Validity and Reliability of Teachers' Psychological Well-Being Instruments in School Organizations Based on the Rasch Model Approach: A Pilot Study

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Abstract
This pilot study was to validate and examine the reliability of the psychological well-being instrument in school organizations (i-OS). This instrument consists of 130 items and was distributed to 60 teachers from two schools in the Federal Territory of Kuala Lumpur. This instrument was developed to measure four constructs namely i) job demands of teachers in schools; ii) sources of teacher employment in schools; iii) teacher's personal resources; and iv) holistic psychological well-being of teachers in schools. The Rasch Model approach was used to check the validity and reliability of the instrument through this pilot study. The Rasch model is used because this approach can measure the reliability of respondents and items and it is even stronger than just looking at Cronbach's Alpha. Winsteps Version 4.8.0.01 software was used to examine the functionality of items from the aspect of reliability and item-respondent isolation; polarity; item fit measures the construct; standardized residual correlation value; scale review; maps of individual abilities and item difficulties; and differences in item functioning (DIF) based on gender. The final analysis found that 27 items were dropped because they did not meet the inspection criteria and 8 items were refined because they partially met the inspection criteria and took into account the expert's recommendations. The final instrument showed a total of 103 items suitable for use after refinement to measure the four constructs of the i-OS instrument. Since this study is only a pilot study, distribution to real respondents can be done to measure all four i-OS constructs.
Keywords: Validity And Reliability, Rasch Model, Psychological Well-Being, School Organization

Introduction

The teaching profession in the 21st century has changed drastically. This situation indirectly causes a large impact on the health and well-being of employees due to unmanaged job demands (Velle, 2020). This is proven by several latest research done from both inside and outside the country that a career as an educator is the most job at risk of experiencing work stress, include a study by *The American Institute of Stress* in 2019 proved that the profession as a teacher is the most profession stressed by various current challenges leading to the risk of health problems seriously. It is also proven with the statistics study by Universiti Putra Malaysia as many as 71.1 percent of teachers in the Klang Valley area were having problems related to work stress caused by various school environment factors (Amin, Amir, & Ismail, 2019). While the latest Malaysian Ministry of Education report in 2021 in parliament stated that there were 4,360 teachers applying for early retirement due to health, workload, lack of interest, family, and personal reasons. Therefore, the need for current research is high to identify aspects of teacher job demands, school organizational resources, teacher personality and teacher psychological well-being in order to manage advanced interventions such as the development and prevention of teacher health and well-being. In this effort, the development of an instrument for the psychological well-being of teachers in school organizations (i-OS) in particular is expected to be the main indicator in identifying the level of teacher's work demands, school organizational resources, teacher's personality and holistic psychological well-being of teachers.

Following that, the development of a quality instrument needs to have good psychometric properties so that the instrument really measures what it is supposed to measure. The validity and reliability of an instrument used is the most important thing (Noraini 2013). Therefore, to ensure that the instrument has good validity and reliability, a pilot study was carried out. Next, the researcher conducts an analysis to see the level of validity and reliability of the instrument with the Rasch Model approach. Through this approach, the examination for each item can be done in more depth, compared to the classical test theory approach which only looks at Cronbach's Alpha value alone. Through this Rasch Model approach, some in-depth analysis can be done such as checking the functionality of each item.

Literary Highlights
Job Demands-Resources Theory (JD-R)

In the 21st century, the Job *Demands-Resources* (JD-R) theory introduced by (Demerouti, Bakker, Nachreiner , & Schaufeli (2001) has become very popular among researchers today. It became popular possibly because the theory assumes health or employee well-being is from the balance of job characteristics between positive (job resources) and negative (job demands). In addition, the JD-R theory is also flexible and suitable for any job field. In 2004, the JD-R model was revised by Schaufeli and Bakker by including well-being or work engagement in addition to burnout and considering burnout and worker well-being as mediators of the relationship between job demands and health problems, as well as job resources and work performance. The latest JD-R theory suggests that high job demands cause stress and disorders of health and psychological well-being. While high work resources (job resource) lead to increased motivation and higher productivity (motivational process). In addition, personal resources are also used as variables that will have a positive influence on job demands and psychological well-being of employees.

i.   Teacher Job Demands

Bakker & Demerouti (2007) explained that job demands are from the aspects of physical, psychological, and social demands that require continuous physical and psychological ability from employees. Among the job demands are time pressure, work pressure, workload, relationship conflicts between employers, employees and customers, role ambiguity, and an unhealthy work environment. A study conducted by Kyriacou and Chien (2004) found that workload is the main cause of work stress among teachers. Responsibility which is excessive will increase the level of work stress among teachers. The reality now is, teachers have been burdened with various administrative tasks that have become their job routine, such as filing in forms, collecting fees, reporting data and so on. While the research findings from Baharin and Mariam (2010) found that the workload factor is the main factor that causes teacher stress. The findings also found that teachers had to do clerical work in their assignments. In addition, they do not have enough time to check the students' exercise book.

ii.   Teacher Job Resources

Bakker & Demerouti (2018) Job resources are organizational resources from physical, psychological and social aspects that are able to reduce workload, function in achieving organizational goals, and support employee career development. Among the job resources in the organization are autonomy, social support, role clarity, career opportunities, competency improvement programs, and facilities' access. A study by Salina (2018) found that social support has a significant relationship and is a predictor of the psychological well-being of teachers at school. Whereas, autonomy refers to the freedom of teachers in making decisions related to their teaching and learning so that it can be adapted to the situation and students they teach. This is in line with the opinion of Rohani, Hazri, and Mohammad (2017) that insists teachers who are effective in using Learning and Facilitation of the 21st century are able to adapt the teaching material with the real life of students will stimulate student engagement because the adaptation of these teaching materials gives meaning to their lives. Furthermore, this facility resource refers to the provision of physical facility resources to assist teachers in carrying out their duties and responsibilities smoothly. If these resources fail to be provided, then it will affect the psychological well-being of teachers at work such as stress, depression, and conflict. The explanation of this meaning is in line with the findings of studies by Tajulashikin (2013), Shakeel (2011) and Abdilah & Woo (2010) who found that facility resource constraints are among the factors affecting teacher stress and pressure in school organizations.

iii.   Teacher's Personal Resources

Bakker & Leiter (2010) personal resources are positive self-evaluations related to resilience and refer to the individual's ability to control and influence their environment. Personal resources consist of self-efficacy, optimism, and motivation. In the school context, the teacher's attitude of openness to accept changes in the education system is necessary. This is because every organization will experience changes according to time, leadership and demand. The study of Mascall, Leithwood, Straus and Sacks (2008) found that teachers' optimistic attitude can be an effect on the development of a variety of leadership styles. While the study by Selcuk (2020) found that the higher teacher's self-efficacy, the higher the work performance that involves the teacher's commitment to the organization and their involvement in performing tasks. Motivation is also part of the teacher's personal resources and can influence the workplace environment. Previous study by Arzizul & Dg (2018)

explained that teachers who have high motivation are more likely to carry out tasks efficiently and subsequently can reduce the workload.

iv.   Psychological Well-Being of Teachers

Well-being is a concept of mental health, where mental health is divided into three components of well-being, namely subjective well-being, psychological well-being and well-being at work (Page & Vella- Brodrick 2009). Dagenais-Desmarais & Savoie (2012) explained that psychological well-being at work refers to the depiction of subjectively positive experiences by individuals at work, especially with a eudemonic view, which can realize their positive potential at work. Psychological well-being at work is a more specific psychological well-being, the possibility of better outcomes. In addition, they also explained that psychological well-being and psychological well-being at work have the same conceptual framework, but psychological well-being at work shows the uniqueness of the definition of the construct related to work and organization. Teachers who endure and experiencing stress at work continuously have an impact on unstable emotions and affect the quality of work and personal well-being of teachers (Collie et al. 2015). a study by Lee (2020) examines the relationship between work stress and the psychological well-being of teachers in SJKC Kulai District. The findings of the study show that work pressure has a significant relationship with the psychological well-being of teachers.

Item Response Theory (TRI)

Rasch model is based on the item response theory approach that allows the researcher to revise the instrument (add or remove items), detect *bias* that may exist in the measurement, and can facilitate the researcher to communicate the findings of the study such as using the *Wright Map* that can compare the order of individual abilities and difficulties items clearly (Boone et.al 2014). The basic principle of the Rasch model is to convert raw data or ordinal data into interval data based on probability and apply the logarithmic method, which makes it a log-linear model because it produces measurements using logit units (Linacre 2010). Using the Rasch model, item difficulty and individual ability are placed on the same linear scale column because it is assumed that all items have different discrimination indexes and each item is calculated only as a difficulty parameter (Bond & Fox 2015). Rasch model analysis can address some of the shortcomings of classical test theory because it can detect missing data, make validity and reliability measurements of individuals and item calibration, measure individuals and items on the same metric and are not dependent on the sample (Bond & Fox 2015; Bradley et al. 2015).

Item Response Theory method has the advantage of analyzing in detail up to the item and individual level (Bond & Fox 2015; Linacre 2010; Siti 2008), compared to the classical test theory which has many limitations that can affect the accuracy of measurements and further analysis (Siti 2018). Among the limitations of classical test theory are related to item statistics, individual statistics, model assumptions that are easily satisfied by the data, reliability estimates associated with the length of an instrument, and assuming measurement error is the same for all candidates. Item response theory can address the limitations of classical test theory (Meyer & Zhu 2013). Mohd (2015) suggested the use of the Rasch measurement model to overcome the limitations of classical test theory.

By using the Rasch Measurement Model approach, the researcher examined the functionality of the items from the aspect of (i) reliability, and item-respondent separation; (ii) detect the polarity of items that measure the construct based on the PTMEA CORR value;

(iii) appropriateness (fit) of items measuring the construct; and (iv) determine the dependent item based on the standardized residual correlation value. These four diagnoses complement the conditions necessary to examine the construct validity and reliability of the instrument.

Objectives of the Study

The objective of this pilot study is to test the validity and reliability of the instrument that has been developed. A pilot study is conducted before the actual study is conducted. A pilot study needs to be conducted to reduce errors in the actual study because the reliability and validity of the questionnaire used needs to be tested first. Through this pilot study, the researcher conducted testing of item functionality from the aspect of reliability and item-respondent separation; detect the polarity of items that measure constructs based on PTMEA CORR values; the appropriateness (fit) of items measuring the construct; and determine the dependent item based on the standardized residual correlation value.

Methodology

The pilot study conducted is a survey study involving quantitative methods using questionnaires and presented using the Rasch Measurement Model approach . Quantitative data was collected through questionnaires. The researcher distributed a set of questionnaires to teachers in two schools in the Federal Territory of Kuala Lumpur after being suggested by the Psychology and Counseling Sector, State Education Department. Next, the researcher conducted a clustered random sampling technique to select a sample of 60 teachers from the two schools as the study sample. According to Johanson and Brooks (2010) the minimum number of respondents of 30 people is sufficient to analyze the validity and reliability in the preliminary study. The questionnaire that will be prepared is divided into five parts, namely part A (demographics), part B (teacher job demands), part C (teacher job resources), part D (teacher personal resources) and part E (psychological well-being holistic teacher). The breakdown of the survey form can be seen as in Table 1.

Table 1
Item content according to the construct in the instrument.

Section	Construct	No. Item	Total Items
Section B	Teacher job demands	A1 – A23	23
Section C	Teacher job resources	B24 – B56	33
Section D	Teacher's personal resources	C57 – C84	28
Section E	Holistic psychological well-being of teachers	D85 – D130	46
		Total	**130**

Study Findings and Discussion

By using the Rasch measurement model approach, the researcher examines item functionality from the aspects of (i) reliability and item-respondent separation; (ii) detect the polarity of items that measure the construct based on the PTMEA CORR value; (iii) appropriateness (fit) of items measuring the construct; and (iv) determine the dependent item based on the standardized residual correlation value. The explanation for each item functionality check is as follows.

Item Reliability and Separation

The level of reliability of the study can be determined by using the interpretation of Cronbach's Alpha value which has a range between 0.00 to 1.0. If the value of the range is close to 1.0, it shows that the level of reliability is at a good, high, and effective level. Whereas, the range that is close to 0.00, it depicts a low level of reliability (Yusof, 2004). The findings of the pilot study analysis found that the reliability value referring to the Cronbach's Alpha value is 0.98 as shown in Table 2. This shows that the instrument is in a very good condition and effective with a high level of consistency and thus can be used in real research (Bond & Fox, 2015).

Table 2
Cronbach's Alpha Score Interpretation Table (Bond & Fox, 2015)

Cronbach's Alpha Score	Level of Reliability
0.8 to 1.0	Very good and effective with a high level of consistency
0.7 to 0.8	Good and acceptable
0.6 to 0.7	Acceptable
<0.6	Item needs repair
<0.5	Items need to be dropped

Based on figure 1, it shows the statistics of the respondent's reliability value (*person reliability*) and item reliability (item reliability) which are acceptable respectively which are 0.96 and 0.93. While the value of the separation index (*separation index*) of individuals and items shows a good separation index value that exceeds the value of 2.0, which is respectively at the value of 5.21 and 3.70. According to Linacre (2010), a good isolation index is greater than a value of 2.0.
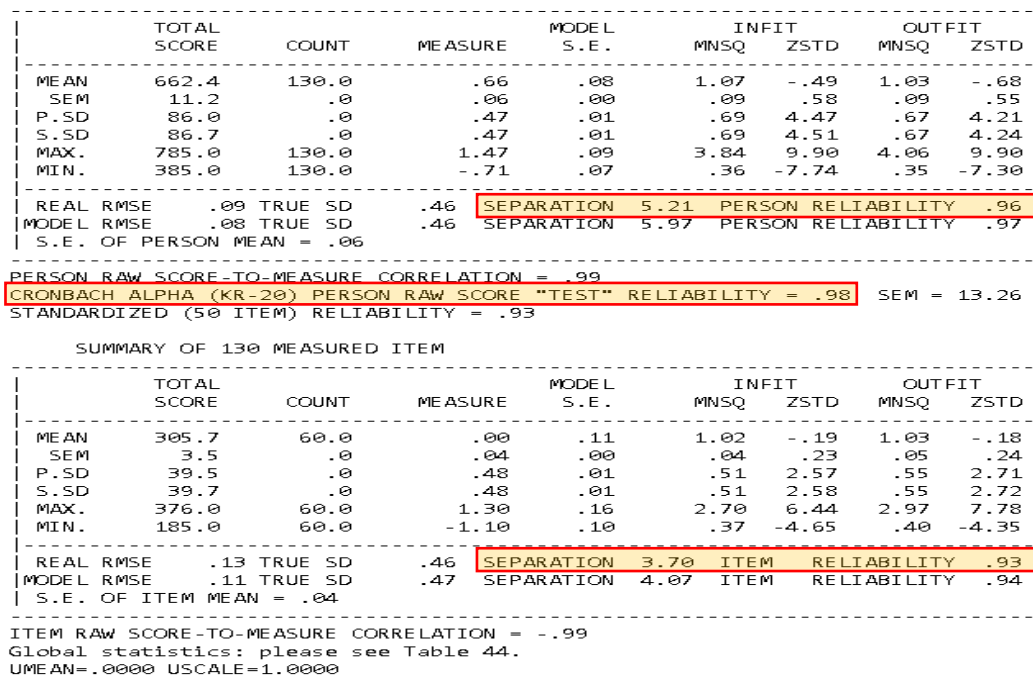

Figure 1 Individual - Item Reliability and Separation Values for the Entire Construct of the i-OS Instrument for the first test

Polarity Items Through PTMEA CORR

Point Measure Correlation (PTMEA CORR.) value check is to detect the polarity of items aimed to test how far the construction of the construct achieves its goal. If the PTMEA CORR value is a positive value (+), it indicates that the item measures the construct that is intended to be measured (Bond & Fox, 2015). If the value obtained is negative (-) it means that the developed item does not measure the construct that is intended to be measured. Then it needs to be repaired or dropped because the item is not directed to the question or is difficult for the respondent to answer.

The obtained PTMEA value should preferably have a positive value and exceed 0.3 logits (Bond & Fox 2015; Wu & Adams 2007). The findings of this analysis show that all PTMEA values are positive and exceed 0.3 logit for all items on the construct of teacher job demands and teacher job resources with a range of logit values between 0.38 to 0.78 as shown in Table 3.

Next, for the teacher's personal resource construct, only 26 items have a positive PTMEA value and exceed 0.3 logit, which is a logit range between 0.35 to 0.88 logit. While two items namely items C66 and C67 are at PTMEA values below logit 0.3 and negative values. This finding is also the same as the PTMEA value for 46 items on the teacher's holistic psychological well-being construct . There are 43 items out of all the items that have a positive PTMEA value and exceed 0.3 logit which is the range of logit value between 0.35 to 0.88 logit, while the remaining three items are at PTMEA values below logit 0.3 and negative values, namely items D88, D89, and D93. As a result of this analysis, 125 items can measure each construct, when this item is at a positive PTMEA value and exceeds 0.3 logit. While the remaining five items will be dropped because they cannot accurately measure the construct to be measured.

Table 3
Analysis of item polarity by construct

Construct	Number of items	No. items + ≥ 0.3 PTMEA	No. items - < 03 PTMEA	Dropped Items
Teacher job demands	23	23	0	0
Teacher job resources	33	33	0	0
Teacher's personal resources	28	26	2	C66, C67
Holistic psychological well-being of teachers	46	43	3	D88, D89, D93

Item Fit

The fit value of the item that is the value of infit and outfit mean square (MNSQ) conforms to the setting range of the item with a value of 0.5 to 1.5 logit (Boone et al. 2014; Sumintono & Widhiarso 2014). In addition, the ZSTD outfit value also needs to be in the range of -3 to +3 (Sumintono & Widhiarso 2014). But according to Linacre (2010), if the MNSQ is acceptable then the ZSTD value can be ignored. Bambang (2015) and William et al. (2014) stated that the MNSQ outfit value and the MNSQ infit value are enough to ensure that the items developed are appropriate to measure the construct. Therefore, for this study the MNSQ outfit value will be given priority in checking the fit of the item, if the MNSQ outfit value does not meet the criteria, the MNSQ infit value, and ZSTD are also taken into account in making judgments for

an item to be dropped or refined according to the needs of the study and expert recommendations.

Table 4 shows that there are 20 items in the logit range of MNSQ outfit criteria. While three items in the misfit category because the values are outside the MNSQ logit range, namely items A3, A4 and A23. When looking at the MNSQ outfit value for item A3, and A4 still carry a value of 2.0 logit, this means that this item is less successful to measure but not weak (Linacre JM 2010). Therefore, these three items (A3, A4, and A23) will be refined by looking at the needs of the study and expert opinion and taking into account the PTMEA correlation value is at a positive value and above 3.0 logit. If the PTMEA correlation value is a positive value (+), it indicates that the item measures the construct that wants to be measured (Bond & Fox, 2015). While for the construct of teachers' employment resources, there are 32 items that meet the MNSQ outfit criteria. There is one dropped item; item B28 is above 1.5 logit outfit MNSQ and is considered a confusing item.

Table 4
Analysis of fit of items according to construct

| Construct | Total of items | No. Item | | Item | |
		MNSQ outfit range 0.5-1.5)	outside the range of MNSQ outfit	Pure	Fall
Teacher job demands	23	20	3	A3, A4, A23	-
Teacher job resources	33	32	1		B28
Teacher's personal resources	28	17	11	C69, C76, C78, C81	C61, C63, C64, C66, C67, C71, C73
Holistic psychological well-being of teachers	46	35	11		87, 88, 89, 93, 100, 102, 103, 111, 115, 117, 120.

The next findings show that 17 items out of 28 items from the teacher's personal resource construct are compatible with meeting the MNSQ outfit criteria. While 11 items are outside the MNSQ outfit range, namely items C61, C63, C64, C66, C67, C69, C71, C73, C76, C78, and C81. After referring to experts and looking at the needs of the study, items C69, C76, C78 and C81 will remain with refinement because the PTMEA correlation value is positive and over 0.3 logit. In addition, items C76, C78, and C81 are also considered too predictable by respondents but can measure constructs and subconstructs. While item C69 is considered fit when the MNSQ infit criteria is in the required range. Next, seven other items namely items C61, C63, C64, C66, C67, C71 and C73 will be dropped. Finally, the findings for the teacher's holistic psychological well-being construct show that 35 items meet the MNSQ outfit item suitability criteria. While there are 11 items dropped because they are outside the MNSQ range, namely items D87, D88, D89, D93, D100, D102, D103, D111, D115, D117 and D120.

Measurement of Standardized Residual Correlations
Measurement of the standardized residual correlation value is able to detect local dependence, *i.e.* whether the item is dependent or not between items and other items. Local

dependence can occur if there is a high positive correlation value. According to Linacre (2010)**,** if the correlation value of both items exceeds 0.7, it shows that the items are interdependent and not singular. So Linacre (2010) suggested that only one item be selected to be used in measurement. He added that in order to produce a good and quality instrument, one of the items needs to be dropped. Item selection refers to the MNSQ value, where a value close to 1.00 will be retained (Linacre, 2010).

The results of the analysis in Table 5 show that there are 14 matching items with a high residual correlation standard value of 0.71 to 0.91. The range that meets the condition of local independence is the correlation value less than 0.70 (Linacre 2010). This means that these items have the same measurement or combine some other shared dimensions together Therefore, this item should be given attention to and one item should be dropped for each pair of items involved. If referred to the MNSQ value as shown in the diagram of the items involved, the necessary items to be dropped are only A10, A12, B26, B32, B37, D92, D113, and D124. Item selection which needs to be eliminated should also be aligned with the items that are dropped based on negative item value PT MEASURE CORR. as discussed in the previous analysis this. However, the MNSQ value closest to 1.00 has been retained, namely items A11, B25, B31, B36, B38, B39, C82, C84, D91, D114, D125, and D126.

Table 5
Standard value of the highest residual correlation on pairs of items

Correlation	Item	MNSQ outfit	Status	Item	MNSQ outfit	Status
0.91	B37	1.48	Drop	B38	1.14	Stay
0.89	B25	0.84	Stay	B26	0.82	Drop
0.88	D124	0.73	Drop	D125	0.83	Stay
0.86	A10	1.16	Drop	A11	1.00	Stay
0.86	D91	0.75	Stay	D92	0.61	Drop
0.83	B38	1.14	Stay	B39	0.99	Stay
0.82	D125	0.83	Stay	D126	0.75	Stay
0.80	A11	1.00	Stay	A12	0.78	Drop
0.79	B37	1.48	Drop	B39	0.99	Stay
0.79	D124	0.73	Drop	D126	0.75	Stay
0.78	B36	1.28	Stay	B37	1.48	Drop
0.73	C82	0.88	Stay	C84	0.79	Stay
0.73	D113	0.67	Drop	D114	0.81	Stay
0.71	B31	1.02	Stay	B32	1.09	Drop

Purification and Dropping of i-OS Items
After a rigorous analysis process using the Rasch measurement model, there are 37 items that do not pass the criteria of item appropriateness, item polarity and measurement of standardized residual correlation values. Removal and item refinement is done by referencing and fetching count the opinions and evaluations of experts again. The summary of the whole related items is in Table 3.31 as follows.

Table 6
Number of items refined and dropped

Construct	Total original item	Number of items refined	Number of dropped items	Number of items retained
Teacher job demands	23	3	2	21
Teacher job resources	33	1	4	29
Teacher's personal resources	28	4	7	21
Holistic psychological well-being of teachers	46	0	14	32
Total	**130**	**8**	**27**	**103**

Conclusion
Based on these findings, the researcher made a conclusion that validity and reliability are aspects which is very important and should be considered in develop a new instrument for a study. 27 dropped items are doubtful items of its validity and reliability making the sum left are only 103 items. So based on validity and reliability checks, the i-OS instrument has undergone item refinement and subsequently has good psychometric characteristics to be carried out for real studies.

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