Development and validation of the Zadrian-Ifdil Problem Checklist (ZIPC) for college student

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ABSTRACT

The variety of problem conditions and the specific dynamics of college student demographics demands a holistic measurement. Various measurements to reveal the attributes of students' problems have been developed in Indonesia, but they are not optimal because they are still partial. Even though a holistic measurement tool has been developed, its effectiveness is still a matter of debate, especially in measuring instrument duration and the number of items that are too large. The development of the Zadrian-Ifdil Problem Checklist (ZIPC) measuring instrument aims to obtain an effective and efficient measuring tool in identifying problems experienced by students daily. This study consists of three phases: item development, testing, validation, and item revision. The sample involved in this study were 639 people spread all over Indonesia. Analysis and validation of measuring tools using the Rasch model approach. The development and validation results revealed that the student version of ZIP-C was reliable and valid to reveal daily personal problems in 8 variables of problem conditions and 50 items. This measuring tool can be used for research purposes and practice services and mental health interventions by professionals.

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Introduction

College students are generally in the late adolescent or early adulthood development stage when they first enter college (Akeman et al., 2020; Cooper, 2018; Hui, 2020; Karris Bachik, Carey, & Craighead, 2020; Rehman, Bhuttah, & You, 2020; Tarescavage, Forner, & Ben-Porath, 2020). These conditions make college students experience many changes and role changes, and must adapt to these conditions. Transitioning from high school, which is generally still under parental control (especially in Indonesia), living separately from parents, finding a new environment, and experiencing cultural changes is a process that students must go through. The changing of conditions is dominant for new students and students who are about to complete their studies (García Cruz, Valencia Ortiz, Hernández-Martínez, & Rocha Sánchez, 2017; B. Kim, Lee, & Lee, 2020; Peltz, Rogge, Bodenlos, Kingery, & Pigeon, 2020).

The increase in demands that coincide with the stages of development that occurs in students is also a manifestation of students' maturity (Liu et al., 2020; Mehta & Dementieva, 2017; Mohr & Rosén, 2017). College students were the individuals who are initially dependent on their parents first. When they become

part of the college community, they must be responsible for themselves (da Silva et al., 2020; Tian & Heppner, 2018; J. Zhang, Lanza, Zhang, & Su, 2015). They have independent career planning, find passion in their future, determine the right social circle with their personalities, adapt themselves to academic guidance, carry out financial management independently, and many changes in other demands. Besides, lifestyle is also a determining factor in determining maturity at this stage of development (Y. R. Kim et al., 2018; Vasko et al., 2019; Y. J. Zhang et al., 2019).

However, not a few students experienced problems in adapting to these changes and demands (Chang et al., 2017; da Silva et al., 2020; Hunt, Forbush, Hagan, & Chapa, 2017; Schroder, Dawood, Yalch, Donnellan, & Moser, 2015). The occurrence of maladaptive behavior to flight to drugs due to depression and excessive stress is also an issue for students. Besides, the mismatch between majors and self-desire or ability is also a significant problem for students, so it often results in students' failure to complete their college studies (Chou et al., 2015; da Silva et al., 2020; Preddy, McIndoo, & Hopko, 2013; Yılmaz Irmak, Aksel, & Thompson, 2016). These various problems describe the complexity of the problems as a manifestation of the changes and demands of the stages of development experienced by students.

The diversity of problems that the students have the potential to experience requires proper and serious handling efforts (Chou et al., 2015; da Silva et al., 2020; B. Kim et al., 2020; Morán, Olaz, & Del Prette, 2015; Tian & Heppner, 2018). Handling of problems, especially those related to students' mental health, should be carried out by professionals in counseling and psychological services. The accuracy of student mental health services is very dependent on the assessment process carried out. Comprehensive measurement is the key to handling these various student problems. Measurements taken in order to handle student problems should be done comprehensively (da Silva et al., 2020; Tian & Heppner, 2018; Walker & Stephens, 2014; Yan, Li, & Sui, 2014). Mapping the overall condition of students becomes the basis for consideration in providing services and the right approach. The level of service accuracy is also a determinant of handling student problems in the counseling session.

The development of measuring instruments to map the psychological conditions and problems of students has been carried out for years, especially in the realm of counseling services (Basu, Samanta, Basu, & Bhattacharya, 2018; Fogaca, 2019; Reiland, 2017). Various instruments have been validated to get the psychological attributes of students precisely. However, the conditions of social dynamics and changes in service targets' characteristics make measurement tools also have to adjust for these changes. Changes or revisions to measuring students' problems should adjust to the characteristics of the measuring objectives themselves. Research that researched out in the last decade shows that there has been a change in generations' characteristics, especially concerning exposure to technology cross-cultural changes brought about by technology itself (Li et al., 2008; Preddy et al., 2013). The measuring instrument's target character for the condition of these psychological problems is often called the millennial generation; where the character is faster in mastering technology, is more likely to want simple literacy, is quick in making decisions so that he tends to dislike measuring instruments with many items (Fogaca, 2019; Klanecky, Ruhnke, & Meyer, 2019; Reiland, 2017).

Besides, the measuring instrument should also be upgraded and adjusted to its validity and reliability. If the measuring instrument is no longer able to meet the requirements as an excellent measuring instrument, adjustments and changes should be made by re-standardizing or developing a new measuring instrument that is more comprehensive, complex, but effective (Li et al., 2008; Preddy et al., 2013). With the complexity and need to map the problems experienced by students and for the benefit of counseling and mental health services, it is necessary to develop instruments that adapt to students' problems. According to millennial characteristics, these instruments need to comprehensively cover all aspects and psychological attributes and apply them to students' various platforms. This research aims to created, development and validation of the Zadrian-Ifdil Problem Checklist (ZIPC). The instrument is used to comprehensively map the condition of students' problems from various points of view but still pay attention to the target measuring instrument's characteristics.

Method

Participant

This study involved 639 respondents from all over Indonesia. The instrument was developed considering the representation of each region in Indonesia. The sample demographics are dynamic and varied in terms of gender, region, and current semester. Table 1 describes the conditions of the distribution of respondents based on demographics. Respondent data was collected by first filling in the consent form to use

the data for research and development purposes. The validity and quality of sampling are preceded by the judgment of measurement and psychological experts.

Sampling was carried out following measurement rules that prevent α and β errors. (Chi, Glueck, & Muller, 2019; Ramos-Guajardo, González-Rodríguez, & Colubi, 2020). The error limit value is measured using the help of G*Power analysis. To get a proper sample power in order to generalize the research results with an actual power of 0.95, an analysis was carried out so that the total sample value was 96 respondents. Thus, the minimum requirements for sampling in this research have been met.

Table 1. Sample Demographics

Respondent Demography		Samples	%
Gender	Male	240	37,56
	Female	399	62,44
Region	Sumatra	192	30,05
	Java	251	39,28
	Kalimatan (Borneo)	50	7,82
	Southeast Nusa Islands	67	10,49
	Bali	43	6,73
	Sulawesi	11	1,72
	Papua	25	3,91
Semester	1-2	158	24,73
	3-4	193	30,20
	5-6	191	29,89
	7-8	62	9,70
	9-10	35	5,48

Measurements

This study aims to produce a valid, reliable, practical, and effective instrument to measure the conditions of students' problems in Indonesia. With this aim, the instrument developed is an instrument that meets a suitable measuring instrument's minimum requirement. The instrument developed in this research is the Zadrian-Ifdil Problem Checklist (ZIPC), which has first gone through development, revision, and refinement according to scientific methods and principles.

The instrument's development was first carried out by analyzing the condition of the problems that students tend to experience in general. Then do the problem variable grouping. Experts in psychology and counseling are asked for input during the Focus Group Discussion to gain insights regarding the material and content of the instruments being developed. Expert validation is carried out to maintain the instrument's quality and the suitability of the instrument to the construct being developed. Quantitatively, the analysis results are presented in the research results in this manuscript.

Data Analysis

The data collected was then analyzed to see the instruments' suitability developed with the minimum requirements of psychological measuring instruments. To analyze the research results quantitatively and produce coefficient values of validity and reliability, testing was carried out using Rasch Analysis. This procedure was carried out by considering the analysis accuracy while reducing its impact error. However, analysis of the product using the Rasch Model approach was performed with Winstep 3.72 software (Ardi et al., 2019; Syahniar et al., 2018).

Results and Discussions

The analysis results from the development of the Zadrian-Ifdil Problem Checklist (ZIPC) measuring instrument are presented following the results of the Rasch modeling analysis.

Reliability

The consistency of item and respondent data on the measuring instrument developed can be seen in Table 2. The item reliability condition is 0.99; this value indicates that the item reliability is superior (> 0.94). The

separation index condition also shows that the diversity of the item group is magnificent (above 3.0). This result shows that each item's differences can be observed and understood well by the respondents. While the value of the respondents' separation index is 2.64, it can be interpreted that this data source is quite heterogeneous with the presence of 3 groups of respondents. The interaction of reliability between items and respondents formed a Cronbach α value (KR21); this indicates that the consistency of respondents' answers to items was excellent.

Table 2. The ZIPC Reliability

	Mean	SD	Separation Index	Reliability	Chronbach α
Person	.07	1.65	2.64	.87	.93
Item	.19	1.50	10.77	.99	

Unidimensionality Test

Undimensionality is one of the prerequisites in instrument analysis using item response theory. Undimensionality is intended so that the measuring instrument only measures a concept that is intended. In this case, the Rasch model analysis uses Principal Component Analysis (PCA) of the residuals, which measures the extent to which the instruments' diversity measures what should be measured.

Table 3. The Undimensionality of ZIPC

	Empirical		Modeled	
Total raw variance in observations	98,93	100.0%		100.0%
Raw variance explained by measures	34,93	35.3%		35.1%
Raw variance explained by persons	9.31	9.4%		9.4%
Raw Variance explained by items	25.61	25.9%		25.8%
Raw unexplained variance (total)	64.0	64.7%	100.0%	64.9%
Unexplned variance in 1st contrast	3.5	3.6%	5.5%	
Unexplned variance in 2nd contrast	2.6	2.7%	4.2%	
Unexplned variance in 3rd contrast	2.4	2.5%	3.8%	
Unexplned variance in 4th contrast	2.1	2.2%	3.4%	
Unexplned variance in 5th contrast	2.0	2.1%	3.2%	

Table 3 shows that the results of measuring the diversity (raw variance) of data are 35.3%. This result shows that the minimum requirements for unidimensionality are met (Sumintono & Widhiarso, 2014). Then the unexplained variance ideally should not exceed 15%. In general, this shows that this measuring instrument has the criteria to measure students' problems accurately.

Item Fit and Item Difficulties

The analysis begins by adding up the standard deviation and mean score, then comparing the infit value with the MNSQ, so the measurement logit must be between -1.08 or +1.08. Based on this data, several items have a value above the predetermined logit, namely item X20, X21. X27, X14, X3, X2, and X7. Furthermore, further analysis was carried out on the MNSQ outfit, where the logit value ranged from 0.50-1.50. Based on this data, there is 1 item under the logit value and three items above the logit value; this shows that these items are included in the outlier limit.

Difference Item Functioning (DIF)

The DIF analysis of the sex group was carried out because there could be a possibility of response bias between men and women in answering items related to problem disclosure as in this instrument. Table 5 shows that several items have a probability value of less than 5% (0.05), namely items X13, X14, X15, X16, X19, X22, X34, X36, X51, and X55. It can be interpreted that the items are biased for gender categories.

Table 4. Constructing Examinations from Calibrated Item, Item Difficulty, and Item Fit

Item	Measure	Infit MNSQ	Outfit MNSQ	Perceived Difficulties
X17	4.05	.94	**36**	*Most difficult item*
X34	3.14	.97	.89	
X5	2.71	1.02	1.22	
X47	2.65	1.00	.81	
X20	2.11	**1.10**	**1.80**	
X21	2.04	**1.09**	**1.61**	
X19	2.00	1.07	1.49	
X55	1.82	1.02	1.18	
X56	1.65	1.04	1.22	
X64	1.51	.90	.64	
X29	1.42	1.00	.82	
X13	1.29	1.07	1.43	
X16	1.21	.99	1.02	
X40	1.07	.96	.81	
X44	.92	.95	.89	
X4	.89	1.00	1.07	
X28	.83	.92	.81	
X42	.83	.94	.91	
X26	.78	1.01	.89	
X24	.77	.96	.92	
X15	.63	1.05	1.16	
X25	.60	1.04	1.19	
X48	.53	.95	.84	
X18	.52	1.08	1.08	
X43	.46	.92	.79	
X41	.33	1.01	.89	
X39	.27	1.01	.94	
X36	.23	1.01	1.04	
X37	.22	0.98	.94	
X30	.20	0.94	1.04	
X6	.08	1.05	.94	
X35	.03	1.06	.79	
X38	.02	1.00	1.11	*Cut point*
X27	-.05	**1.10**	1.11	
X46	-.05	.90	1.02	
X14	-.07	**1.14**	1.17	
X62	-.20	.88	.79	
X32	-.21	1.00	1.24	
X31	-.23	.99	.75	
X9	-.25	.88	.94	
X63	-.29	.87	.99	
X3	-.34	**1.13**	.79	
X2	-.51	**1.13**	.80	
X59	-.57	.99	1.34	
X54	-.79	.92	1.34	
X49	-.87	1.08	.93	
X52	-.95	.93	.84	
X10	-1.15	1.04	1.06	
X33	-1.16	.96	.95	
X60	-1.28	.93	.89	
X61	-1.28	1.01	1.04	
X7	-1.32	**1.13**	1.20	
X1	-1.43	1.07	1.10	
X11	-1.56	.95	.90	
X23	-1.86	.84	.75	
X53	-1.96	.98	.97	
X57	-1.97	.93	.87	
X45	-2.04	.86	.81	
X8	-2.16	1.06	1.06	
X22	-2.29	1.08	1.05	
X12	-2.32	**1.26**	**1.52**	
X50	-2.33	.91	.89	
X58	-2.96	1.04	1.15	
X51	-3.35	.91	.88	*Most easy item*

Table 5. The Differential Item Functioning (DIF) based on Gender

| Item	Summary DIF Chi-Squared	Probability
X1	2.54	.27
X2	.77	.67
X3	3.40	.17
X4	1.43	.48
X5	.96	.61
X6	.04	.97
X7	2.82	.24
X8	4.52	.10
X9	.17	.91
X10	.42	.80
X11	.32	.85
X12	1.30	.51
X13	23.59	**.00**
X14	24.49	**.00**
X15	21.83	**.00**
X16	7.16	**.02**
X17	3.44	.17
X18	3.29	.18
X19	26.85	**.00**
X20	.01	.99
X21	.25	.88
X22	9.00	**.01**
X23	2.33	.30
X24	.07	.96
X25	1.05	.58
X26	.87	.64
X27	1.34	.50
X28	2.99	.22
X29	2.21	.32
X30	.01	.99
X31	.38	.82
X32	3.20	.19
X33	2.42	.29
X34	7.66	**.02**
X35	1.19	.54
X36	10.60	**.00**
X37	2.78	.24
X38	.72	.69
X39	1.64	.43
X40	.21	.89
X41	2.27	.31
X42	.34	.84
X43	.12	.94
X44	2.74	.24
X45	.97	.61
X46	2.93	.22
X47	.71	.69
X48	1.11	.56
X49	1.23	.53
X50	3.33	.18
X51	7.96	**.01**
X52	.83	.65
X53	1.03	.59
X54	.56	.75
X55	6.53	**.03**
X56	.61	.73
X57	.38	.82
X58	2.33	.30
X59	.83	.65
X60	3.21	.19
X61	3.39	.18
X62	.00	1.00
X63	3.97	.13
X64	.35	.83

Test of Information Function
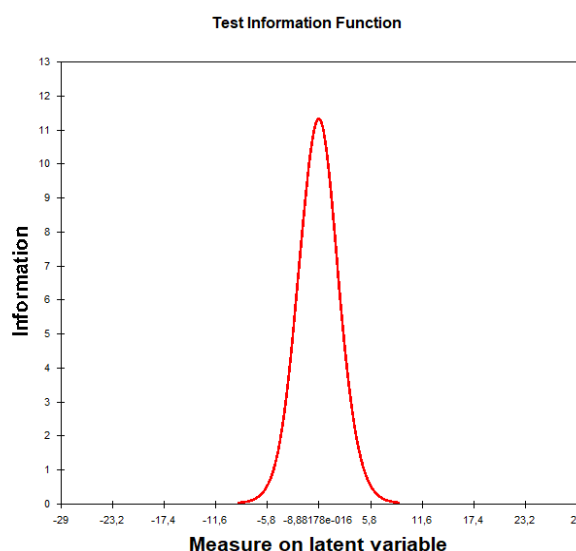
Figure 1. Test information Function dari alat ungkap masalah

The level of information provided by this instrument indicates a reasonably high category, namely 12 points. So, it can be concluded that through this instrument, the respondents get information that represents the problems they are experiencing.

Based on the results of the analysis of measuring instruments, it can be seen that some items are declared not meeting the minimum limits of valid and reliable instruments. This condition requires that some items be discarded so that there is a decrease in the number of items. The initial number of items developed was 64 items; after validation, the number of items was reduced to 50 items. However, when viewed from the balance of the instrument's contents, holistically, the measuring instrument has been able to explain individual problems' conditions and map the conditions of the measurement targets well (Fogaca, 2019; Klanecky et al., 2019; Reiland, 2017). The accuracy of the measurement results is also inseparable from the items' demographic diversity and condition by face validity, which is adjusted to the measuring instrument targets' characteristics (Li et al., 2008; Preddy et al., 2013).

In general, measuring instruments have shown the ability to predict and map student problems in general in Indonesia. This instrument development opens up new opportunities that this measuring tool can be disseminated in various formats and accessible platforms to students. Besides, this measuring instrument's follow-up is the first step in formulating the types and formats of counseling and other mental health services. Individual conditions measured using this instrument can be the basis for the development of a counseling service program that is more targeted and achievable.

Conclusion

The development and validation of the student problem measurement tool Zadrian-Ifdil Problem Checklist (ZIPC) is an alternative in mapping student problem conditions holistically and on target. This development is also directed at the effectiveness of the preparation of programs for counseling services and other mental health services. This measuring instrument's presence is one of the bases for professionals in determining the right approach so that student problems are resolved quickly and effectively. The condition of the measuring instrument adjusted to millennial characteristics is also an added value of this instrument. Besides, the instrument's readiness to be adapted on various platforms is also a means for developing this measurement to the next level. Further research is needed to see the effectiveness of using this instrument in cross-platform conditions and its integration with counseling service programs and other mental health services.

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