Measuring Life Satisfaction: A Rasch Model Approach to Instrument Validation

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Abstract:
Low life satisfaction can lead to serious mental health problems, including depression and anxiety, which can negatively impact quality of life. This study aims to develop and validate an instrument from Diener that can be used to measure life satisfaction accurately and reliably using the Rasch Model approach. This research method involved 70 participants representing various backgrounds, both men and women. The collected data were analyzed using the Rasch Model to evaluate scale accuracy, validity, reliability, and undimensionality on the life satisfaction scale. The results of this study explain that out of 7 scale item choices, there are three item choices on the life satisfaction scale that are inappropriate, namely scales 3, 4 and 5 which do not have peaks. The validity and reliability results show that 5 items are valid and reliable with the results of the validity value meeting the validity and reliability criteria resulting in a Cronbach's alpha value obtained of 0.83 which means it is in the good category. Furthermore, the findings of the dimensional test tested with standardized residuals are known to have a value of 65.1%. Assuming these criteria are met, the life satisfaction instrument meets the 20% threshold for the unidimensionality test.
Keywords: Life Satisfaction; Rasch Model; Scale.

Introduction

Life satisfaction is a concept that reflects an individual's perception of his or her quality of life (Rokhimawaty et al., 2025; Siswanto, 2024). Life satisfaction in this case is a measure of mental well-being that evaluates a person's feelings and attitudes about life at a particular point in time (Khodabakhsh, 2022; Senmar et al., 2023). It includes aspects such as social relationships, work, health, and achievements that contribute to an individual's overall feelings about life (Karataş et al., 2021; Malvaso & Kang, 2022). Life satisfaction depends not only on objectively experienced conditions, but also on individuals' subjective perceptions of what they perceive as a good life (Rokhimawaty et al., 2025; Siswanto, 2024). In the context of health and psychology, life satisfaction is very relevant because it is directly proportional to a person's mental and physical health (Rumawas, 2021; Sari & Pramono, 2014). Research shows that individuals who are satisfied with their lives tend to have lower stress levels and are better able to face challenges (Rumawas, 2021;

Sari & Pramono, 2014). On the other hand, low life satisfaction can lead to serious mental health problems, including depression and anxiety, which can negatively impact overall quality of life (Widiastuty, 2020).

Life satisfaction theory can be divided into several categories, one of which is the theory of comparison of expectations and achievements (E. Diener, 2009; Rokhimawaty et al., 2025; Siswanto, 2024) According to this theory, individual life satisfaction is built when expectations and achievements are in optimal balance. If expectations are met or even exceeded, individuals will feel high life satisfaction (Afiyanti, 2010). However, if individuals often feel that their expectations are not achieved, a sense of dissatisfaction will arise (Feil et al., 2022). In addition, internal factors such as personality also influence how individuals view their lives, while external factors such as socioeconomic and cultural conditions also play an important role (Kozlova et al., 2024; Nasution, 2023).

The importance of measuring life satisfaction is increasingly recognized in various studies. Life satisfaction measurement serves as an indicator of individual well-being and can provide an overview of the factors that affect a person's quality of life (Sari & Pramono, 2014). For example, research shows that physical activity and a healthy lifestyle have a positive impact on physical and mental health, which in turn contributes to increased life satisfaction (Etika et al., 2021). Public health programs that emphasize these healthy behaviors are increasingly relevant, especially considering the impact of healthy lifestyles on long-term health. Factors that affect life satisfaction, both external factors such as economic conditions and internal factors such as personality must be considered (Pai et al., 2023). Countries that have a high level of welfare tend to have a population that shows a better level of life satisfaction (Nasution et al., 2023; Soeharto & Kuncoro, 2015) For example, social support from a spouse or work environment can affect job satisfaction (Rokhimawaty et al., 2025; Siswanto, 2024) and also have an impact on overall life satisfaction, especially for working mothers.

This study aims to develop and validate an instrument that can be used to measure life satisfaction accurately and reliably using the Rasch Model approach. The Rasch Model, which is one of the techniques in psychometric measurement theory, offers advantages in terms of validity and consistency of instrument measurement (Rokhimawaty et al., 2025; Siswanto, 2024). By using this Rasch model, it is expected to validate the life satisfaction measurement instrument, providing a more objective and accurate approach than conventional methods. The developed instrument can provide more precise and descriptive results in a more accurate way regarding the level of life satisfaction of individuals in various contexts. The urgency of this research lies in the importance of accurate life satisfaction measurement, given that life satisfaction is a key factor in understanding individual well-being, which can influence social and public health policies.

Methods

This study involved 70 participants who represented demographics based on gender, the data can be seen in the following table:

Table 1. Tabulation of Research Sample

Criteria	Number of Samples
Male	33
Female	37
Total	70

Each participant was asked to complete the Satisfaction with Life Scale (SWLS), an instrument developed by Diener, Emmons, Larsen, and Griffin (1985) that was adapted using the Indonesian language to measure the level of life satisfaction. The SWLS consists of five items with 7 scale options designed to evaluate individuals' perceptions of their overall quality of life. The collected data were analyzed using the Rasch Model to evaluate the validity, reliability, and dimensionality of the SWLS instrument in measuring life satisfaction. Undimensionality tests were conducted to ensure that the SWLS measures one common dimension, namely life satisfaction. In addition, scale accuracy, validity, and reliability tests were also conducted to ensure measurement accuracy. This analysis process uses Winstep software version 4.01 to ensure the strength and accuracy of the measurement results. The results of this analysis provide an in-depth description of the psychometric characteristics of the SWLS, ensuring that this instrument is valid and reliable in measuring life satisfaction.

Results and Discussion
Scale Accuracy
Scale accuracy analysis was carried out using the Rasch model through the Winstep application. The accuracy test scale can be seen in the following figure.

Table 2. Life Satisfaction Scale Accuracy Test Results

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-------------------------------------------------------------------------
|CATEGORY     OBSERVED|OBSVD SAMPLE|INFIT OUTFIT|| ANDRICH  |CATEGORY|
|LABEL SCORE COUNT %|AVRGE EXPECT| MNSQ   MNSQ||THRESHOLD| MEASURE|
|-----------------+------------+------------++---------+--------|
|  1    1       8   2| -1.58 -1.63| 1.25  1.13||  NONE   |( -3.82)| 1
|  2    2      28   8| -1.03 -1.13| 1.27  1.33||  -2.63  | -1.97  | 2
|  3    3      20   6|  -.73  -.66|  .66   .70||  -.56   | -1.09  | 3
|  4    4      37  11|  -.35  -.13|  .75   .50|| -1.02   |  -.50  | 4
|  5    5      83  24|   .50   .55| 1.03   .89||  -.62   |   .29  | 5
|  6    6     138  39|  1.96  1.79|  .68   .87||   .59   |  2.46  | 6
|  7    7      36  10|  3.84  4.16| 2.21  1.22||  4.23   |( 5.35)| 7
-------------------------------------------------------------------------
```

Apart from looking at the picture above, to see the accuracy of the scale can be seen in the following diagram.
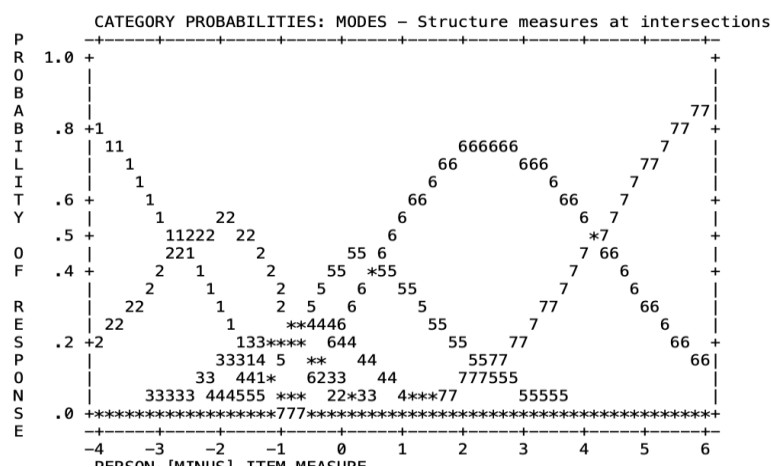
Figure 2. Life Satisfaction Scale Accuracy Diagram

The change from category 1 to 2 is 2.63. Changes from category 2 to 3 amounted to 2.07, changes from category 3 to 4 amounted to 0.45, changes from category 4 to 5 amounted to 0.40, changes from category 5 to 6 amounted to 1.21 and changes from category 6 to 7 amounted to 3.64. number of category changes there are no sufficient ranges of 1.4-5.0, namely category 3 to 4 (0.45) and category 4 to 5 (0.40). This can also be seen in Figure 2. Where answer choices 3, 4, 5 do not exactly form a peak while other answer choices form their own peaks. Based on this condition, the scale options on the life satisfaction instrument were changed to four answer choices, namely 1, 2, 5 and 7 choices. After making changes, the results of the scale accuracy test can be seen as follows.

Table 2. Scale Accuracy Test of Answer Choices and Scoring Guidelines for the Life Satisfaction Scale After the Scale Accuracy Test

Answer Choices	Score	
	Favorable	Not favorable
Very suitable	4	1
Appropriate	3	2
Not in accordance with	2	3
Very Unsuitable	1	4

Validity

Validity of items and respondent data on life satisfaction instruments. The provisions are as follows, valid items are

1. Accepted Mean Mean Square (MNSQ) value: 0.5 < MNSQ < 1.5.
2. Accepted Z-Standard Outfit Value (ZSTD): -2.0 < ZSTD < + 2.0
3. Accepted Point Measure Correlation (Pt Measure Corr) values: 0.4 < Pt Measure Corr < 0.85.

An item can be said to be valid if it meets at least one or two of the three requirements above. An item can be said to be valid if it meets at least one or two of the three conditions above (Sumintono & Widhiarso, 2015). Based on the tests that have been carried out, it results that

Table 3. Item Validity Test with Rach Model

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-----------------------------------------------------------------------------------------------
|ENTRY   TOTAL   TOTAL            MODEL|  INFIT   | OUTFIT   |PT-MEASURE |EXACT MATCH|      |
|NUMBER  SCORE   COUNT   MEASURE  S.E. |MNSQ  ZSTD|MNSQ  ZSTD|CORR.  EXP.| OBS%  EXP%| ITEM |
|---------------------------------------+----------+----------+-----------+-----------+------|
|    5    284      70     1.13    .12|1.59   2.9|1.32   1.6|A .75   .79| 40.0  43.1| F    |
|    4    369      70     -.24    .14|1.02    .1| .97   -.1|B .67   .68| 58.6  51.1| E    |
|    1    361      70     -.09    .14| .87   -.6| .95   -.2|C .68   .69| 57.1  50.8| B    |
|    2    373      70     -.32    .14| .67  -1.8| .75  -1.3|b .72   .68| 60.0  51.3| C    |
|    3    380      70     -.47    .15| .74  -1.3| .67  -1.7|a .74   .67| 65.7  53.3| D    |
|---------------------------------------+----------+----------+-----------+-----------+------|
| MEAN   353.4    70.0     .00    .14| .98   -.1| .93   -.3|           | 56.3  49.9|      |
| S.D.    35.2     .0      .58    .01| .33   1.7| .23   1.2|           |  8.6   3.5|      |
-----------------------------------------------------------------------------------------------
```

Based on the item validity test that has been carried out, valid and invalid (not used) items are obtained on the life satisfaction scale. The items are as follows:

Table 4. Life Satisfaction Scale Validity Test Results

No	Description	Item Number	Total
1.	Valid Question Items	1,2,3,5	5
2.	Invalid Items	0	0
	Total		5

Based on the results of data tables 3 and 4, the validity of the life satisfaction scale results in all valid items supported by the provisions of at least one or two criteria according to (Sumintono & Widhiarso, 2015).

Reliability

After going through the item validity test, the self-disclosure instrument is then tested for item reliability. The results of the reliability test using the Rasch model will obtain three things, namely person reliability, item reliability and Cronbach's alpha. Further data is obtained as follows.

Table 5. Life Satisfaction Item Reliability Test Results

```
     SUMMARY OF 104 MEASURED PERSON
-----------------------------------------------------------------------
|          TOTAL                        MODEL      INFIT      OUTFIT    |
|          SCORE    COUNT    MEASURE    ERROR    MNSQ  ZSTD  MNSQ  ZSTD |
|---------------------------------------------------------------------|
| MEAN     107.3     37.0        .81      .28    1.01   -.3  1.00   -.3 |
| S.D.       9.1       .0        .71      .02     .67   2.4   .66   2.3 |
| MAX.     140.0     37.0       4.05      .42    4.89   8.4  4.91   8.3 |
| MIN.      74.0     37.0      -1.32      .24     .17  -5.1   .17  -5.2 |
|---------------------------------------------------------------------|
| REAL RMSE    .31 TRUE SD    .63 SEPARATION 2.05 PERSON RELIABILITY .81|
|MODEL RMSE    .28 TRUE SD    .65 SEPARATION 2.35 PERSON RELIABILITY .85|
| S.E. OF PERSON MEAN = .07                                            |
-----------------------------------------------------------------------
PERSON RAW SCORE-TO-MEASURE CORRELATION = .99
CRONBACH ALPHA (KR-20) PERSON RAW SCORE "TEST" RELIABILITY = .83

     SUMMARY OF 37 MEASURED ITEM
-----------------------------------------------------------------------
|          TOTAL                        MODEL      INFIT      OUTFIT    |
|          SCORE    COUNT    MEASURE    ERROR    MNSQ  ZSTD  MNSQ  ZSTD |
|---------------------------------------------------------------------|
| MEAN     301.7    104.0        .00      .17    1.00    .0  1.00    .0 |
| S.D.      41.5       .0       1.03      .01     .21   1.5   .22   1.5 |
| MAX.     373.0    104.0       3.55      .20    1.42   2.4  1.43   2.4 |
| MIN.     144.0    104.0      -2.15      .14     .55  -3.4   .56  -3.4 |
|---------------------------------------------------------------------|
| REAL RMSE    .17 TRUE SD   1.01 SEPARATION 5.85 ITEM   RELIABILITY .97|
|MODEL RMSE    .17 TRUE SD   1.01 SEPARATION 6.11 ITEM   RELIABILITY .97|
| S.E. OF ITEM MEAN = .17                                              |
-----------------------------------------------------------------------
UMEAN=.0000 USCALE=1.0000
ITEM RAW SCORE-TO-MEASURE CORRELATION = -.99
```

The rasch model reliability criteria according to (Sumintono & Widhiarso, 2015) are as follows:

Table 6. Cronbach's Alpha Reliability Criteria in the Rach Model

Value	Criteria
< 0.5	Poor
0.5-0.6	Poor
0.6-0.7	Fair
0.7-0.8	Good
> 0.8	Very good

Table 7. Person and Item Reliability Criteria in the Rasch Model

Value	Criteria
< 0.67	Weak
0.67-0.80	Fair
0.81-0.90	Good
0.91-0.94	Very good
> 0.94	Excellent

Based on the results of the reliability test and the reliability criteria for the life satisfaction scale, it is known that the Cronbach's alpha value is obtained at 0.83, which means it is in the good category. For person reliability, it is obtained at 0.81 which is in the good category. While the reliability of the item is obtained at 0.97 which is in the excellent category. It can be concluded that in essence, the reliability test results show that the life satisfaction scale has a very good level of reliability.

Undimensionality Test

To find out whether the life satisfaction scale can measure life satisfaction, an undimensionality test is conducted. The following are the results of the undimensionality test of the life satisfaction scale in the figure below.

Table. 8 Undimensionality Test of Life Satisfaction items

```
Table of STANDARDIZED RESIDUAL variance (in Eigenvalue units)
                                              -- Empirical --   Modeled
Total raw variance in observations     =    14.3 100.0%         100.0%
  Raw variance explained by measures   =     9.3  65.1%          65.9%
    Raw variance explained by persons  =     5.8  40.7%          41.3%
    Raw Variance explained by items    =     3.5  24.3%          24.6%
  Raw unexplained variance (total)     =     5.0  34.9% 100.0%   34.1%
    Unexplned variance in 1st contrast =     1.9  13.0%  37.1%
    Unexplned variance in 2nd contrast =     1.3   8.7%  25.0%
    Unexplned variance in 3rd contrast =     1.1   7.6%  21.7%
    Unexplned variance in 4th contrast =      .8   5.4%  15.5%
    Unexplned variance in 5th contrast =      .0    .2%    .6%
```

In the raw material variance explained by the measured part, the findings of the dimensionality test are known to be 65.1%. Assuming this criterion is met, the life satisfaction instrument meets the 20% threshold for the undimensionality test (Medvedev & Krägeloh, 2022). Beyond that, it is known that the unexplained variation in the first contrastive segment is 13.0%. If the value is less than 15% (x < 15%), it also meets the minimum criteria. Based on the results of these data, it can be concluded that the life satisfaction scale built can provide a general description of life satisfaction.

Based on the overall test of the data, it can be concluded that the life satisfaction scale by Diener has good validity, reliability and undimensionality and can be used to measure the satisfaction scale, but on the scale selection items in the results of 7 only 4 are effectively used. Life satisfaction is important in an individual's life (Özmen et al., 2021), in increasing a person's life satisfaction, one of the interventions that can be provided is the implementation of guidance and counseling. Guidance and counseling is a series of procedures to help a person overcome individual problems (Akdemir, 2023; Andra et al., 2023; Nasution & Neviyarni, 2025), one form of counseling that is effective in increasing life satisfaction can use group counseling (Bakalım & Taşdelen Karçkay, 2017; Karimi et al., 2019), group counseling with a psychodrama approach is in accordance with the individual development process and is a powerful method in restoring mental illness while studying objects related to individual relationships (Permana & Suwarjo, 2022; Pylypenko et al., 2023). \

Conclusion

The findings in this study produced a life satisfaction scale compiled by Diener with a total of 5 items with a scale choice of 1-7, on the results of the scale accuracy test resulted in 4 items that were effective for measuring life satisfaction. The validity and reliability test resulted in 5 valid and reliable items with the results of the validity value meeting the validity criteria and the reliability resulted in a Cronbach's alpha value obtained of 0.83 which means it is in the good category. Furthermore, the results of the dimensional test show that the value itself is 65.1%. With the fulfillment of these assumption criteria, the life satisfaction instrument meets the 20% threshold for the unidimensionality test. So, Diener's life satisfaction scale can be used to measure individual life satisfaction with a choice of only 4 items.

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