

## ORIGINAL ARTICLE

# Using RASCH analysis to evaluate anxiety assessment instruments In Postpartum Mothers

Lani Gumilang<sup>1</sup>, Desy Linasari<sup>2\*</sup>

- 1) Division of Maternal and Child Health, D4 Midwifery Study Program, Department of Public Health Sciences, Faculty of Medicine, Universitas Padjadjaran.
- 2) Department of Community Medicine, Faculty of Medicine, Universitas Jenderal Achmad Yani, Cimahi, Indonesia.

\*Corresponding author. E-mail: [desy.linasari@lecture.unjani.ac.id](mailto:desy.linasari@lecture.unjani.ac.id)

## ABSTRACT

Globally, an estimated 20% of women who give birth experience postpartum anxiety. Women, after childbirth, require both physical and psychological adaptation. If not treated immediately, postpartum mothers can experience different levels of anxiety. Anxiety in postpartum mothers can harm both mother and baby. Therefore, health workers need to detect anxiety immediately. This assessment (*Postpartum Specific Anxiety Scale*), or PSAS, helps health workers assess anxiety in postpartum mothers starting from the beginning of the puerperium. However, this measuring instrument needs to be evaluated to assess its use. A Rasch analysis is needed to accurately picture postpartum maternal anxiety. It is considered to have the ability to enhance the accuracy of statistical analysis results and increase measurement precision. This research aims to analyze the postpartum maternal anxiety assessment instrument using Rasch analysis. This study used a descriptive method with a cross-sectional research design involving 36 spontaneous postpartum mothers. The Postpartum Specific Anxiety Scale (PSAS) is the instrument used in this study. According to the results of analysis using the Winsteps program, it is known that there are 34 out of 51 items that meet the item-model accuracy index, with an alpha coefficient of 0.94. The instrument's separation item index has a value of 3.06. The *unexplained variance* value does not exceed 15%, so this instrument is ideal for use. Overall, it can be concluded that the anxiety assessment scale for postpartum mothers, namely PSAS, has good psychometric properties for assessment and research.

**Keyword:** anxiety in postpartum, postpartum mother, Postpartum Specific Anxiety Scale (PSAS), RASCH analysis instrument, validity

## INTRODUCTION

The incidence of postpartum maternal anxiety levels is still high worldwide. Indonesia is the fourth largest country at 28.7%, compared to Pakistan, Hong Kong, and Bangladesh.<sup>1,2</sup> Anxiety is the most dominant mental health disorder, affecting 25% of the world's population. This anxiety is common in women. Women experience anxiety in the first four weeks after giving birth. In addition to hormones, this also occurs due to the adaptation period to becoming a mother.<sup>3-5</sup> The impact of postpartum maternal anxiety can result in postpartum *blues*, and if left unchecked, postpartum depression can occur even with the desire to kill the baby. Postpartum blues are 3.5 times more likely at age 35 than those aged 20-35 and 3.6 times more likely in primiparous than multiparous. In addition, milk production can also decrease, which is closely related to hormones regulated by the hypothalamus. Hormones regulated by the hypothalamus work in accordance with brain commands and maternal emotions.<sup>6,7</sup> Some of these unexpected conditions require early detection by health workers (professionals) in relation to anxiety assessment in postpartum mothers. This postpartum maternal anxiety assessment can be performed in the early puerperium phase, and it can be started in the taking-in phase, which is two days after the mother gives birth. This taking-in phase is when the mother's condition is often irritable and she often cries. Therefore, in this phase, health workers and families should immediately provide assistance to prevent the mothers from excessive anxiety.<sup>8,9</sup>

Therefore, screening for anxiety in postpartum mothers is important as a form of preventing the occurrence of postpartum blues and depression. Healthcare providers can conduct anxiety screening using standardized instruments, which is related to postpartum mothers. One tool for measuring anxiety is the Postpartum Specific Anxiety Scale (PSAS). The PSAS is a research instrument designed to

mothers during postpartum period. It includes questions relate to the mother's anxiety about her abilities and interests, the baby's safety and well-being, caring for the baby, and the mother's psychosocial adjustment. This is in accordance with previous research showing that the appropriate instrument to use is the PSAS. The selection of the appropriate instrument can influence the accuracy of research results. Once screening discovers that the mother is suffering from postpartum anxiety, health workers can intervene and overcome this anxiety, so that depression and postpartum blues can be prevented. Postpartum blues is a form of mood disorder that can be detected in the postpartum phase. It occurs in the first 10 days of the postpartum phase, with its peak on days 3–5. In addition, the mother's readiness can also influence the postpartum mother's quality of life (QOL), which refers to her emotional, social, and physical condition, including the ability to carry out daily tasks<sup>20</sup>. One of health workers' roles to improve the quality of life of mothers by providing psychological support.<sup>24-26</sup>

This study focused on analyzing the instrument for early diagnosis of anxiety in postpartum mothers. The *Postpartum Specific Anxiety Scale* (PSAS) is the instrument used to assess postpartum maternal anxiety). The PSAS assessment examine four anxiety factors: competence and attachment anxiety, infant safety and well-being anxiety, infant care anxiety, and psychosocial adjustment to motherhood. Rasch's modeling provides a more effective method to addressing the natural characteristics of data compared to classical test theory, which requires converting raw score data into *odds ratios* and transforming them into logit units to represent respondents' probability of responding to a question. Rasch modeling can converts sequence responses into ratio forms with higher precision, based on the principle of probability. Rasch modelling can also predict missing data based on systematic response patterns.

Moreover, it improves the accuracy of statistical analysis results and the ability to produce more precise results.<sup>10-12</sup> Rasch modeling views attribute data as measurement and converts categorical data into interval data through logit transformations. The result's score is an actual score rather than a raw score. The calibration process in Rasch modelling involves simultaneously addressing three aspects: the measurement scale, respondents, and questions (items). Using the Rasch model in the instrument validation process will provide more comprehensive information about the instrument and better fit the measurement concept. Rasch's model analyzes question item responses and the relationship between anxiety and difficulty levels.<sup>10,13-15</sup> One of the advantages of the Rasch model is that it satisfies the five principles of the measurement model; namely, the first can provide equal intervals on a linear scale. Second, it can predict missing data. Third, it can give a more precise estimate because it does not depend only on the number of correct answers. Fourth, identify error responses and conjectures to detect model inaccuracies; fifth, produce replicable measurements. Therefore, analysis using the Rasch model can evaluate the advantages and disadvantages of the instrument well.<sup>16</sup> This study aimed to analyze the postpartum maternal anxiety assessment instrument using Rasch analysis.

## METHODS AND SUBJECTS

This research employs a quantitative descriptive approach using a cross sectional research design. The population of this study were all spontaneous postpartum mothers who visited the Ibrahim Adjie Community Health Center in Bandung City between 6 July and 6 August 2023. In addition, total sampling was used as the sampling technique. The collection of data used the PSAS questionnaire instrument, which had been translated and distributed to the

respondents of the study. The data analysis method uses a Likert scale. The inclusion criteria were all spontaneous postpartum mothers at the Ibrahim Adjie Community Health Center in Bandung City, while the exclusion criteria were respondents who did not complete the questionnaire. This research has been granted approval from the Unpad Faculty of Medicine research ethics committee number 1062/UN6.KEP/EC/2023.

The study focused on Rasch analysis of postpartum maternal anxiety assessments. The study subjects were postpartum mothers who gave birth in the first two weeks. This study used a standard questionnaire originally developed and validated by Dr. Vicky Fallon at the *University of Liverpool*. The PSAS instrument consisted of 51 questions that were tested on postpartum mothers. The answers to the presented questions used the Likert scale, from never, sometimes, often, and almost always.<sup>12</sup> The PSAS was a scale comprising 51 items designed to assess the frequency of anxieties related to maternal and infant well-being experienced by women during the first year after giving birth. This measurement tool evaluated four distinct components of anxiety specific to the postpartum period: Factor 1 (Maternal Competence and Attachment Anxieties) comprised 15 items that addressed concerns related to a mother's self-confidence, parenting abilities, and the bond with her infant. Factor 2 (Infant Safety and Welfare Anxieties) included 11 items that pertained to worries about the infant's health, safety, and well-being, including concerns about illnesses, accidents, and sudden infant death syndrome. Factor 3 (Practical Infant Care Anxieties) contained 7 items that focused on anxieties regarding the day-to-day care of the infant, such as feeding, sleep patterns, and establishing a routine. Factor 4 (Psychosocial Adjustment to Motherhood) consisted of 18 items that addressed concerns related to the mother's adjustment to her new role following the infant's birth.

The PSAS included managing personal appearance, relationships, social support, work, finances, and sleep. Each response was rated on a Likert scale ranging from 1 ("Not At All") to 4 ("Almost Always"), with a maximum possible score of 204.<sup>12,17</sup>

The output of Winsteps software provided several parameters for question items that aligned with the Rasch model. In addition, we calculated a Cronbach alpha value, which was the result of an overall grain reliability test. Meanwhile, the values of the MNSQ outfit, ZTSD outfit, and the correlation between the question items and the total score indicated whether the items fitted the model. In this context, the MNSQ outfit values in the range of 0.5 to 1.5, the ZTSD outfit values in the range of -2.0 to 2.0, and the

grain correlation values with total scores in the range of 0.4 to 0.85 indicated the match of items with the model.<sup>10,11,17-19</sup>

## RESULT AND DISCUSSION

This anxiety assessment instrument for postpartum mothers employed Rasch analysis using Winstep software. The analysis of variable maps on the right shows the ability and level of difficulty of question items that postpartum mothers can answer. Figure 1 indicates that the mother who has the highest ability to answer is respondent number 01, and the respondent who has the lowest ability is respondent number 09. The analysis of the question items reveals that the P1 questions are the most difficult, and the P17 questions are the easiest.

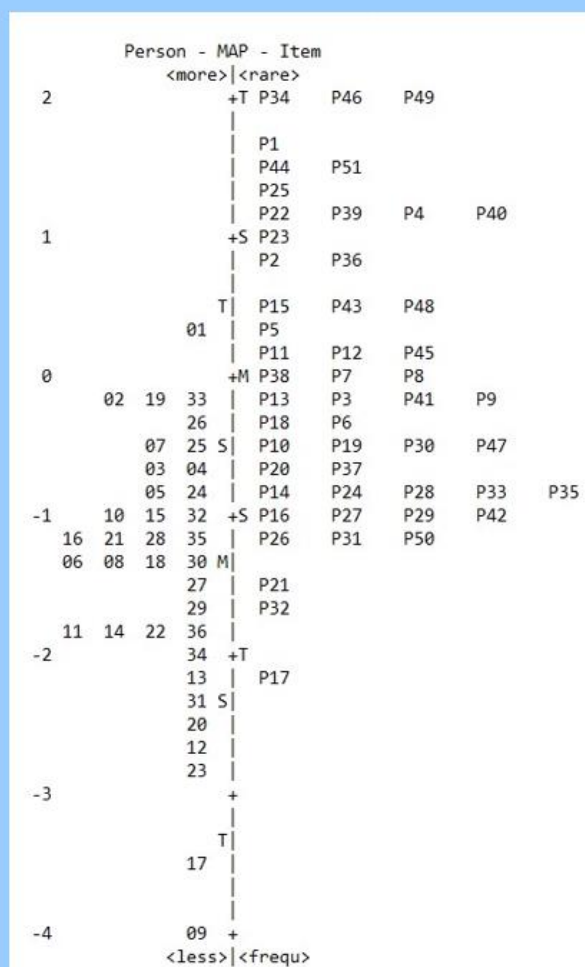


Figure 1. Variabel Maps

34 valid questions were obtained from the validity test. Valid questions must meet the following criteria: outfit mean square (MNSQ)  $0.5 < \text{MNSQ} < 1.5$ , outfit Z-

standard (ZSTD)  $-2.0 < \text{ZSTD} < +2.0$ , point measure  $0.4 < \text{Pt mean correlation} < 0.85$  (Table 1).

**Table 1.** Instrument Validity Analysis

Item Code	Statement	Fit Statistic			Interpretation
		MNSQ	ZSTD	Pt. Measure Corr	
Factor 1: maternal competence and attachment anxieties					
P1	I have had negative thoughts about my relationship with my baby	4.11	3.2	0.25	Invalid
P2	I have felt that my baby would be better cared by someone else	0.60	-1.0	0.36	Invalid
P3	I have felt insecure or unable to fulfil my baby's basic need.	0.96	0.0	0.49	Valid
P4	I have worried about the bond I have with my baby	0.91	0.0	0.51	Valid
P5	I have worried that my baby feels more content in someone else's care	0.61	-1.2	0.42	Valid
P6	I have felt that other mothers are coping with their babies better than me	0.58	-1.7	0.50	Valid
P7	I have felt that I am not the parent I want to be	0.81	-0.5	0.46	Valid
P8	I have worried I will not know what to do when my baby cries	0.92	-0.2	0.46	Valid
P9	I have worried about how I will cope with my baby when others are not around to support me	0.80	-0.7	0.49	Valid
P10	I have worried about being unable to settle my baby	0.61	-1.6	0.51	Valid
P11	I have worried that my baby is picking up on my anxieties	0.65	-1.2	0.44	Valid
P12	I have worried that my baby is less content than other babies	0.65	-1.1	0.44	Valid
P13	I have worried that other people think my parenting skills are Inadequate	0.60	-1.5	0.49	Valid
P14	I have felt that motherhood is much harder than expected	0.71	-1.3	0.55	Valid
P15	I have felt that I should not need help to look after my baby	1.62	0.29	0.40	Invalid
Factor 2: infant safety and welfare anxieties					
P16	I have worried about my baby being accidentally harmed by someone or something else	0.73	-1.2	0.57	Valid
P17	I have repeatedly checked on my sleeping baby	1.66	2.3	0.62	Invalid
P18	I have worried that my baby will stop breathing while sleeping	1.27	1.0	0.50	Valid
P19	I have felt frightened when my baby is not with me	1.13	0.6	0.51	Valid

P20	I have worried about leaving my baby in a childcare setting	2.26	3.8	0.54	Invalid
P21	I have worried about accidentally harming my baby	1.31	1.3	0.60	Valid
P22	I have thought of ways to avoid exposing my baby to germs	0.97	0.1	0.33	Valid
P23	I have not taken part in an everyday activity with my baby because I fear they may come to harm	1.6	1.3	0.35	Invalid
P24	I have worried about my baby's health even after reassurance from Others	0.74	-1.1	0.55	Valid
P25	I have worried that I will become too ill to care for my baby	0.84	-0.1	0.30	Invalid
P26	I have felt a greater need to do things in a certain way or order than before my baby was born	0.88	-0.5	0.58	Valid
Factor 3: practical infant care anxieties					
P27	I have worried about my baby's milk intake	1.14	0.7	0.56	Valid
P28	I have worried about my baby's weight	0.82	-0.7	0.55	Valid
P29	I have worried about getting my baby into a routine	0.48	-2.7	0.56	Valid
P30	I have worried about the way that I feed my baby	0.97	0.0	0.51	Valid
P31	I have worried about the length of time that my baby sleeps	0.75	-1.1	0.58	Valid
P32	I have used the internet for reassurance about my baby's health	0.79	-0.9	0.61	Valid
P33	I have worried that my baby is not developing as quickly as other Babies	0.65	-1.6	0.55	Valid
Factor 4: psychosocial adjustment to motherhood					
P34	I have felt resentment towards my partner	1.05	0.3	0.25	Invalid
P35	I have felt tired even after a good amount of rest	0.71	-1.3	0.55	Valid
P36	I have worried more about my relationship with my partner than before my baby was born	1.34	0.9	0.37	Invalid
P37	I have worried that I am not going to get enough sleep	0.96	-0.1	0.46	Valid
P38	I have worried that my partner finds me less attractive than before my baby was born	0.92	-0.1	0.46	Valid
P39	I have worried more about my relationship with my family than before my baby was born	0.97	0.1	0.33	Invalid
P40	I have worried more about my appearance than before my baby was Born	0.78	-0.4	0.33	Invalid
P41	I have worried more about completing household chores than before my baby was born	0.90	-0.2	0.48	Valid
P42	I have had difficulty sleeping even when I have had the chance to	0.73	-1.2	0.56	Valid
P43	I have felt that I do not get enough support	1.81	1.9	0.40	Invalid

P44	I have worried more about my relationship with my friends than before my baby was born	1.31	0.7	0.29	Invalid
P45	I have been less able to concentrate on simple tasks than before my baby was born	0.78	-0.6	0.44	Valid
P46	I have worried about returning to work	2.02	1.4	0.25	Invalid
P47	I have felt unable to juggle motherhood with other responsibilities	0.92	-0.2	0.51	Valid
P48	I have felt that I have had less control over my day than before my baby was born	0.82	-0.4	0.40	Valid
P49	I have felt isolated from family and friends	5.01	3.4	0.25	Invalid
P50	I have worried more about my finances than before my baby was born –	1.58	2.3	0.62	Invalid
P51	I have felt that when I do get help it is not beneficial	1.59	1.1	0.29	Invalid

The summary statistics presented in Table 2 show overall information about the respondents' quality. On this instrument, the value of person reliability is 0.93, while the item reliability is 0.90. It means that the consistency of answers from respondents and the quality of instrument items are very good. The result of Cronbach alpha value is 0.94,

which means that the interaction between the person and the item in the category is very good. The value of the separation item index in this instrument is 3.06. Linacre states that the separation item index is considered good if it exceeds the value of 2. The greater the separation value, the better the instrument's overall quality.<sup>11,21</sup>

**Table 2. Summary Statistics**

	Separation	Reliability	Cronbach Alpha
Person	3.55	0.93	0.94
Item	3.06	0.90	

The unidimensionality analysis results show that a measured value of 45.0%, explain the raw variance, indicating that this instrument is in a good

category. The value of unexplained variance value does not exceed 15%, so this instrument is ideal for use.

		-- Empirical --		Modeled
Total raw variance in observations	=	92.7	100.0%	100.0%
Raw variance explained by measures	=	41.7	45.0%	45.5%
Raw variance explained by persons	=	8.3	8.9%	9.0%
Raw Variance explained by items	=	33.4	36.1%	36.4%
Raw unexplained variance (total)	=	51.0	55.0%	54.5%
Unexplnd variance in 1st contrast	=	7.0	7.5%	13.6%
Unexplnd variance in 2nd contrast	=	5.3	5.8%	10.5%
Unexplnd variance in 3rd contrast	=	4.9	5.3%	9.6%
Unexplnd variance in 4th contrast	=	3.9	4.2%	7.6%
Unexplnd variance in 5th contrast	=	2.9	3.1%	5.7%

**Figure 2.** Output result of unidimensionality

Questionnaires to detect anxiety in pregnant women are very important because the incidence of anxiety after childbirth is higher than depression after childbirth. Anxiety during childbirth is a risk factor for depression among maternity mothers. Symptoms such as difficulty concentrating and sleep disturbances can indeed indicate anxiety problems during the puerperium. Delays in diagnosis or misdiagnosis may occur if these symptoms are ignored or not correctly identified.<sup>22</sup> Postpartum depression generates an atmosphere that doesn't support the personal growth of mothers or the best possible development of a child. Consequently, it is crucial to identify and address depression during the postnatal phase promptly to prevent detrimental outcomes.<sup>23</sup>

## CONCLUSION

According to the analysis results with Rasch modelling, this anxiety assessment instrument for postpartum mothers proved to provide stable results. It identified one consistent psychological construct (unidimensional), namely postpartum depression. Out of 51 questions, 34 are valid with an instrument probability coefficient of 0.93, an item probability coefficient of 0.90, and a respondent probability coefficient of 0.94. Instrument PSAS produces a consistent and reliable

measurement score with good item quality. The *unexplained variance* value does not exceed 15% making this instrument is ideal for use.

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