The Confirmatory Factor Analysis (CFA) of the Zadrian-Ifdil Problem Checklist (ZIPC) College Student Version as a Comprehensive Measurement Application for Millennial Generation

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Abstract. In the course of their education, students face various mental health problems that impact the smoothness of their education. This stressful and risky situation can ideally be managed with various psychological interventions. However, the search for these psychological conditions is often not optimally carried out because of the weakness of the assessment process before counseling interventions are carried out. This study aims to develop a comprehensive measuring tool regarding the psychological condition and mental health of students named the Zadrian-Ifdil Problem Checklist (ZIPC). This study involved 638 respondents in all universities in Indonesia. To find patterns and meet the requirements for developing a good measuring instrument, the research data was processed by applying the Confirmatory Factor Analysis (CFA) Model, resulting in the distribution of factors that supported each other's constructsṁ.

Keywords: Confirmatory Factor Analysis · Academic Stress · Assessment

1 Introduction

College students are heavily involved in the planning and execution of numerous initiatives across the nation [1]–[4]. Their mental health affects not only their own development and education but also the long-term stability of the nation and society. However, in recent years, there has been a growth in the topic due to the sporadic occurrence of psychiatric crises among college students [3, 5]–[7]. Both the general public and university staff have begun to pay close attention to it. Counselors must first understand the stress levels of college students in order to manage the psychological problems they confront. Second, the cause of psychological stress in college students is accurately assessed, and the causes of psychological stress in college students are carefully investigated. Lastly, appropriate intervention options are suggested [2, 8, 9].

Psychological stress is the result of the body's stress reaction, changes in the external environment, and a person's physiological and emotional changes [10, 11]. College

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students' move from high school to university marks a significant turning point from education into society. The process of adjusting to a new environment, taking new courses, overcoming new obstacles, and forming new relationships can be stressful in many different ways [12]–[14]. The following factors are the main psychological pressure sources for college students: first, the psychological pressure brought on by role changes and disorders of adaptation; second, the learning pressure brought on by changes in learning styles and low learning motivation; third, the interpersonal pressure brought on by communication issues and poor communication skills; fourth, the financial stress and mental stress brought on by the family's financial struggles; fifth, the employment stress brought on by the difficult job market and the fierce competition for talent; sixth, the psychological stress brought on by a lack of sexual education and an immature concept of love; seventh, the psychological stress brought on by personality and emotional issues; and eighth, the psychological stress brought on by personality and emotional issues [5, 15].

College students' learning outcomes and daily quality of life are directly impacted by their psychological stress. It is important for schools to be able to generate graduates who have outstanding mental health and professional caliber [10]–[12]. Some academics believe that college students are a high-stress group based on study on the subject. Other studies hold that college students merely experience reduced stress, but the most significant contributors to mental health issues among college students are actually the perception of stress and the method in which they manage it. Inability to relieve psychological stress in a timely manner might put physical health at risk by raising blood pressure and developing cardiovascular disease [11, 12, 16]. The effects of psychological pressure on a student's mood will be felt in their academic performance and interpersonal interactions. Students at college will experience happiness and fulfillment as a result. It may even result in violent occurrences like suicide and injury.

As these "emerging adults" may encounter new issues like leaving their homes, living with other students, loneliness, as well as economic and social concerns, transitioning from high school to college constitutes a pivotal age for developing depression [11, 16, 17]. As a result, mental health issues, particularly anxiety and depression disorders, could develop as a result of psychological strain and a poor adjustment to college. Particularly, research appears that college students have higher rates of depression than the overall population, which has a negative impact on both academic and social performance. With the mental health problems experienced by these students, it is necessary to have the proper intervention. Achieving the right treatment is, of course, preceded by an assessment of the condition through an assessment process. With the characteristics of students and their different literacy abilities, a measuring instrument with conditions close to the student's character is used. This article discusses the development of instruments to assess students' mental health conditions using Exploratory Factor Analysis.

2 Research Method

This study involved all university students in Indonesia with a random sampling method. The sample involved in this study amounted to 638 people, with 39.18% male and 60.82% female. The distribution of respondents is carried out by considering the representation of each region in Indonesia. In addition, demographic conditions also consider the types

of universities divided into two, namely 80% state universities and the rest private universities. The representation of the respondents is done to ensure the usability of the measuring instrument when it is widely used later. In data collection, respondents were given information and asked to fill out a data use consent form. This is intended to ensure ethical clearance for the use and publication of research results. Technically, data collection uses the help of the SurveyMonkey platform with the one-vote one IP method.

The instrument used in this research results from developing various measuring instruments with similar domains. Prayitno and his team first developed the previous measuring tool called the Problem Expression Tool [1]. Several measuring tools with similar domains have also been developed. However, based on the initial analysis and needs studies, it is known that the existing measuring tools can no longer provide an accurate representation of student problems and the level of literacy suitability of the millennial generation. Therefore, in this study, the Zadrian-Ifdil Problem Checklist (ZIP-C) instrument was used with the college student version [1]. In the initial development stage, 64 items were found with 10 problem clusters. Along with the development and validation process, items shrink and produce new instruments that are more robust. To locate and establish the relationship between the manifest variable and the constructs, data analysis was done using Confirmatory Factor Analysis (CFA). This study processed data using the open-source Jeffreys Amazing Statistics Program (JASP) 0.14.1 [18].

3 Result and Discussion

The development of the instrument essentially pays attention to several things that must be fulfilled statistically. Empirical evidence will determine whether a measuring instrument is suitable for use or requires improvement. In principle, the ZIP-C instrument is believed to be a form of re-transformation of various predecessor instruments by considering user needs, millennial generation literacy skills and the reliability of the measuring instrument item itself. Therefore, to ensure the quality of the resulting instrument, the analysis carried out is also comprehensive, following the rules and regulations of a good instrument.

The Measure of Sampling Adequacy (MSA) test, along with the Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test of Sphericity, is the first test to demonstrate the reliability and accuracy of the measuring device. The correlation between the initial variable formation and an acceptable limit of 0.5 were determined using the MSA test. The factors examined by the Zadrian-Ifdil Problem Checklist (ZIPC) instrument are deemed sufficient for further study based on Table 1. A high association between the independent variables and the assumption that factor analysis is suitable is demonstrated by the analysis of MSA and KMO. All clusters had values above 0.5 in the KMO test's assessment of overall MSA acquisition. Calculation demonstrates sample strength and suitability for analysis.

The chi-square fit index measures how well the data from a set of measurement items fit the proposed model (the observed variables). The chi-square statistic obtained using the maximum likelihood method is the model chi-square. The likelihood ratio test statistic is frequently used to evaluate the overall goodness of fit when a model is calculated using maximum likelihood. The likelihood ratio test statistic would resemble

Table 1. Result of The Measure of Sampling Adequacy (MSA) and Kaiser-Meyer-Olkin (KMO) Test

Var	MSA	Var	MSA	Var	MSA
Overall	0.898	V26	0.872	V52	0.939
V1	0.945	V27	0.861	V53	0.942
V2	0.872	V28	0.878	V54	0.941
V3	0.897	V29	0.871	V55	0.823
V4	0.882	V30	0.904	V56	0.848
V5	0.764	V31	0.943	V57	0.934
V6	0.853	V32	0.938	V58	0.91
V7	0.874	V33	0.945	V59	0.906
V8	0.928	V34	0.755	V60	0.93
V9	0.943	V35	0.867	V61	0.937
V10	0.905	V36	0.913	V62	0.911
V11	0.919	V37	0.888	V63	0.894
V12	0.896	V38	0.863	V64	0.903
V13	0.762	V39	0.87		
V14	0.862	V40	0.867		
V15	0.837	V41	0.855		
V16	0.864	V42	0.858		
V17	0.776	V43	0.911		
V18	0.842	V44	0.822		
V19	0.721	V45	0.959		
V20	0.689	V46	0.907		
V21	0.661	V47	0.831		
V22	0.946	V48	0.862		
V23	0.957	V49	0.909		
V24	0.849	V50	0.951		
V25	0.823	V51	0.926		

a central chi-square distribution if the proposed model were accurately stated. The chi-square test, which is also used to produce additional fit indices, is the most often used global fit index in CFA. It examines the model's covariance matrix to see if it accurately depicts population covariance. A low chi-square value in relation to the degrees of freedom (and a higher p-value) indicate better model fit, which is how chi-square is typically employed as an absolute fit metric. Chi-square is frequently referred to as a "badness of fit" or "lack of fit index" because the test is used to reject a null hypothesis

Table 2. Model Fit Analysis

Chi-square test			
Model	**X^2**	**df**	**p**
Baseline model	12552.666	2016	
Factor model	4907.125	1924	<.001

that represents a perfect fit. Based on Table 2, it can be seen that the model is in the fit category and there is a match between the estimated model and the conditions found.

Based on the explanation in Table 3, it can be seen that all indicators have eigenvalues that are in the reception area. This condition means that, in essence, all indicators constructively support each latent variable factor measured by the ZIP-C instrument well. However, if traced from the strength of the factor loading on each indicator, it still shows a weak position, even though the Standard Error is still in good acceptance. It can be analyzed on one indicator with a reasonably low loading power, namely V5 (problematic because has a physical disability) with a value of 0.036 and obtains a p-value $< .001$. This gain can be ignored with the assumption that all indicators support the construct, but to maintain the quality of the assessment, the weak loading factor value will be replaced, especially for items with an indication of the same item target as the problem area in the assessment which is quite strong (Table 4).

Based on the analysis of the covariance factor values between variables, it can be seen that between variables there are indications of interrelationships that form a single unit of measurement. The number of components we need to extract can be determined using eigenvalues, which are a measure of the variance that each factor contributes to. Based on the exposure on the scree plot, it can be seen that there is a match between the number of factors obtained and the factors that have been determined previously. This condition indicates that the problem areas covered by this instrument are in accordance with the constructs although there are still some items that need to be revised (Fig. 1).

The results of the ZIPC measuring instrument's computation reveal the extent to which the construct is capable of representing the conditions and issues related to teenagers' overall mental health. Each produced product has the ability to influence the elements it gathers. This means that by using this measurement tool, counselors and mental health professionals may map out the issues that college students are facing.

Through ZIPC, the mapping of youth problems may be done properly and regularly affects all part of their lives. The construct validity measurement findings demonstrate that this measuring tool may reliably give a broad overview of the elements of problems that students may encounter. In terms of both the content and the construct to be assessed, the creation of this measuring tool also involves upgrading the prior measuring tool.

An analysis that is more precise, like a CVR analysis or a Rasch analysis, is needed when taking into account each item, including the editorial in the next sentence. However, ZIPC has proven to be a useful measurement tool when compared to the problem checklist instrument created previously. In addition, ZIPC also depends on the usefulness of measuring tools, the effectiveness of processing time, and the psychological state of the assessment target at the time of data collection. This promotes additional

Table 3. Loading Factor of ZIP-C College Student Version

Factor	Indicator	Estimate	Std. Error	z-value	p	Std. Est. (lv)
PHY	V1	0.241	0.02	11.864	<.001	0.241
	V2	0.183	0.02	9.383	<.001	0.183
	V3	0.184	0.019	9.681	<.001	0.184
	V4	0.134	0.014	9.489	<.001	0.134
	V5	0.036	0.007	4.933	<.001	0.036
	V6	0.173	0.018	9.879	<.001	0.173
	V7	0.207	0.021	10.047	<.001	0.207
	V8	0.276	0.019	14.421	<.001	0.276
	V9	0.274	0.018	15.555	<.001	0.274
	V10	0.265	0.02	13.353	<.001	0.265
	V11	0.324	0.019	16.977	<.001	0.324
	V12	0.149	0.02	7.39	<.001	0.149
	V13	0.061	0.013	4.779	<.001	0.061
RAM	V14	0.245	0.019	13.013	<.001	0.245
	V15	0.261	0.016	16.782	<.001	0.261
	V16	0.137	0.014	10.123	<.001	0.137
	V17	0.03	0.004	6.972	<.001	0.03
	V18	0.21	0.016	12.818	<.001	0.21
	V19	0.097	0.01	9.65	<.001	0.097
FAM	**V20**	0.049	0.01	5.12	<.001	0.049
	V21	0.034	0.01	3.409	<.001	0.034
	V22	0.241	0.02	11.984	<.001	0.241
	V23	0.31	0.02	15.449	<.001	0.31
	V24	0.187	0.015	12.664	<.001	0.187
	V25	0.186	0.016	11.898	<.001	0.186
	V26	0.172	0.015	11.562	<.001	0.172
SOS	V27	0.165	0.018	9.116	<.001	0.165
	V28	0.161	0.014	11.393	<.001	0.161
	V29	0.1	0.012	8.377	<.001	0.1
	V30	0.205	0.017	12.326	<.001	0.205
	V31	0.201	0.018	10.939	<.001	0.201
	V32	0.195	0.018	10.623	<.001	0.195

(*continued*)

Table 3. (*continued*)

Factor	Indicator	Estimate	Std. Error	z-value	p	Std. Est. (lv)
	V33	0.262	0.02	13.204	<.001	0.262
	V34	0.024	0.006	4.036	<.001	0.024
	V35	0.165	0.018	9.314	<.001	0.165
	V36	0.185	0.017	11.062	<.001	0.185
	V37	0.205	0.017	12.437	<.001	0.205
	V38	0.214	0.017	12.371	<.001	0.214
	V39	0.189	0.016	11.473	<.001	0.189
	V40	0.147	0.013	11.247	<.001	0.147
	V41	0.181	0.016	11.093	<.001	0.181
EDU	V42	0.26	0.013	20.511	<.001	0.26
	V43	0.203	0.015	13.196	<.001	0.203
	V44	0.245	0.012	19.686	<.001	0.245
	V45	0.205	0.02	10.207	<.001	0.205
	V46	0.208	0.018	11.856	<.001	0.208
	V47	0.049	0.007	6.693	<.001	0.049
	V48	0.299	0.014	22.006	<.001	0.299
TMA	V49	0.221	0.02	11.147	<.001	0.221
	V50	0.324	0.018	17.969	<.001	0.324
	V51	0.289	0.016	18.555	<.001	0.289
	V52	0.273	0.019	14.071	<.001	0.273
ECO	V53	0.312	0.019	16.577	<.001	0.312
	V54	0.291	0.019	15.451	<.001	0.291
	V55	0.051	0.01	4.858	<.001	0.051
	V56	0.063	0.011	5.708	<.001	0.063
	V57	0.328	0.019	17.719	<.001	0.328
	V58	0.299	0.017	18.07	<.001	0.299
	V59	0.265	0.019	14.235	<.001	0.265
CAR	V60	0.312	0.019	16.056	<.001	0.312
	V61	0.258	0.02	12.784	<.001	0.258
	V62	0.308	0.017	18.171	<.001	0.308
	V63	0.345	0.017	20.583	<.001	0.345
	V64	0.132	0.011	11.729	<.001	0.132

Table 4. Factor Covarians antar Variabel ZIP-C College Student Version

			Estimate	Std. Error	z-value	p	Lower	Upper	Std. Est. (lv)
PHY	↔	RAM	0.464	0.045	10.307	<.001	0.376	0.552	0.464
PHY	↔	FAM	0.751	0.034	21.834	<.001	0.684	0.819	0.751
PHY	↔	SOS	0.734	0.03	24.277	<.001	0.675	0.793	0.734
PHY	↔	EDU	0.464	0.041	11.386	<.001	0.384	0.544	0.464
PHY	↔	TMA	0.61	0.039	15.551	<.001	0.534	0.687	0.61
PHY	↔	ECO	0.565	0.039	14.581	<.001	0.489	0.641	0.565
PHY	↔	CAR	0.609	0.037	16.614	<.001	0.537	0.681	0.609
RAM	↔	FAM	0.497	0.048	10.279	<.001	0.402	0.592	0.497
RAM	↔	SOS	0.372	0.048	7.784	<.001	0.278	0.465	0.372
RAM	↔	EDU	0.237	0.049	4.807	<.001	0.14	0.334	0.237
RAM	↔	TMA	0.288	0.052	5.493	<.001	0.185	0.391	0.288
RAM	↔	ECO	0.29	0.05	5.784	<.001	0.192	0.388	0.29
RAM	↔	CAR	0.21	0.051	4.074	<.001	0.109	0.311	0.21
FAM	↔	SOS	0.625	0.04	15.548	<.001	0.546	0.704	0.625
FAM	↔	EDU	0.502	0.043	11.557	<.001	0.417	0.588	0.502
FAM	↔	TMA	0.642	0.043	15.065	<.001	0.558	0.726	0.642
FAM	↔	ECO	0.626	0.041	15.411	<.001	0.547	0.706	0.626
FAM	↔	CAR	0.595	0.042	14.253	<.001	0.513	0.677	0.595
SOS	↔	EDU	0.501	0.039	12.767	<.001	0.424	0.578	0.501
SOS	↔	TMA	0.692	0.035	19.528	<.001	0.623	0.762	0.692
SOS	↔	ECO	0.655	0.035	18.903	<.001	0.587	0.722	0.655
SOS	↔	CAR	0.712	0.032	22.473	<.001	0.65	0.774	0.712
EDU	↔	TMA	0.447	0.044	10.179	<.001	0.361	0.533	0.447
EDU	↔	ECO	0.399	0.043	9.243	<.001	0.314	0.484	0.399
EDU	↔	CAR	0.563	0.037	15.179	<.001	0.49	0.636	0.563
TMA	↔	ECO	0.932	0.024	38.754	<.001	0.885	0.979	0.932
TMA	↔	CAR	0.671	0.037	18.217	<.001	0.598	0.743	0.671
ECO	↔	CAR	0.605	0.037	16.236	<.001	0.532	0.678	0.605

study to determine the usefulness of the measuring tool if treatment is administered after the measurement as an alternative to the pretest and as the foundation for counseling treatments [19]–[21].

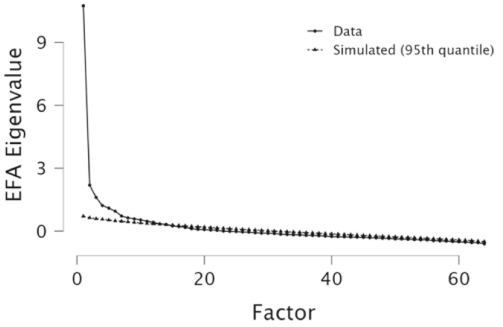

Fig. 1. Scree Plot of ZIPC Assessment Model

4 Conclusion

A number of existing problem checklist measurement instruments were updated and improved upon to create the Zadrian - Ifdil Problem Checklist (ZIPC) instrument. This development was implemented to improve processing speed, the items' potency in exposing assessment target issues, and adjustments to the traits and demography of the assessment targets. Additionally, the instrument was created by taking into account fresh issues that arose, particularly in the period of the fourth industrial revolution, and by enhancing the usefulness of assessment results so that they could be followed up on in counseling interventions. It is necessary to build analysis that compiles the measuring instrument itself in developments that include significant demographic variation and expert judgment regarding measuring instrument content. In response to this need, the calculations that were performed and the findings that were reported in this publication provide an explanation of how to construct the items that have been developed to produce the components of a measuring instrument. The study of the calculation findings demonstrates that the instrument can be utilized as an alternative in mapping the issues or mental health situations of adolescents, especially high school students, and that it has good construct validity.

References

1. Z. Ardi, I. Ifdil, and M. Maysitoh, "Development and validation of the Zadrian-Ifdil Problem Checklist (ZIPC) for college students," International Journal of Technology, Innovation and Humanities, vol. 1, no. 1, pp. 41–50, 2020.
2. H. Dubowitz, S. Roesch, and T. Lewis, "Child maltreatment, early adult substance use, and mediation by adolescent behavior problems," Child Maltreat, vol. 26, no. 2, pp. 238–248, 2021.
3. C. M. D. Acevedo, J. K. C. Gómez, and C. A. A. Rojas, "Academic stress detection on university students during COVID-19 outbreak by using an electronic nose and the galvanic skin response," Biomed Signal Process Control, vol. 68, p. 102756, 2021.
4. J. D. Guldager, S. Jervelund, and G. Berg-Beckhoff, "Academic stress in Danish medical and health science students during the COVID-19 lock-down," Dan Med J, vol. 68, no. 7, pp. 1–10, 2021.

5. D. Adom, H. B. Essel, and J. Chukwuere, "The state of academic stress in the Higher Institutions of Ghana: The way forward," Universal Journal of Educational Research, vol. 8, no. 2, pp. 321–331, 2020.
6. E. Axelsson, E. Andersson, B. Ljótsson, D. Björkander, M. Hedman-Lagerlöf, and E. Hedman-Lagerlöf, "Effect of internet vs face-to-face cognitive behavior therapy for health anxiety: a randomized noninferiority clinical trial," JAMA Psychiatry, vol. 77, no. 9, pp. 915–924, 2020.
7. R. D. Butterfield, R. B. Price, M. L. Woody, A. S. Morris, and J. S. Silk, "Adolescent girls' physiological reactivity to real-world peer feedback: A pilot study to validate a Peer Expressed Emotion task," J Exp Child Psychol, vol. 204, p. 105057, 2021.
8. J. O. Dada, S. O. Babatunde, and R. O. Adeleye, "Assessment of academic stress and coping strategies among built environment undergraduate students in Nigerian higher education," Journal of Applied Research in Higher Education, vol. 11, no. 3, 2019.
9. N. Laporte, B. Soenens, K. Brenning, and M. Vansteenkiste, "Adolescents as active managers of their own psychological needs: The role of psychological need crafting in adolescents' mental health," J Adolesc, vol. 88, pp. 67–83, 2021.
10. P. A. Novick, J. Lee, S. Wei, E. C. Mundorff, J. R. Santangelo, and T. M. Sonbuchner, "Maximizing academic integrity while minimizing stress in the virtual classroom," J Microbiol Biol Educ, vol. 23, no. 1, pp. e00292-21, 2022.
11. H. K. Rustam and F. Tentama, "Creating academic stress scale and the application for students: Validity and reliability test in psychometrics," International Journal of Scientific and Technology Research, vol. 9, no. 1, pp. 661–667, 2020.
12. A. J. Fuligni, J. J. Chiang, and N. Tottenham, "Sleep disturbance and the long-term impact of early adversity," Neurosci Biobehav Rev, vol. 126, pp. 304–313, 2021.
13. J. Ling and N. R. Zahry, "Relationships among perceived stress, emotional eating, and dietary intake in college students: Eating self-regulation as a mediator," Appetite, vol. 163, p. 105215, 2021.
14. K. Piwowar-Sulej, M. Krzywonos, and I. Kwil, "Environmental entrepreneurship–Bibliometric and content analysis of the subject literature based on H-Core," J Clean Prod, vol. 295, p. 126277, 2021.
15. J. H. Stubbe et al., "Prevalence of mental health complaints among performing arts students is associated with COVID-19 preventive measures," Front Psychol, vol. 12.
16. Z. Ardi, "Development of Solution Focused Brief Counseling online counseling model to reduce student academic stress," Universitas Negeri Padang, Padang, 2021.
17. Z. Ardi, "The Analysis of Solution Focused Brief Counseling Contribution in Reducing First-Year Students Academic Stress Symptoms," in 2nd Progress in Social Science, Humanities and Education Research Symposium (PSSHERS 2020), 2021.
18. H. Han, J. Park, and S. J. Thoma, "Why do we need to employ Bayesian statistics and how can we employ it in studies of moral education?: With practical guidelines to use JASP for educators and researchers," J Moral Educ, vol. 47, no. 4, pp. 519–537, 2018.
19. P. Dutta, S. Anand, S. Gupta, R. Kanchan, and K. K. Parhi, "Assessment of post-traumatic stress disorder symptoms during COVID-19 pandemic among medical students," Biomedicine (Taipei), vol. 42, no. 1, pp. 117–121, 2022.
20. S. D. A. Litam, C. D. Ausloos, and J. J. S. Harrichand, "Stress and resilience among professional counselors during the COVID-19 pandemic," Journal of Counseling & Development, vol. 99, no. 4, 2021.
21. R. M. Murray, C. M. Sabiston, I. Doré, M. Bélanger, and J. L. O'Loughlin, "Longitudinal associations between team sport participation and substance use in adolescents and young adults," Addictive behaviors, vol. 116, p. 106798, 2021.