

EVALUATION OF PERCEIVED MENTAL WORKLOAD, ASSOCIATED FACTORS AND GENERAL WELLBEING OF UNIVERSITY STUDENTS: A CROSS-SECTIONAL STUDY

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ABSTRACT

There is increase mental workload of university students in Nigeria due to persistent strike actions by the universities' academic staff, rising insecurity and economic slump in the country, which play important role in the overall wellbeing of the university students. The focus of this study is to ascertain the impacts of mental workload and academic attainment on the wellbeing of the university students in Southeast region of Nigeria while controlling for the demographic factors. Survey questionnaires comprising of demographic items, NASA-TLX items for measuring mental workload and wellbeing items were administer to 676 students randomly selected from the Faculty of Education, University of Nigeria, Nsukka. Data from 669 valid questionnaires were analyzed using frequencies, percentages, multivariate analysis of variance (MANOVA), bivariate linear regression and correlation analyses. At $p < 0.05$, year of study and mental workload had inverse association with the students' positive wellbeing and direct association with negative wellbeing. Third and fourth year students had decrease in wellbeing compared to first and second year students while increase in mental workload increased negative wellbeing.

KEYWORDS: mental health; stress; university students; vulnerability; wellbeing

INTRODUCTION

Mental illness is a global crisis affecting over 450 million individuals across the world (World Health Organization, 2017 and 2024) and ranks high in contributions to global disease burden (Bhugra et al., 2019 and Okeke et al., 2024). Mental workload is one of the key contributors to mental illness and academic stressor (Rubio-Valdehita et al., 2014, Gyprffy et al., 2016, Nino et al., 2023, Adams and Nino, 2024, Bhandari, 2024, Mahdavi et al., 2024, and WHO, 2024). According to Rubio-Valdehita et al. (2014), mental workload is the interaction between the requirements to do a task, the circumstances in which the task must be performed and the skills, emotions and perceptions of the individual involved. Prastawa et al. (2018) view mental workload as the distinction between the maximum mental capacity to perform a task or multiple tasks and the workload demands of the tasks. Where the workload demands for the task exceeds the maximum carrying capacity of the individual, the general wellbeing comes under threat. Among university students, mental workload manifests as the mental demands imposed on the students in performing series of multiple tasks (Mahdavi et al., 2024). Fatigue, decrease in willingness to put more efforts, impaired cognitive functions, decline in concentration, reduced productivity and slowdown in information processing, are some of the consequences of students' extended engagements in mentally challenging functions and tasks (Völker et al., 2016; Heidarimoghadam et al., 2022; Heinrich et al., 2022 and Moussa et al., 2023).

Several factors affect the health and wellbeing of university students, and mental workload is one of them (Sydney-Agbor et al., 2018, González-Palacios et al., 2021, and Muslim and Widyanti, 2024). Wang et. al. (2021) revealed that students in Malaysia with poor financial conditions experience mental workload and poor health conditions. The study by Huang and Zhao (2020) among university students and other tertiary institutions in Malaysia identified mental workload, anxiety, depression and stress as the key predictors of low quality of health and wellbeing among the students. Abdullah et al. (2022) discovered that depression among university students in Malaysia is predicted by academic workload, financial factor and family support. The study by Dewi et al. (2021) has shown that the majority of students offering online courses experienced mental work overload due to

multi-assignment tasks, time limits to do the tasks and task intensity. Yangdon et al. (2021) evaluated the perception of wellbeing and academic workload b science and technology students and the study revealed that students have challenges in coping with negative emotions.

Mental workload among university students has been the subject of several investigations (Rubio-Valdehita, 2017; Pedroso et al., 2020; and Xiong et al., 2024) using different subjective measures such as self-assessment, task measures and physiological measures (Moustafa et al., 2017, and Smith and Smith, 2017). Jansen et al. (2020) measured the association between sleep quality and mental workload among young adults in a college town in the US using Mental and Physical State and Trait Energy and Fatigue scales. Using the Students Well-being Questionnaire, Yangdon et al. (2021) sought empirical association between the wellbeing and academic workload of university students. Rubio-Valdehita et al. (2014) applied the NASA-TLX scale to evaluate the workload perceived by psychology students according to their negative and positive perceptions, and the effects of academic contexts on the perceived workload. Beena and Sony (2022) assessed university students' workload for online learning during the COVID-19 using the NASA-TLX scale, focusing on the Mental demand (MD), Physical demand (PD), Temporal demand (TD), Effort (EF), Performance (PE) and Frustration (FR) components of the scale. Muslim and Widyanti (2024) employed the NASA-TLX workload scale to evaluate the mental workload of students of engineering in multi-campus lectures. Herrero-de Lucas et al. (2022) adopted the two critical incident questions to determine student workload and the learning environment created through project-based learning. Smith and Firman (2020) investigated the microstructure of the Student Wellbeing Process Questionnaire (Student WPQ) while examining the profiles of the individual predictor and outcome items of the questionnaire.

Mental workload and the implications on the wellbeing of students of public universities in Nigeria has received little attention. Public universities in Nigeria have been blighted in recent times with prolonged strike actions lasting sometimes more than six months by the academic and non-academic staff of the universities in protest against systemic neglect, poor working conditions and remuneration (Ogbette et al., 2017, Offem et al., 2017, Nkanu et al., 2023). The negative impacts of the strike actions on the academic programmes of the universities impose substantial burden on the students, resulting in increased stress, worry, distress, anxiety, uncertainty, instability and other mental health challenges (Nwanyanwu et al., 2023 and Adesola et al., 2024). The disruptive impacts of the prolonged strike actions, the uncertainties about when classes will continue, examinations and not being able to meet up with consequent academic demands cast long shadows on the mental health of the students (Adesola et al., 2024). Studies have shown that campus strikes, distorted academic programmes and the financial burden on students (Hile, 2023) could lead to increased anxiety in students (Ewah et al., 2023a, 2023b), frustration (Garvey et al., 2021), low self-esteem and poor self-image (Brooks, 2023) illicit conducts and violence (Monogbe and Monogbe, 2019). Other factors associated with decline in the mental wellbeing of university students include lack of engagement with learning and leisure activities (Campbell et al., 2022), poverty (Kukoyi et al., 2022), institution tight schedule and continuous study sequence (Limone and Toto, 2022), among others. Therefore, the purpose of this study was to evaluate the effect of workload and academic attainment on the wellbeing of undergraduate university students in Southeast province of Nigeria while controlling for the effects of the demographic factors.

METHODS

Design of the Study

The study adopted the cross-sectional survey research design with negative and positive general wellbeing as response variables. The cross-sectional survey design is the type of survey design in which data are collected from many different respondents at a single point in time based on specified inclusion and exclusion criteria (Thomas, 2022). Cross-sectional survey designs are very useful in population-based and clinical-based survey studies (Vega et al., 2021).

Participants and sample

The participants were undergraduate students drawn from the Faculty of Education, University of Nigeria, Nsukka, in the Southeast province of Nigeria. From the faculty records obtained from the faculty officer, there were a total of 9,128 undergraduate students of the faculty at the time of the study. Using the GPower 3.1.9 statistical software for sample size determination, a sample of 676 was obtained with effect size of (0.0155) and power of 0.95. Systematic random sampling was used to locate and identify the 676 students of the faculty at carefully determined sampling interval and random starts from the table of random numbers. The students included in the study sample were notified through their e-mail addresses and phone numbers about their selection to participate in the study. They were educated on the importance, benefits and procedures for the study and assurances of confidentiality.

Instrument for Data collection

The research instrument is a survey questionnaire made up of three distinct components: demographic factors, mental workload assessment and wellbeing assessment. The demographic factors included age of the respondents (16 – 20 years, 21 – 25 years, 26 – 33 years, and more than 33 years), gender (male and female), marital status (single, married, divorced/separated, widowed), year of study (first, second, third and fourth years), and place of residence (on-campus, off-campus).

The NASA-Task Load Index (NASA-TLX) was used in this study to assess workload among the university students. The NASA-TLX index for workload assessment was developed by the Human Performance Group of the National Aeronautics and Space Administration (NASA), Ames Research Center, California, USA. The workload measuring scale is made up of six workload subscales, namely: mental demand (MD), physical demand (PD), temporal demand (TD), which relates to academic demands, and performance (PF), effort (EF), and frustration (FR) level, which relates to how the student handle the academic demands (Muslim and Widyanti, 2024). The mental demand measures the extent of psychological activities, whether the task is simple, difficult or complex; physical demand measures the extent of physical activity required, whether the task is physically laborious; temporal demand measures the pressure due to time restriction; effort measures the extent of hard work required to complete a task; performance measures the degree of achievement in completing a task; while frustration measures the level of frustration experienced in completing a task (Beheshti and Hajizadeh, 2013). The NASA-TLX score was calculated by multiplying each subscale rate by its weight (Safari et al., 2013). Subsequently, the overall workload was obtained by summing across subscales and dividing by 15 (Shoja et al., 2020). The higher the overall score, the higher the respondent's workload (Osmanovic-Thunstrom et al., 2015). Adopting the Sugarinda et al. (2017) categorization procedure, the NASA-TLX workload scores were divided into 'low workload' and 'high workload'. Mohammedi et al. (2013) has established that the Chronbach's alpha reliability of the NASA-TLX workload instrument is 0.897.

The positive wellbeing and negative wellbeing outcomes, which are components of the Student Wellbeing Process Questionnaire (Student WPQ), were used to obtain quantitative information on the students' wellbeing. The Student WPQ was developed by Williams et al. (2017) and has been applied in similar studies by Smith and Firman (2020). According to Williams et al. (2017), the positive wellbeing refers to the students' happiness, positive affect and life satisfaction and is measured by the happiness, positive affect, life satisfaction questions and the Warwick-Edinburgh short items, on a scale of 1 to 10, depicting 'disagree strongly' to 'agree strongly'. The higher the score, the more positive wellbeing. The negative wellbeing refers to students' anxiety, depression and stress levels, and measured by the anxiety, depression and stress items, also on a scale of 1 to 10 representing 'not at all anxious' to 'extremely anxious' for anxiety, 'not at all stressful' to 'very stressful' for stress, and 'not at all depressed' to 'extremely depressed', for depression. The higher the score, the more the negative wellbeing. The positive and negative wellbeing outcomes were not categorized but treated as continuous outcomes.

The students' academic attainment was the semester-by-semester academic performances of the students, a combination of their examination scores and continuous assessment scores, presented as their cumulative grade point average (CGPA). The students provided their cumulative grade point average as their academic attainment data, which were combined with their survey data and anonymized for the study.

Data collection for the study was from October 15, 2024 to December 9, 2024. Data collection involved the distribution of the research instrument in a person-to-person contact to facilitate quick responses and minimize non-responses.

Statistical analysis

Demographic characteristics of the respondents were analyzed using means, frequencies and percentages. Multivariate analysis of variance (MANOVA) was used to evaluate the effects of the predictor variables (workload, academic attainment and demographic factors) on the outcome/independent variables (positive and negative wellbeing). The effect of the predictor variables which had significant effect in the MANOVA were regressed on each individual independent variable. All statistical tests were conducted at 0.05 level of significance, and a p-value of less than 0.05 was considered to be statistically significant. The IBM SPSS version 26 was used to facilitate the analysis of the quantitative data.

Ethical Considerations

The ethical approval for this study was obtained from the Research Ethics Committee of the Faculty of Education, University of Nigeria, Nsukka, Nigeria with reference number, REC/FE/2024/00037. The participants were duly informed of the purpose, benefits and implications of the study. Informed consent form was completed and signed by each of the selected student participants prior to the administration of the study questionnaire. Participation in the study was completely voluntary and the privacy of the respondents was protected by ensuring responses were anonymized. Furthermore, the study methodology adhered to the guidelines of the Helsinki Declaration.

RESULTS

Out of the 676 questionnaires distributed to the respondents, only 7 were not accounted for due to unit non-response. The results of the analysis of data from the 669 valid responses from the survey are presented subsequently. The demographic characteristics of the respondents were summarized in Table 1. More than half of the respondents, specifically, 58.9% were at most 25 years of age, representing very young population of students, who were mostly females (56.1%) with substantial male representation (43.9%) in the study. Majority (83.1%) of the respondents were single, live off-campus (59.5%) and were in third year (32.3%).

Table 1: Frequency Distribution of Demographic Characteristics of Respondents

		Frequency	Percent	Cumulative Percent
Age of respondents	16 – 20 years	178	26.6	26.6

	21 – 25 years	216	32.3	58.9
	26 – 33 years	187	28.0	86.9
	More than 33 years	88	13.1	100.0
Gender	Male	294	43.9	43.9
	Female	375	56.1	100.0
Marital Status	single	556	83.1	83.1
	Married	101	15.1	98.2
	Divorced/separated	5	0.8	99.0
	Widowed	7	1.0	100.0
Year of study	First year	162	24.2	24.2
	Second year	183	27.4	51.6
	Third year	216	32.3	83.9
	Fourth year	108	16.1	100.0
Place of residence	On-Campus	271	40.5	40.5
	Off-Campus	398	59.5	100.0

The results of the multivariate analysis of variance (MANOVA) for the overall effects of academic attainment, workload and demographic characteristics of the respondents showed that Gender (Wilks' Lambda = 0.911, $F = 4.182(4.784)$, $p = 0.028(0.029)$), year of study (Wilk's Lambda = 0.650, $F = 3.074 (7.279)$, $p = 0.037(0.007)$), mental workload (Wilk's Lambda = 0.806, $F = 4.156(7.096)$, $p = .024(0.008)$) and academic attainment (Wilk's Lambda = 0.798, $F = 3.659(36.834)$, $p = 0.0318(0.00)$) have significant effects on the wellbeing of the students. The individual effects of the variables showed that Gender ($F = 4.784$, $p = 0.029$), year of study ($F = 7.279$, $p = 0.007$), mental workload ($F = 7.096$, $p = 0.008$) and academic attainment ($F = 36.834$, $p = 0.00$) have significant effects on the positive wellbeing of the students. Also, Gender ($F = 5.393$, $p = 0.021$), year of study ($F = 7.247$, $p = 0.007$), place of residence ($F = 4.835$, $p = 0.028$), workload ($F = 15.677$, $p = 0.00$) and academic attainment ($F = 29.494$, $p = 0.00$) have significant effects on the negative wellbeing of the students. These implied that gender, year of study, workload and academic attainment have effects on both the positive and negative wellbeing of the students while place residence has effect only on the negative wellbeing but not on the students' positive wellbeing. Furthermore, there is significant interaction between the students' workload and their academic attainment, which implied that the students' academic attainment interacts with their workloads. On the contrary, age and marital status had no significant effects on the positive and negative wellbeing of the students.

Table 2: Multivariate ANOVA Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	P-value
Corrected Model	Positive wellbeing	7878.784	8	984.848	7.028	0.008**
	Negative wellbeing	345.752	8	743.219	5.449	0.020*
Intercept	Positive wellbeing	25243.301	1	25243.301	180.150	0.000**
	Negative wellbeing	58574.193	1	58574.193	429.404	0.000**
Age	Positive wellbeing	287.851	1	287.851	2.054	0.152
	Negative wellbeing	217.205	1	217.205	1.592	0.207
Gender	Positive wellbeing	669.781	1	669.781	4.784	0.029*
	Negative wellbeing	735.642	1	735.642	5.393	0.021*
Marital Status	Positive wellbeing	280.009	1	280.009	1.998	0.158
	Negative wellbeing	1.200	1	1.200	0.009	0.925
Year of Study	Positive wellbeing	1020.010	1	1020.010	7.279	0.007**
	Negative wellbeing	988.558	1	988.558	7.247	0.007**
Residence	Positive wellbeing	5.957	1	5.957	0.043	0.837
	Negative wellbeing	537.483	1	537.483	4.835	0.028*
Workload	Positive wellbeing	994.313	1	994.313	7.096	0.008**
	Negative wellbeing	2138.526	1	2138.526	15.677	0.000**
Academic attainment	Positive wellbeing	5161.360	1	5161.360	36.834	0.000**
	Negative wellbeing	4023.263	1	4023.263	29.494	0.000**
Workload * GPA	Positive wellbeing	1132.469	1	1132.469	8.082	0.005**
	Negative wellbeing	1033.673	1	1033.673	7.578	0.006**
Error	Positive wellbeing	91641.117	654	140.124		
	Negative wellbeing	89210.818	654	136.408		

**Significant at 0.01, *Significant at 0.05

Linear regression analysis was used to determine the influence of the significant variables, gender, year of study, mental workload and academic attainment on positive wellbeing. Gender ($B = 3.226$, $p = 0.002$), year of study ($B = -0.16$, $p = 0.00$), academic attainment ($B = 1.156$, $p = 0.007$) and mental workload ($B = -2.016$, $p = 0.044$) have significant influence on the positive wellbeing of the university students (Table 3). Mental workload has significant negative influences on the students' positive wellbeing, indicating that increase in mental workload

has negative impact on their positive wellbeing. Academic attainment has positive influence such that increase in the GPA of the students results in increase in the students' positive wellbeing.

Table 3: Regression Analysis of Factors Influencing Positive Wellbeing

Model	Unstandardized Coefficients			P-Value
	B	Std. Error	t	
Gender	3.226	0.894	3.088	0.002**
Year of Study	-0.160	0.045	-3.548	0.000**
Academic Attainment (GPA)	1.156	0.425	2.720	0.007**
Mental Workload	-2.016	1.002	-2.012	0.044*

**Significant at 0.01, * Significant at 0.05, Regression ANOVA = 3.319, p = 0.011, R-square = 0.544

From Table 4, gender (B = 0.398, p = 0.029), year of study (B = 2.104, p = 0.00), place of residence (B = 1.494, p = 0.001), academic attainment (B = -3.101, p = 0.005) and mental workload (B = 1.498, p = 0.00) have significant influence on the negative wellbeing of the students. Academic attainment has significant negative influence on the students' negative wellbeing such that increase in a student's GPA reduces the student's negative wellbeing. Mental workload has significant positive influence on the negative wellbeing of the students such that negative wellbeing increases with every increase in the students' mental workload.

Table 4: Regression Analysis of Factors Influencing Negative Wellbeing

Model	Unstandardized Coefficients			P-value.
	B	Std. Error	t	
Gender	0.398	0.182	2.187	0.029*
Year of Study	2.104	0.444	4.738	0.000**
Place of residence	1.494	0.429	3.482	0.001**
Academic Attainment (GPA)	-3.101	1.110	-2.794	0.005**
Mental Workload	1.498	0.357	-4.196	0.000**

**Significant at 0.01, * Significant at 0.05

The correlation between positive wellbeing and workload sub-scales shows that there is strong negative significant correlation between positive wellbeing, mental demand, physical demand, performance, efforts and frustration (Table 5). All the workload sub-scales have negative correlation with positive wellbeing, indicating that increase in each sub-scale results to decrease in positive well-being and decrease in a sub-scale results to increase in the positive wellbeing of the students. There are also significant positive correlations between negative wellbeing and mental workload sub-scales, mental demand, physical demand, performance effort and frustration while the correlation with temporary demand is weak and insignificant. The positive correlation coefficients indicate that increase in the workload sub-scales led to increase in the negative wellbeing of the students and the negative wellbeing decreased with decrease in a workload sub-scale.

Table 5: Correlation Between Positive Wellbeing and Workload Sub-Scales

Workload Sub-Scale	Positive Wellbeing	P-Value	Negative Wellbeing	P-Value
Mental Demand	-0.532	0.000**	0.378	0.000**
Physical Demand	-0.518	0.000**	0.495	0.000**
Temporary Demand	-0.071	0.065	0.001	0.611
Performance	-0.627	0.000**	-0.413	0.000**
Effort	-0.571	0.000**	0.241	0.000**
Frustration	-0.215	0.000**	0.575	0.000**

**Significant at 0.01, * Significant at 0.05

DISCUSSION

The study revealed that gender, year of study, academic attainment and mental workload had significant influence on the positive and negative wellbeing of the university students while place of residence had significant influence on the negative wellbeing. There is negative influence of mental workload on the students' positive wellbeing and positive influence of mental workload on negative wellbeing, which implied that increase in the mental workload of a student led to decrease in the student's positive wellbeing. Those who reported increased mental workload had decreased positive wellbeing and increase in negative wellbeing. These results are in agreement with related study by Yangdon et al. (2021), who revealed that increase in students' mental workload has severe consequences on the mental, physical and social wellbeing of the students. Yangdon et al. (2021) found that increased mental workload among Bhutanese college students negatively impacted their wellbeing, leading to uncertainties, anxiety, deterioration in mental health, dropouts and death among university students. Contrarily, the results by Smith (2019) showed that increase in workload resulted to increase in positive wellbeing, contradicting the finding

of this study, but agreed that higher workload also increased negative wellbeing of the students. Smith argued that the negative and positive effects of workload on the students' wellbeing may have occurred at different points in time, viewing increase in workload as a challenge rather than a threat.

The mental workload sub-scales: mental demand, physical demand, performance, efforts and frustration, have significant negative correlation with the students' positive wellbeing and significant positive correlation with negative wellbeing of the students. High mental demand, physical demand, performance, effort and frustration resulted in low positive wellbeing and high negative wellbeing among the university students. Students who indicated low mental demand, physical demand, performance, effort and frustration reported high positive wellbeing. There was no correlation between temporal demand and the wellbeing of the students.

The significant influence of year of study on the students' positive and negative wellbeing showed that being in first, second, third or fourth year could significantly impact the wellbeing of the university students. There was inverse relationship between the students' year of study and positive wellbeing such that the higher a student was in academic studies, the lower the positive wellbeing. This implied that students in third and fourth years experienced decrease in their wellbeing. This was substantiated by the direct relationship between year of study and negative wellbeing, the higher the academic year of study, the higher the negative wellbeing. Similar findings by Szepe and Meszraos (2024) corroborated these results. Szepe and Meszraos (2024), in a study involving the non-medical faculties of Semmelweis University Budapest, revealed that there is inverse correlational coefficient between the students' wellbeing and their year of study such that students in years 2 and 3 had significantly better wellbeing record than students in years 4 and 5. The wellbeing of the 4th and 5th year students were found to be significantly lower. Year 5 involved was because the Pharmacy program lasts for 5 years while other programs last for 4 years. In the present study, the faculty programs have a 4-year duration. The lower positive wellbeing and higher negative wellbeing for the students in higher academic years could be attributed to increased stress and anxiety towards graduation and uncertainties about life after graduation. The findings of Bewick et al. (2010) revealed that students in first year and second year reported the lowest levels of wellbeing, contradicting the findings of this study. The study argued that students in their first and second years face are at the beginning of their studies, faced with high level of uncertainty and the daunting task of managing different challenges associated with freshers. This contrary view reflects wider diverse opinions on the fluctuations of students' wellbeing over the year of study.

Academic attainment of the students was also shown to have significant influence on the positive and negative wellbeing of the university students with reverse relationship with negative wellbeing such that those who had decrease in their grade point average (GPA) reported increased negative wellbeing. This contradicts the direct relationship between the academic attainment of the students and their wellbeing whereby those with high GPA reported increase in positive wellbeing and those with low GPA reported decrease in positive wellbeing. Therefore, low academic attainment leads to increase in wellbeing while high academic attainment leads to negative wellbeing among the students. Related study by Klapp et al. (2024) revealed that there is significant relationship between psychological, social and cognitive wellbeing of university students from Swedish longitudinal project and their academic attainments, corroborating the findings of this study.

CONCLUSION

The study evaluated the effects of mental workload and academic attainment on the wellbeing of students of the faculty of education, University of Nigeria, Nsukka, Nigeria while controlling for the demographic factors (age, gender, marital status, year of study and place of residence). Workload, academic attainment, gender and year of study had significant effects on the positive and negative wellbeing of the university students while place of residence (on-campus and off-campus) had significant effect on negative wellbeing only at $p < 0.05$. The interaction between mental workload and academic attainment had significant effect on the students' positive and negative wellbeing. Year of study and mental workload had inverse association with the students' positive wellbeing and direct association with negative wellbeing. Students in third and fourth years experienced decrease in their wellbeing compared to first year and second year students while increase in mental workload decreased the positive wellbeing and increased negative wellbeing. Mental demand, physical demand, effort and frustration correlated negatively with positive wellbeing and positively with negative wellbeing, except performance which correlated negatively with positive and negative wellbeing of the university students.

One of the limitations of this study is that the present results and conclusions were drawn from cross-sectional data, longitudinal data will be required for better causality. Another limitation is the use of students from only the faculty of education. Involving students from other disciplines could give a wider perspective to the study outcomes.

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