., 2018). The social effects of drug use are not only felt by individuals but also have an impact on friendships, families, and the community (Sani, 2010). It is characterized by withdrawal, tolerance, illness, overdose, and crime, and the impact of drug addiction can damage codependency in the family system.

Several psycho-social factors underlie a person experiencing drug addiction, one of which is lack of relationship and parental supervision (Jokhio & Soomro, 2022; Kusumawaty et al., 2021; N & Anwuri, 2017), poverty, unemployment, accessibility of drug use, neglect, depression, and proximity to the environment and sources of drugs (Jokhio & Soomro, 2022; Saavedra & Tornese, 2018). Previous research also showed that violence and drug addiction have a unidirectional relationship, namely that drug use can predict violence, and a two-way relationship, namely that there is a mutual and causal relationship between violence and drug addiction (Raffle et al., 2021).

The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) specifies that symptoms of substance-related disorders may include tolerance; withdrawal; lose control; failed attempts to reduce or stop; significant time spent discovering, using, or recovering from substance use; disturbances in certain areas of a person's life; and continuing to use it despite the negative consequences (Association, 2000). To meet the criteria for dependence, a person must have three or more of the following symptoms. To meet the criteria for abuse, a person must experience negative impacts from drug use to such an extent that it interferes with at least one area of life functioning (e.g., work, family, social life). To determine the severity of the disorder, the appearance of 2-3 symptoms out of 11 symptoms is defined as mild, while the appearance of 4-5 symptoms is defined as moderate, and the appearance of 6 or more symptoms is defined as severe. (Singh & Gupta, 2017).

The effects of drug addiction are severe for the survival of future generations. The consequences of drug addiction will have quite significant effects, such as the inability to concentrate and be productive at school and life in general. This impact can make teenagers unable to adapt and feel relevant to society. Apart from that, it can also result in emotional insufficiency, isolation from the social environment, irritability, irritability, and depression (Taylor et al., 2013). More specifically, drugs can cause psychological and physical problems such as anxiety disorders, namely panic, phobias, paralyzing worry or compulsions, mood disorders such as depression or dysthymia, and deviant

behavioral disorders such as antisocial personality disorder. Other possible impacts of substance abuse or addiction are trauma-related problems, including sleep disorders, irritability, anxiety, difficulties in work or relationships, and depression. Physically, this will result in changes in appetite, increased heart rate, and slurred speech (Okolo & Chinwuba, 2022).

Empirically, drug and alcohol addiction can be overcome through intense professional services over some time (Topkaya et al., 2021). However, the relapse rate for drug sufferers is still relatively high (Bassuk et al., 2016). The adverse effects cannot be stopped, so drug addiction needs to be identified early. Then, it can be followed up for preventive and curative efforts to protect the younger generation.

Early detection is vital in efforts to screen teenagers for prohibited substances. Apart from that, preventive efforts are essential through early assessment of attitudes that lead to dependence on prohibited substances or drug addiction. Therefore, developing assessments that can help students detect addiction early is necessary.

Method

This research uses Rasch model analysis to Analyze drug addiction scale validity and reliability. The Rasch model is used for developing test instruments by analyzing the responses to question items and the relationship between the level of student ability and the level of difficulty of the question items (Bond & Fox, 2013). The instrument is designed from variables that have been defined satisfactorily. The relevant constructs are identified, and from there, the question items are created and developed to measure the desired variables

The sample in this research was 2673 students spread across Surabaya. The sample in this research was state junior high school students in Surabaya aged 12-15 years. This instrument consists of 23 statement items. Data analysis uses the Rasch model to test the validity and reliability of the instrument (Sumintono & Widhiarso, 2014). The research uses Liu's (2010) steps in developing a test instrument using the Rasch model include defining a construct that linear properties can characterize. At this stage, identify operational definitions and scale dimensions. Second, identify abilities according to different levels of a predetermined construct. This stage prepares scale indicators based on type and level. Third, namely trials with representative samples from the target population. Fourth, apply the Rasch model. Fifth, review the items according to statistics and revise the items if necessary. Seventh, establish validity and reliability claims for the question instrument. Eighth, develop documentation for the question instrument.

Instrument validity criteria are determined through the accepted outfit mean square (MNSQ) value: 0.5 <MNSQ< 1.5, the accepted Z-standard outfit (ZSTD) value: −2.0 < ZSTD< +2.0 (but ZSTD can be ignored if the number of respondents is >300) and the point measure correlation value (Pt Measure Corr): 0.4 < Point Measure Corr < 0.85 (Sumintono & Widhiarso, 2014).

Results

This type of research instrument is a closed questionnaire which has four levels of answers. Respondents were asked to choose one of four answer options. In this questionnaire, a measurement scale is determined to see a picture of teenagers' resilience in facing the threat of drug addiction. The following is a validity and reliability test based on the results of the Rasch model.

Construct Validity

The first step to see construct validity is done by looking at item polarity. It is shown in the table that all items have positive Point Measure Correlation (PMC) values. This shows that there is no conflict between the items and the construct being measured. Next, the researcher looked at the Principal

Component Analysis of Rasch Residual to see the unidimensionality of the construct. As shown in the picture below, this test consists of 23 active items with explanations below.

Table 1. Standarized Residual Variance

```
          Table of STANDARDIZED RESIDUAL variance (in Eigenvalue units)
                                            -- Empirical --    Modeled
     Total raw variance in observations    =     31.5 100.0%        100.0%
       Raw variance explained by measures   =      8.5  26.9%         28.7%
         Raw variance explained by persons  =      2.5   8.0%          8.5%
         Raw Variance explained by items    =      5.9  18.9%         20.1%
     Raw unexplained variance (total)       =     23.0  73.1% 100.0%  71.3%
       Unexplned variance in 1st contrast = =      2.1   6.7%   9.2%
       Unexplned variance in 2nd contrast = =      1.8   5.6%   7.6%
       Unexplned variance in 3rd contrast = =      1.4   4.6%   6.3%
       Unexplned variance in 4th contrast = =      1.3   4.1%   5.6%
       Unexplned variance in 5th contrast = =      1.2   3.7%   5.1%
```

Data from Table 1 shows that the instrument had a measured variance of 26.9% more than 20% indicating that the figures are desirable for the Rasch Model. It can be concluded that the item is said to have good instrument validity. Variance is below 10%, namely 6.7%, 5.6%, 4.6%, 4.1% and 3.7% so that each dimension can measure the variable well and is not influenced by other factors that cause changes in results instrument. Based on the Rasch results above, it can be concluded that there is no second dimension in the construct of the adolescent resilience instrument because all items/questions were created to measure adolescent resilience to the threat of drug addiction.

Content Validity

The criteria used to see that a question item is valid or has good quality in the Rasch model is if it meets one of the criteria: (1) Outfit mean square (MNSQ) value received: 0.5 <MNSQ< 1.5; (2) Outfit Z-standard value (ZSTD) accepted: −2.0 < ZSTD< +2.0 (but ZSTD can be ignored if the number of respondents is >300); (3) Required Point Measure Correlation value. Alagumalai, Curtis, & Hungi (2005) classified these values into very good (>0.40), good (0.30–0.39), fair (0.20–0.29), unable to discriminate (0, 00-0.19), and requires examination of the item (<0.00). If the question items in these two criteria are not met, it means the question items are not good and need to be revised or replaced. The Table 2 show the results of content validity along with decision making from several related statements. Based on the results of the analysis of the quality of the questions using Rasch modeling, it was found that 11 questions were declared valid (accepted), 12 items would be revised, and 0 items would be discarded because they did not meet the requirements for MNSQ outfit, ZSTD Outfit, and Point Measure Correlation (Pt Measure Corr).

Table 2. Item Validity Results

Valid Items *(fit)*	Revised Items	Discarded Item *(misfit)*
5, 6, 8, 9, 10, 11, 13, 17, 18, 22, 23	1, 2, 3, 4, 7, 12, 14, 15, 16, 19, 20, 21	-
11 items	**12 items**	**0 item**

Reliability

Based on the Table 3, it can be analyzed that reliability testing is divided into three parts, namely 1) Overall Reliability; 2) Item Reliability and 3) Person Reliability. It is known that Cronbach's Alpha is 0.69 (sufficient category), while Person Reliability is 0.69 (sufficient) and Item Reliability is 1 (special category). The Cronbach's Alpha value shows that this instrument is generally sufficient in trials. The

Person Reliability value is 0.69 and the Item Reliability value is 1. This shows that the subject gives consistent answers and the quality of the questions on the instrument has special reliability.

Table 3. Measured Person and Item

```
    SUMMARY OF 2673 MEASURED Person
-------------------------------------------------------------------------------
|          TOTAL                     MODEL      INFIT       OUTFIT            |
|          SCORE     COUNT   MEASURE  ERROR   MNSQ  ZSTD   MNSQ  ZSTD        |
|-----------------------------------------------------------------------------|
| MEAN      76.1      23.0     1.30    .28    1.01   .1    1.00   .1         |
| S.D.       6.7        .0      .50    .05     .33  1.1     .46  1.1         |
| MAX.      90.0      23.0     3.21    .68    3.07  4.6    4.51  5.7         |
| MIN.      40.0      23.0    -1.07    .24     .33 -3.2     .31 -2.8         |
|-----------------------------------------------------------------------------|
| REAL RMSE   .30 TRUE SD    .40  SEPARATION 1.30  Person RELIABILITY  .63  |
|MODEL RMSE   .29 TRUE SD    .41  SEPARATION 1.41  Person RELIABILITY  .67  |
| S.E. OF Person MEAN = .01                                                  |
-------------------------------------------------------------------------------

Person RAW SCORE-TO-MEASURE CORRELATION = .98
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .69

    SUMMARY OF 23 MEASURED Item
-------------------------------------------------------------------------------
|          TOTAL                     MODEL      INFIT       OUTFIT            |
|          SCORE     COUNT   MEASURE  ERROR   MNSQ  ZSTD   MNSQ  ZSTD        |
|-----------------------------------------------------------------------------|
| MEAN    8839.9    2673.0      .00    .03    1.07  1.2    1.00  -.1         |
| S.D.     976.7       .0      .67    .01     .26  5.7     .22  5.2         |
| MAX.   10299.0    2673.0     1.31    .05    1.72  9.9    1.55  9.9         |
| MIN.    6411.0    2673.0    -1.35    .02     .51 -9.9     .54 -9.9         |
|-----------------------------------------------------------------------------|
| REAL RMSE   .03 TRUE SD    .67  SEPARATION 21.66  Item  RELIABILITY 1.00  |
|MODEL RMSE   .03 TRUE SD    .67  SEPARATION 23.32  Item  RELIABILITY 1.00  |
| S.E. OF Item MEAN = .14                                                    |
-------------------------------------------------------------------------------

UMEAN=.0000 USCALE=1.0000
Item RAW SCORE-TO-MEASURE CORRELATION = -.98
61479 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 114481.13 with 58782 d.f. p=.0000
Global Root-Mean-Square Residual (excluding extreme scores): .7642


SUMMARY OF CATEGORY STRUCTURE.  Model="R"
----------------------------------------------------------------
|CATEGORY    OBSERVED|OBSVD SAMPLE|INFIT OUTFIT|| ANDRICH |CATEGORY|
|LABEL SCORE COUNT %|AVRGE EXPECT| MNSQ  MNSQ||THRESHOLD| MEASURE|
|--------------------+------------+------------++---------+--------|
|  1   1    2288   4|  .51   .26| 1.25  1.52||  NONE   |( -2.33)| 1
|  2   2   11143  18|  .68   .67|  .99   .93|| -1.12   |  -.50  | 2
|  3   3   13448  22|  .99  1.11|  .91   .71||  -.70   |  -.70  | 3
|  4   4   34600  56| 1.67  1.64|  .97   .99||   .42   |( 2.03) | 4
----------------------------------------------------------------
OBSERVED AVERAGE is mean of measures in category. It is not a parameter estimate.


----------------------------------------------------------------------------
|CATEGORY   STRUCTURE   | SCORE-TO-MEASURE  | 50% CUM.| COHERENCE    |ESTIM|
| LABEL    MEASURE S.E. | AT CAT. ----ZONE----|PROBABLTY| M->C C->M  RMSR |DISCR|
|-----------------------+---------------------+---------+----------------+-----|
|   1       NONE        |( -2.33) -INF  -1.48|         | 57%   1% 1.8971|   1
|   2      -1.12   .02  |  -.50  -1.48    .14| -1.27   | 44%  17% 1.0454| .88| 2
|   3       .70    .01  |   .70    .14   1.41|   .29   | 29%  67%  .4665| .81| 3
|   4       .42    .01  |( 2.03)  1.41  +INF|  1.02   | 82%  62%  .6026|1.09| 4
----------------------------------------------------------------------------
M->C = Does Measure imply Category?
C->M = Does Category imply Measure?
```

Answer Choices Validation

In the table 4, it can be seen that the average observation starts from a logit of 0.51 for a score of 1 (i.e. very inappropriate), then there is an increase up to a score of 4 (i.e. very suitable) with a logit value of 1.67. It can be seen that between options 1 to 4 there is an increase in the logit value which shows that respondents can confirm options 1 to 4 (very unsuitable to very suitable). Another measurement is the Andrich Threshold to assess the accuracy of the polytomies that have been used. The Andrich Threshold value which leads from None negative to continuing towards a positive value indicates that the options given are valid for the respondent. So that the validity of the scale has been tested well and is in accordance with the researcher's design, so that the highest score is a label score of 4 and each label score corresponds to the weight of each number ranging from 4 to 1. It can be concluded that the determination of the scale and scoring is correct and not confusing respondents. It can be concluded that if a person's extraversion is low (low ability) then a person will tend to choose

answer scale 1. If the higher the level of extraversion (high ability), the probability of choosing answer scale 4 will be lower and vice versa. It can be concluded that the function of the rating scale is running well.

Table 4. Category Stucture

```
SUMMARY OF CATEGORY STRUCTURE.  Model="R"
-------------------------------------------------------------------
|CATEGORY    OBSERVED|OBSVD SAMPLE|INFIT OUTFIT|| ANDRICH |CATEGORY|
|LABEL SCORE COUNT %|AVRGE EXPECT| MNSQ  MNSQ||THRESHOLD| MEASURE|
|------------------+------------+-----------++---------+--------|
|  1   1   2288   4|  .51   .26| 1.25  1.52||  NONE  |( -2.33)| 1
|  2   2  11143  18|  .68   .67|  .99   .93|| -1.12  |  -.50  | 2
|  3   3  13448  22|  .99  1.11|  .91   .71||  -.70  |  -.70  | 3
|  4   4  34600  56| 1.67  1.64|  .97   .99||   .42  |( 2.03) | 4
-------------------------------------------------------------------
OBSERVED AVERAGE is mean of measures in category. It is not a parameter estimate.

--------------------------------------------------------------------
|CATEGORY   STRUCTURE    | SCORE-TO-MEASURE  | 50% CUM.| COHERENCE   |ESTIM|
| LABEL    MEASURE  S.E. | AT CAT. ----ZONE----|PROBABLTY| M->C C->M  RMSR |DISCR|
|-----------------------+--------------------+---------+------------------+-----|
|  1      NONE      |( -2.33) -INF  -1.48|        | 57%  1% 1.8971|     | 1
|  2     -1.12   .02| -.50 -1.48   .14| -1.27  | 44% 17% 1.0454| .88| 2
|  3      .70    .01|  .70   .14  1.41|  .29   | 29% 67% .4665| .81| 3
|  4      .42    .01|( 2.03) 1.41  +INF | 1.02  | 82% 62% .6026|1.09| 4
--------------------------------------------------------------------
M->C = Does Measure imply Category?
C->M = Does Category imply Measure?
```

Figure 1. Category Probabilities
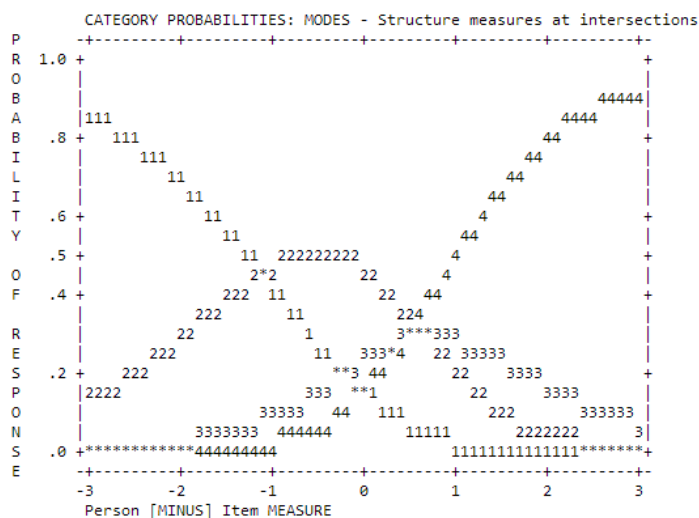
Discussions

This self-resistance questionnaire against drugs was prepared to determine students' responses to the situation. This situation is classified as a drug-related situation. Teenagers' resilience to face situations that encourage them to consume illegal substances is what teenagers need in the current era. So, through the development of this instrument, it is hoped that it can be used as a preventive effort by guidance and counseling teachers or related institutions to identify early the resistance of teenagers to drug addiction. To go further, guidance and counseling teachers or related institutions should provide guidance services containing information and the impact of use so that they can build adolescent resilience to avoid offers to consume prohibited substances.

Statements on the development of drug addiction instruments tend to discuss self-resilience in not becoming dependent on drugs and illegal substances. This self-resilience is related to how students can ward off disturbances and threats from the social environment. It cannot be denied that many

students experience drug addiction due to the social environment (Latief & Solli, 2020; Nadine, 2013; Sani, 2010). Apart from that, the influence is also usually triggered by a smaller environment, namely the family. The family influences the development of children's trauma so that children take out family problems on drug addiction (Barrocas et al., 2016; Jokhio & Soomro, 2022; N & Anwuri, 2017).

The development of this instrument is based on several primary constructs. The assertive dimension of self-resilience contains statements related to the assertive attitude that students should show. Through this statement, it can ultimately be concluded that students' susceptibility to being influenced by the surrounding environment or being firm with offers that are detrimental to themselves (Ames et al., 2017; Küçükkaragöz & Karakayoun, 2020; Latief & Solli, 2020). Self-resilience dimensions of Self-Regulation contain indicators related to the self or personality. The statement items contain self-concept-related situations, daily activities, and lifestyle. This self-regulation leads to an individual's ability to manage their life better and more positively through lifestyle (Caro & Popovac, 2021; Hartiningtyas & Elmunsyah, 2016; Lay et al., 2021). Self-resilience is the dimension of the meaning of life. This aspect contains several indicators relating to the meaning of an individual's life. When students interpret life well, they can live happier, more productively, and meaningfully and act without hurting themselves through detrimental activities (Ortigo et al., 2020; Zhao et al., 2020).

The Drug Addiction Instrument that researchers have developed has been tested for validity and reliability. This Drug Addiction instrument can be helpful to help guidance and counseling teachers or related institutions to develop programs to reduce drug addiction in teenagers. Based on the research results, this instrument can be used through several revisions to the statement items so students can understand them.

Conclusion

The results of item analysis through the Rasch model validity test showed that of the 23 items tested, 11 items were valid or suitable for use, with 12 items revised and 0 items discarded. The results of the reliability test show that the respondents' interaction with the items as a whole meets the reliability criteria. This shows that the subjects give consistent answers and that the quality of the career readiness instrument's items is highly reliable. From the scale test results, the items' validity and reliability of the instrument have been tested. This Drug Addiction Scale has been tested for validity and reliability and can be used to test teenagers' resilience to the threat of drug addiction from the surrounding environment. This instrument can be used as a basis for guidance and intervention efforts so that students are not classified as addicted.

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