

Construct and criterion validity of adjustment scale for adults using the correlation and Receiver-Operating Characteristics Analysis

Iram Naz, Zaqia Bano, Razia Anjum

Department of Psychology, University of Gujrat and GC Women University, Sialkot, Pakistan

Objective: To explore the construct and criterion validity of adjustment scale for adults using correlation and Receiver-Operating Characteristics analysis.

Methodology: This cross sectional survey was conducted at Department of Psychology, University of Gujrat from July 10th to 05th August 2017. The data was collected from the adults of Gujrat city by using convenient sampling technique. We used adjustment scale for adults, screening scale for adjustment disorders: Short form and Coping Styles Scale from 93 adults using face to face interviews and self-administered questionnaire. The data were analyzed with correlation, reliability test and Receiver-Operating Characteristic analysis (ROC).

Results: The results established construct validity with convergent (.626**) and discriminate validity (no

relationship among variables). The scale also demonstrated high reliability value. While in the criterion related validity the ROC area under the curve value was .845 ($p = 0.00$). So, it confirmed that the scale has the ability to discriminate between adjusted and non-adjusted cases. The optimal cut-off point of scale was 71 at the sensitivity of 79.45% and the specificity of 75% with 92.06% Positive Predicted Value (PPV) and 50% Negative Predicted Value (NPV).

Conclusion: The adjustment scale for adults is a valid scale for use with the cut-off point of 71.

Keywords: Adults, receiver-operating characteristics analysis, adjustment disorder, coping, reliability, specificity.

INTRODUCTION

The adjustment process started with arises of a need that is difficult to attainment. Further, a person employed critical thought processing with the drive and trial and error behavior to resolve the hurdles in the attainment of that need.¹ The problem of adjustment arises where an individual accompanies a conflicting situation as the result of some conflicting barriers.² The psychological adjustment can be explained or investigated with adjustment disorder criteria. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) states that Adjustment Disorder accompanies emotional and behavioral manifestations as a result of some stressor or stresses in the time period of 3 months after the encounter of the stressor or stressors.³ About 1.4% of the general population is diagnosed with Adjustment problems without any significant clinical impairment.⁴ To measure the adjustment problems of adults it is quite necessary to have a valid scale of adjustment that can easily differentiate between the adjusted and non-adjusted cases. If a scale is not validated it is very difficult to interpret the test results as inferences about the target behavior cannot be drawn. The validation process of a scale ends up with an efficient and effective tool for the target populations.⁵ The types of validity may include content validity, face validity, construct

validity and criterion related validity.⁶

Construct validity is the assessment of the level to which a scale assessed the phenomena that it is intended to measure.⁷ Whereas criterion related validity may be defined as if a scale is shown to be effective in estimating a person's performance on some criterion measures.⁸ The current study confirmed validity with both construct and criterion related validity. The Adjustment Scales for Adults has been developed to measure the adjustment issues of adults.⁹ The scale was developed on the adjustment disorder criteria³ and Beck Model.¹⁰ The scale comprised of 48 items with 8 sub-scales related to depression, anxiety and conduct disturbance. The full scale and sub-scales reliability was in between .711 to .938 establishing the scale as reliable. The current study was conducted to validate the Adjustment Scale for Adults.

METHODOLOGY

The study was a house based cross sectional survey performed from July 10th to 05th August 2017. The population of the study was comprised of adults age above 19 years, which was approached at their homes in Gujrat using convenient sampling technique. Those age 19 below were excluded from the study. The sample selected using convenient non-probability sampling

technique. The study was approved by the Departmental Research and review committee (DRRC) and Advanced Studies & Research Board (ASRB), University of Gujrat all respondents gave informed consent.

The scale reliability, content and construct validity was already established on a large sample of 416 participants. Therefore, to confirm validation with more advance analysis a sample of 93 was recruited. The current scale was already standardized and published. The questionnaire used in the study were Adjustment Scale for Adults, screening scale for adjustment disorders: Short form¹¹ and Coping Styles Scale.¹²

The construct validity was further measured with convergent and discriminant validity. To access the convergent validity of adjustment problem scale for adults, screening scale for adjustment disorders was used. The scale was Urdu translated for the easy understanding of respondents. The scale consisted of 6 items with yes or no response options. It was hypothesized that there would be positive correlation between the two scales. For discriminant validity Coping Styles Scale in Urdu version was used. It consisted of 22 items with 5-point Likert scale.

The data were collected with face to face interview and self-administrated questionnaire. In the face to face interview, format researcher asked closed ended questions to participant and their responses were recorded on questionnaire and then analyzed using correlation and ROC analysis. The respondents were tempted to see all the items carefully and requested to choice the option that best suited the state of their mind. The identity of the respondents was kept secret to preserve their confidentiality. It was hypothesized that there would be a negative or no correlation exist between adjustment problems scale for adults and coping styles scale.

Statistical Analysis: Data were analyzed using SPSS version 20. Correlation analysis was used to measure the construct validity of the scale. Reliability test was used to determine the reliability of the scale. To confirm the criterion validity of scale, Receiver-Operating Characteristic analysis (ROC) was used. ROC analysis was used to find the optimal threshold score of the scale. Performance indices were measured against sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV). All the performance indices were calculated using the best cut-off calculated by ROC analysis. $P < 0.05$ was considered significant.

RESULTS

Table 1 showed that there is positive correlation exists between the adjustment scale for adults and screening scale for adjustment disorders: Short form establishing

the convergent validity of the scale. The correlation in convergent validity of the scale was greater than .50. Whereas, in case of discriminant validity the results indicated that there is no significant correlation exists between adjustment problems scale for adult and coping styles scale. So, the result confirmed the discriminant validity of the scale.

Table 1: Correlation between scales on depression, anxiety and conduct disturbance of adjustment for adults, screening scale for adjustment disorder and coping style scale (n = 93).

Measures	1	2	3
Adjustment Problems	-		
Adjustment Disorder	.626**	-	
Coping Style	.058	.084	-

** $P < .01$

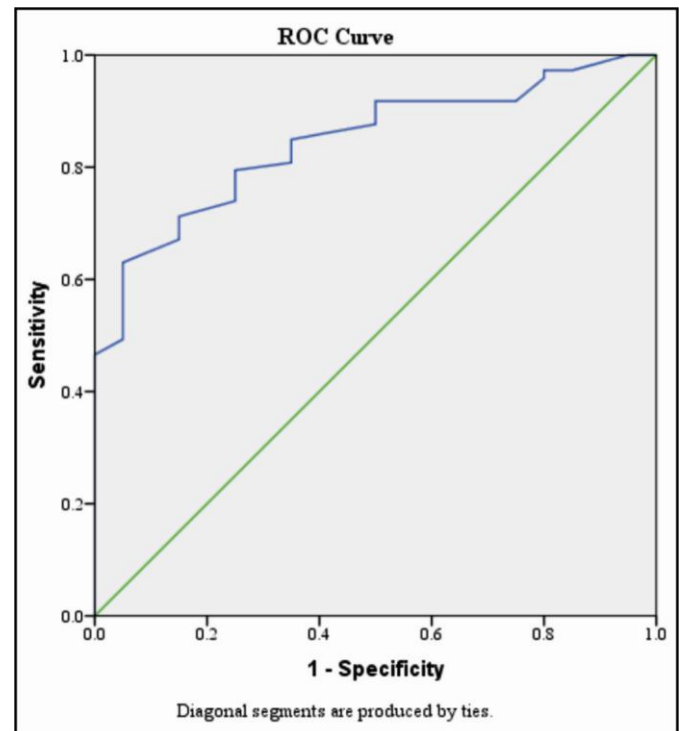


Fig. 1: ROC curve for Adjustment Scale for Adults.

The analysis indicated .929 alpha reliability values of adjustment scale for adults which is considered as high. The ROC area under the curve shown a value of .845 (95% confidence interval: .763 to .92) for adjustment scale for adults which is considered as appropriate in discriminating the adjusted and non-adjusted cases (Fig. 1).

Table 2 indicates the validity coefficients for various thresholds for the Adjustment Scale for Adults. The cut-

Table 2: Validity Coefficient for Adjustment Scale for Adults (all value expressed in percentage).

Cut-off Points	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
66	91.78	50.00	87.01	62.50
67	87.67	50.00	86.49	52.63
68	84.93	65.00	89.86	54.17
69	83.56	65.00	89.71	52.00
70	80.82	65.00	89.39	48.15
71	79.45	75.00	92.06	50.00
72	76.71	75.00	91.80	46.88
73	73.97	75.00	91.53	44.12
74	71.23	85.00	94.55	44.74
75	67.12	85.00	94.23	41.46

off point of 71 attained the high sensitivity and specificity. It can be concluded that the best discriminating performance of the Adjustment Problems Scale for Adults acquired at the 71 cut-off point. It indicated that at the cut-off of 71, the Adjustment Problems Scale for Adults correctly identifies 79.45% of adults with adjustment problems with the specificity of 75%.

DISCUSSION

The study confirmed that the scale is reliable (0.929) to use as Mendi and Mendi established that the reliability value of 0.7 and above considered as appropriate.¹³ The current scale can easily be used for measuring the adjustment problems of adults in all kind of settings and for clinical and non-clinical population. The scale was easily comprehended and completed by the population.

There is positive correlation exists between the adjustment scale for adults and screening scale for adjustment disorders: Short form. For suitable or recommended convergent validity the correlation value must be in the range of not less than 0.50 to above 0.70.¹⁴ Whereas, in case of discriminant validity if there is little or no relation exist in the two constructs than the validity is said to be established.¹⁵ The discriminant validity of the scale shows no significant correlation between the adjustment problems scale for adult and coping styles scale. The discriminant validity is established.

The ROC analysis demonstrated that the area under the curve is 0.845. It was established that if the value of area under curve is in between 0.7 to 0.9 than the scale is at moderate level of accuracy and can be used in future.¹⁶

The ROC analysis confirmed that this scale is appropriate in discriminating the adjusted and non-adjusted cases. Further, the ROC curve of a good test is above the diagonal of the graph or towards the north-western corner of the graph.¹⁷ In the case of adjustment scale for adults the curve is above the diagonal confirming the test as best.

To explore the usefulness of any test it is important to note the ability of the test in detecting an individual with the problem or exclusion of the individual without the problem. It can be discovered best with sensitivity, specificity, positive predictive value and negative predictive value.¹⁸ The study demonstrated that the optimal cut-off point of scale is 71 at the sensitivity of 79.45% and the specificity of 75%. At sensitivity of 79.45% the Positive Predicted Value (PPV) was 92.06 % and Negative Predicted Value (NPV) of 50%.

CONCLUSION

The adjustment scale for adults is a valid scale for use with the cut-off point of 71.

Author Contributions:

Conception and design: Iram Naz, Razia Anjum.

Collection and assembly of data: Zaqia Bano, Razia Anjum.

Analysis and interpretation of data: Iram Naz, Zaqia Bano, Razia Anjum.

Drafting of the article: Iram Naz, Zaqia Bano.

Critical revision of article for important intellectual content: Iram Naz, Zaqia Bano.

Statistical expertise: Iram Naz, Zaqia Bano, Razia Anjum.

Final approval and guarantor of the article: Iram Naz, Razia Anjum.

Corresponding author email: IramNaz:iram.naz@uog.edu.pk

Conflict of Interest: None declared.

Rec. Date: Feb24, 2020 Revision Rec. Date: Aug 28, 2021 Accept Date: October 14, 2021.

REFERENCES

1. Sharma S. Adjustment: Process, Achievement, Characteristics, Measurement and Dimensions. *Int J Acad Res.* 2016; 3: 42-45.
2. Sarbin TR. Adjustment in psychology. *J Personal*, 1940; 8: 240-49.
3. American Psychiatric Association. Diagnostic and statistical manual of mental disorders 5th ed. Arlington, VA: American Psychiatric Publishing, 2013: p. 286.
4. Maercker A, Forstmeier S, Pielmaier L, Spangenberg L, Brähler E, Glaesmer H. Adjustment disorders: prevalence in a representative nationwide survey in Germany. *Soc. Psychiatry Psychiatr Epidemiol.* 2012; 47: 1745-52.
5. Tsang S, Royse CF, Terkawi AS. Guidelines for developing, translating, and validating a questionnaire in perioperative and pain medicine. *Saudi J Anaesthesia*, 2017; 11: 80-89.
6. Miller LA, Lovler RL, McIntire SA. Foundations of psychological testing: a practical approach. 4thed. New York (NY): Sage Publication, 2013.
7. Strauss ME, Smith GT. Construct validity: advances in theory and methodology. *Annu Rev Clin Psychol.* 2009; 5: 1-25.
8. Gregory RJ. Psychological testing: History, principles, and applications. India: Dorling Kindersley, 2008.
9. Naz I, Bano Z, Leghari NU. Construction of Scales on Depression, Anxiety and Conduct Disturbance of Adjustment for Adults: Developing a reliable measure. *Isra Med J.* 2018; 10: 310-14.
10. Beck AT. Thinking and Depression II. Theory and Therapy. *Arch Gen Psychiatry*, 1964; 10: 561-71.
11. Boer D, Bachem R, Maercker A. ADN-6. Adjustment Disorder Screening Scale. In Komper CJ, Brähler E, Zenger M. (Eds.) Psychological and social science short scales. Standardized Survey Instruments for Science and Practice. Berlin: Medical Scientific Publishing Company, 2014: 9-11.
12. Zaman NI. Development and Validation of Coping Styles Scale: The Relationship of Coping Styles with Social Support and Psychological Well-Being of University Students, Dissertation. University of Karachi, Karachi-Pakistan, 2015.
13. Mendi B, Mendi O. Evaluation of Validity and Reliability of the Turkish Version of the E-lifestyle Instrument. *J Yasar Uni.* 2015; 10: 6624-32.
14. Carlson KD, Herdman AO. Understanding the Impact of Convergent Validity on Research Results. *Org Res Methods*, 2012; 15: 17-32.
15. Laerd Dissertation. What is divergent validity? Website [<http://dissertation.laerd.com/convergent-and-divergent-validity-p2.php>]. Retrieved on 22 September 2018.
16. Streiner DL, Cairney J. What's under the ROC? An introduction to Receiver Operating Characteristics Curves. *Can J Psychiatry*, 2007; 52: 121-28.
17. Pintea S, Moldovan R. The Receiver-Operating Characteristic (ROC) analysis: Fundamentals and applications in clinical psychology. *J Cogn Behav Psychother.* 2009; 9: 49-66.
18. Akobeng AK. Understanding diagnostic tests 1: sensitivity, specificity and predictive values. *Acta Paediatr.* 2007; 96: 338-41.