

Mental Health Effects of Term Time Employment for University Students: Evidence from Online Education Period

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Abstract

This study examines the relationship between student's in-term employment and probability of having depression symptoms after earthquake in Türkiye on February 6, 2023. Multinomial logit regression model is applied to assess the associations between socioeconomic variables and depression presence. According to results there is no association between being employed and depression prevalence, but longer working hours are associated with higher depression scores. There is a negative statistically significant relationship between having reliable friends and probability of mental health problems as expected but there is no statistical evidence related to students' gender, household income level or university type.

Key Words: PHQ-9, mental health, in-term employment

JEL Codes: I10, I23, J22

Üniversite Öğrencileri için Dönemsel İstihdamın Ruh Sağlığı Üzerindeki Etkileri: Çevrimiçi Eğitim Döneminden Bulgular

Öz

Bu çalışma, 6 Şubat 2023 tarihinde Türkiye'de meydana gelen deprem sonrasında, öğrencilerin dönem içi bir işte çalışma durumları ile depresyon belirtileri taşıma olasılığı arasındaki ilişkiyi incelemektedir. Ampirik analizde sosyoekonomik değişkenler ve depresyon varlığı arasındaki ilişkileri araştırmak için multinomial logit regresyon modeli kullanılmıştır. Analiz sonuçlarına göre, bir işte çalışıyor olmak ile depresyon belirtileri arasında bir ilişki bulunamamış ancak daha uzun çalışma saatlerinin daha yüksek depresyon skoru ile ilişkili olduğu görülmüştür. Beklendiği gibi güvenilir arkadaşlara sahip olma ile ruh sağlığı sorunları arasında negatif yönde istatistiksel olarak anlamlı bir ilişki bulunmuştur ancak öğrencilerin cinsiyeti, hane gelir düzeyi ya da üniversite türünün depresyon üzerindeki etkisine dair istatistiksel bir kanıt bulunmamaktadır.

Anahtar Kelimeler: PHQ-9, ruh sağlığı, dönem içi istihdam

JEL Kodları: I10, I23, J22

1. Introduction

Research on mental health situation of university students has had growing attention and increasing rate of psychological suffering among university students is noteworthy (Zivin et al.,2009; Auerbach et al., 2018). In general, university entrance means the transition from adolescence to adulthood, gaining independence and the restructuring of the social network with the inclusion of new relationships in both academic (professors, university colleagues) and private life (friends, partner). Therefore, it involves a process of adaptation due to the difficulties encountered and represents a critical period for life development (Sussman & Arnett 2014, Saleh et al., 2017).

Although university life has some difficulties within its own dynamics, after the devastating earthquake on February 6, 2023, the decision taken by the Council of Higher Education (YÖK) to switch to online education has broadly impacted students' regular life. Due to the urgent needs for accommodation, dormitories and apartments allocated for earthquake victims hence, students who had previously resided in dormitories and apartments in the cities where their universities were located, returned their home after the decision to switching to online education. The fact that students have more free time during the online education process may have encouraged some students to participate in the labor force and being employed may have helped the individuals to be more self-confident and to have a more active social life due to increase in income. In this context this study investigates the effects of online education process on students' mental health and labour force participation status.

In recent years, it has developed into a typical practise for students to work part-time during the academic year while also attending college. Two decades ago, the majority of students exclusively worked during their internships or holidays, especially in large cities. However, recent changes in higher education have caused shifts in employment patterns. One of the recent changes is online learning periods that are due to exceptional occurrences such as pandemics and earthquake. In our sample 30,2 percent of students are employed. 60 percent of sample is female. 58 percent of students have been registered in vaqif university.

According to Prause & Dooley (2001), having a full-time job is linked to increased levels of well-being and a reduced number of depression symptoms for the general population.

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For the elderly, unemployment is related to elevated symptoms of depression.

On their theoretical elaboration Broadbridge and Swanson (2005) predicted that engaging in job during the academic semester is associated with a decline in university adjustment, including academic achievement, social integration, and psychological well-being. Contrary to theoretical predictions it was found that in-term student employment can yield favourable outcomes, as certain students may experience psychological advantages from being employed and receiving payment (Swanson et al., 2006). This is because most students feel that they are able to maintain a balance between their responsibilities as students and employees.

Khawaja & Duncanson (2008) investigated gender, ethnicity, relationship status, employment status, year level, faculty enrolled in. Depression was more common in female students, part-time working students and faculty of law students. Students who were satisfied with their living condition and financial situation had a lower rate of depression than those who were not. In addition, their study revealed that students who were employed full-time exhibited significantly elevated levels of depression compared to those who worked part-time or on a casual basis.

Sanders (2023) showed that in-term working is weakly associated with higher mental health issues and there is progressive rise in the incidence of mental health issues when individuals work longer hours. He stated that while the statistical significance of this difference is evident, the magnitude of the link is comparatively smaller than the other studies.

There are studies investigating the association between status in the labour market and mental health for Turkish population, although they do not address our specific research topic. Turgil & Aygün (2021) concluded that men who are properly employed had higher mental well-being scores than males who are unemployed. Men in Turkey traditionally take up the role of breadwinner, and these findings suggest that they have greater satisfaction when doing so. On the other hand, women's mental well-being scores are not affected by whether they are employed. In her study of Turkish Health Surveys, Düzgün-Öncel (2022) discovered that unemployment relates to depression prevalence. Bozkurt et al. (2023) interpreted that the possible job issues that a diminishing labour market may cause in the future became a source of concern for young people who were still in school.

In this article we try to explore how the shift to online education has affected in-term employment, particularly the association between in-term employment and depression prevalence. Turkish universities practiced completely online education at two different times. First was started in March 2020 and ended in 2021 Autumn due to SARS-Cov 2 pandemic. Second online education period started in 14 February 2023 and ended in September 2023. To the best of our knowledge this study is initial attempt to investigate the impacts of in-term employment on the mental health of university students.

We applied a multinomial logit technique to investigate the associations between explanatory variables and our dependent variable, PHQ-9 depression measure based on a cross-sectional survey. The web-based survey had been carried out between 15 April 2023

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and 29 June 2023 and 545 students who are studying at vocational schools and faculties are surveyed. The information about the study aims were given to students and they were assured about the confidentiality of the data and study was approved by the Ethical Committee from Istanbul Gedik University.

Surveyed respondents are grouped into four categories with respect to severity of their PHQ-9 scores based on DSM-IV definitions. Our findings suggest that there is no association between in-term employment and depression in terms of moderate depression and moderately severe depression, but working longer hours can be linked to higher depression prevalence. We also find that household income is significant predictor of depression occurrence.

This paper is structured into five sections. In the following section 2, we present the theoretical and empirical literature on the association between individual's employment and their mental health. The third section introduces methods and materials used. The fourth section provides an interpretation of results. Final section is the conclusion.

2. Socioeconomic determinants of depression

Individual mental health is influenced by a various factors, including behavioural, socioeconomic, environmental, and demographic factors. The association between socioeconomic status and depression has an interdisciplinary nature which has been studied in especially sociology, psychology and public health fields. The mental well-being of university students can be attributed to similar factors, however certain educational and age-related traits peculiar to their life stage should be considered.

Eisenberg et al. (2007) created a dichotomous depression prevalence measure by attributing non-zero PHQ-9 values as "any depression" indicator. They applied logistic regression to assess associations between PHQ value and its predictors. Age, race, gender, marital status, being international student, having the US citizenship, living situation, sexual orientation, financial strain, and Katrina Hurricane effect. The study found that students who reported having financial difficulties were more likely to experience depression issues.

Karaoglan et al. (2022) findings suggest that NEETs students are more likely than their non-NEET peers to experience mental health issues such as depression, feeling depressed, discomfort in doing things, low self-esteem, anxiety, difficulty falling or staying asleep, sleeping too much, fatigue, poor appetite, and difficulty concentrating. By considering the possible relationships between a variety of demographics, socioeconomic, work-related, and health-related aspects, and the mental health of young people, these results both validated and expanded upon the findings of previous studies. Being a neither in employment, nor in education and training (NEET) is associated with depression, anxiety and suicidality and addiction. Students who do not participate in labour force are not classified as unemployed. Since they're in education, they are not considered as NEET.

Broadridge and Swanson (2006) have highlighted that previous studies have primarily

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focused on the detrimental effects of in-term employment and term-time employment results in a less effective adaption to university life in terms of academic performance, social inclusion, and psychological well-being. .

The impact of term-time employment on students' adjustment to university life has been a subject of research interest broadly. Studies indicate that term-time employment is associated with a diminished adaption in academic performance, social inclusion, and psychological well-being (Broadridge & Swanson, 2005). Furthermore, Winkler (2009) highlighted the concentration of previous research on the motivations behind seeking paid employment, the characteristics and patterns associated with this type of employment, and its' potential positive and negative effects on students' academic lives and performances. The common point of these studies is collectively emphasizing the potential negative impact of term-time employment on students' adaptation to university life.

Students today frequently work while attending university and research by Nigar G. Khawaja and Krystle Duncanson suggest that dual commitment has revealed a negative influence on students' adjustment and psychological health (Broadridge & Swanson, 2005). The adverse impact of paid employment, as outlined by Broadridge & Swanson (2005), is attributed to role conflict between work and study, along with concerns related to achieving balance and heightened stress levels. Other studies have suggested that student in-term employment can be beneficial for some students especially psychologically benefiting from paid work (Swanson et al. 2006). They discovered that working throughout the university term had no negative influence on psychological adjustment, and majority of the students perceived a harmonious balance between their responsibilities as student and employee.

Tirgil and Aygün (2021) examined a wide range of social and economic factors that can predict mental health outcomes by analysing data from Turkish Health Surveys. They found that the presence of impolite behaviour and unfair treatment in the workplace detrimentally impacts the mental health of both genders. They also found that elevated levels of mental health are correlated with increased per capita income.

Sanders (2023) employed seven explanatory variables including gender, ethnicity, educational background, polar quintile, parents' education, working hours, and grants and also identifies that during their studies, undergraduate students' levels of wellbeing tend to rise along with an increase in anxiety. This implies that as adapted to university life and experience improved well-being, the pressure of exams may also contribute to heightened anxiety.

After the year 2006, number of universities, size of quotas increased in Türkiye. Therefore, working students has also risen due to being more heterogeneous university students. However, there is research gap regarding the effects of student's employment on their mental health during their university education.

3. Data and Methodology

Recent study by Bayhan & Bozkurt (2021) state that majority of the Türkiye's population experience depression and anxiety symptoms. Accordingly, a sizable portion of society is nervous and depressed. For example, 50% of respondents indicated that they have had a difficulty in performing daily tasks while 50.2% stated increased feelings of anger and irritability. Similarly, 41.8% stated that they had started to feel losing the sense of control over their lives and 46.8% expressing this feeling 70% of the time. The sentences of "I am living under constant fear of this virus" and "the quality of my sleep has been disrupted" indicated by 70% of the time and 33.8% of the time respectively. The sentence of "My fear of the psycho-social effects of the COVID-19 pandemic on the young people of death has increased" preferred by respondent at rate of 73.5%. Also 53.3% of the population believes that they have become scared of losing loved ones. Lastly, feeling constantly tired and exhausted 83.5% of the time reported by the population.

a. Survey

The Survey conducted by researchers and data are collected from undergraduate, graduate and vocational college students during spring semester especially after the earthquake on March, April and May. The data are gathered from web-based survey conducted among students ranges from non-profit foundation vaqif universities to state universities. The universities mainly participating in the survey are Istanbul Gedik University as the non-profit foundation university and Batman University, as state university. The reason for using a web-based questionnaire is that it allows for easy and practical data collection from university students who are considered to be the fastest group to adapt to technological innovations and have access to the internet and data collection quite easy and practical comparing to traditional methods.

Since we are interested in students' mental health after devastating earthquake the Patient Health Questionnaire 9 (PHQ-9) is applied in order to measure it. Although mental health difficulties generally arise after experiencing some kind of shock and individual experiences may differ, in this case it is expected to experience by majority of the group over the period covered by data.

b. Variables

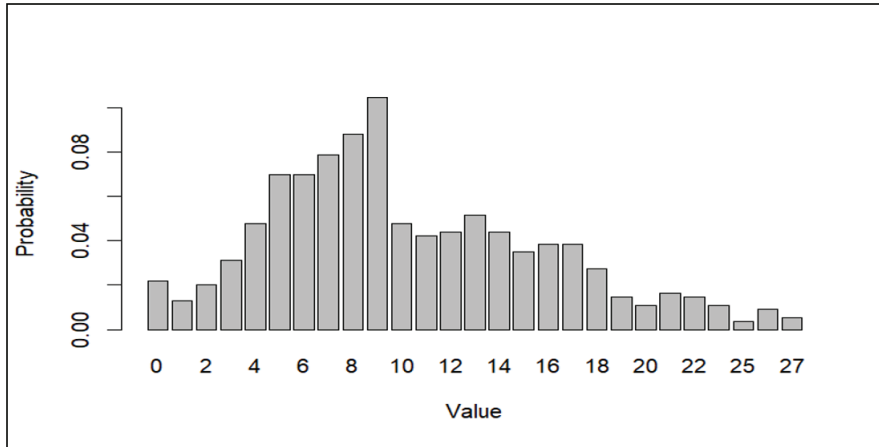
The Patient Health Questionnaire 9 (PHQ-9) survey is used to assess student mental health conditions. Patient Health Questionnaire (PHQ-9) was developed in the 1990s and is widely used for the measurement of self-rating depression, consisting of 9 items in total (Kroenke et al., 2001). Generally, it consists of questions associated with the nine criteria for depression outlined in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1994). Kroenke et al.(2002), uses PHQ-9 for assessment of criterion validity and reported that a PHQ-9 score ≥ 10 had 88% sensitivity and 88% specificity for major depression. Generally, the distributions of PHQ-9 total score are right-skewed in the general population and a PHQ-9 score of 10 approximately corresponds to rank of 95% (Kocalevent et al., 2013; Rief et al., 2004).

Table 1. Definitions of Variables

Variable	Definition	Values
Depression	Depression category of respondent according to PHQ-9 classification	Four level categorical variable
Sex	Gender of the respondent	1: Female, 0: Male
Birthyear	Birth year of the respondent	Year
Cohort	University registration year	Year
Tuition	Type of university student enrolled	1: pays tuition 0: tuition free
Lnincome	Household income of the student	In Turkish Liras
Grant	If student gets grant	Grant=1, otherwise 0
Social support	An indicator for social support	Number of reliable friends
Level	Level of education	Prep. Year=1 Vocational College=2, Faculty=3, Graduate=4
Residence	Lives far from family during online education semester	Lives with family=0, otherwise 1.
Employed	In-term employed during online education semester	1: Employed, 0: Non-employed

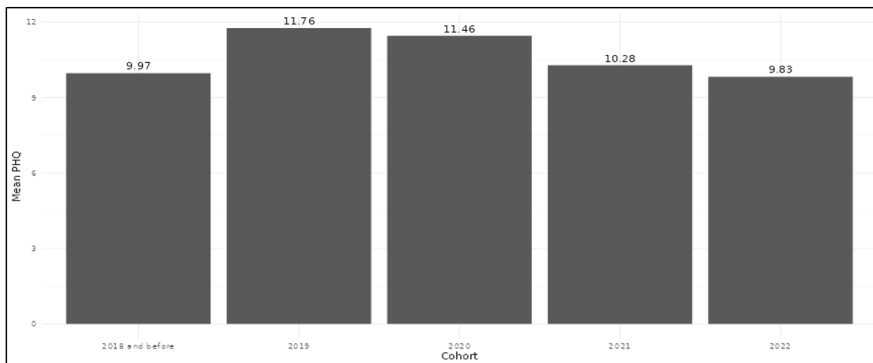
Table 1 shows variables used in the model. Dependent variable is four-category depression scale developed by Kroenke (2002). In line with the findings of previous studies on the mental health of populations, we have included the following factors as control variables: gender, birth year, income, and social support. Men serve as the reference category for gender. Household income is gathered in Turkish Liras and transformed into logarithmic form. Number of reliable friends is an indicator of social support. Residence, grant, tuition and enrolment cohort are distinctive characteristics for university student samples.

Figure 1. Probability Mass Function of PHQ-9 scores



Probability Mass function of PHQ-9 scores is illustrated in Figure 1. PHQ-9 values have right skewed shape, denotes that majority of the population has scores less than 10. Our main concern is students who have PHQ-9 values greater than 10.

Figure 2. Mean PHQ-9 scores across enrolment cohorts



Students who are registered in university in 2019 exhibits higher mean depression scores. This cohort underwent online education on two different times, within three semesters in total. The freshmen and sophomores have lower mean scores with respect to 2019 and 2020 cohorts.

Table 2. Classification of PHQ-9 scores

Score	Assigned Value	Depression severity	Recommendations
0-4	0	Minimal or none	None
5-9	0	Mild	Watchful waiting; repeat PHQ-9 at follow-up
10-14	1	Moderate	Treatment plan, considering counselling, follow-up and/or pharmacotherapy
15-19	2	Moderately severe	Active treatment with pharmacotherapy and/or psychotherapy
20-27	3	Severe	Warrants active treatment with psychotherapy, medications, or combination

We sum first two original categories of PHQ-9 classification in one category, denoting having mild depression or none depression. We have assigned numerical values for PHQ-9 levels such that 1 for moderate depression, 2 for moderately severe depression and 3 for severe depression.

Table 3. Severeness of depression for each sample

PHQ-9 Score	Depression category	Full sample	Employed sample	Not in employment sample
0-9	Minimal or none	0.54	0.53	0.55
10-14	Moderate	0.23	0.22	0.23
15-19	Moderately severe	0.15	0.14	0.15
20-27	Severe	0.07	0.10	0.06

Table 3. presents the distribution of our categorical variable within the entire sample, the employed subset, and non-employed subset. Among the entire sample, 77 percent of students have severe depression while this ratio is 6 percent the not in employment sample. Although depression rates are similar in almost all samples, severe depression ratio in employed sample is substantially higher than its counterparts.

Table 4. Descriptive statistics of the variables

	Full sample		Being employed		Not in employment	
	Mean	Std. dev.	Mean	Std. Dev	Mean	Std. dev
PHQ-9 > 9	0.46	0.50	0.47	0.50	0.45	0.50
Female	0.60	0.49	0.48	0.50	0.65	0.48
Age	21.84	2.06	22.15	2.2	21.71	1.97
Tuition	0.58	0.49	0.56	0.50	0.59	0.49
Vocational	0.52	0.50	0.56	0.50	0.50	0.50
Income	18,150	22,150	20,159	20,164	17,291	22,931
Social support	1.49	0.84	1.38	0.89	1.54	0.82
Residence	0.09	0.29	0.12	0.32	0.08	0.28
Hours	42.66	16.71	42.66	16.71	0	0
Unicity	0.31	0.46	0.30	0.46	0.32	0.47
Grant/loan	0.51	0.50	0.50	0.50	0.51	0.50

In our surveyed sample 46 percent of respondents fall into moderate or higher depression category. Employed sample has 47 percent of depression prevalence, indicating at least moderate depression, while students not currently working during the term show a 45 percent depression prevalence.

There is substantial difference between employed females and males. 48 percent of employed sample are females, whereas 65 percent of not in employment sample consists of females. 56 percent of employed sample are vocational college students. Mean working hours is 42.66 indicating most of in-term working students are full time employees.

As expected, household income of the in-term working students are higher than that of full-time students. There is no difference between employed and full-time students in terms of grant financing.

c. Empirical Model

Depression can be influenced by a various of socioeconomic, demographic, behavioural, and environmental factors. Our study specifically focuses on labour market related determinants by controlling socioeconomic and demographic correlates of mental health.

i. Direction of Causality

A bidirectional relationship may exist between depression and one's status in the labor market. Experiencing depression may cause unemployment or not participation in labour market. This approach is called social causation hypothesis (Prause and Dooley, 2001). Another approach is social selection hypothesis which establishes the direction of causality from labour market status to mental health (Swanson and Broadbridge, 2006). We follow the social causation hypothesis on causal link between being employed and depression.

ii. Identification

As demonstrated in Table 2 we reclassify PHQ-9 depression scale into four categories, with the base category having depression scores less than 10. Therefore, this study estimates relative risk ratios, which allow for the quantification of the risk of falling into one of three distinct depression categories compared to “mild or none” depression category. Cohort is a multinomial predictor which indicates the university enrolment years of the students. income all predictors are binary variables.

Hypothesis 1: Being employed is positively associated with depression symptoms for university students.

Hypothesis 2: Longer working hours is positively associated with depression symptoms for university students.

We utilized multinomial logistic estimation to handle the categorical classification of PHQ-9 interpretation.

$$p = \frac{\exp(\beta_0 + \beta_1 \text{Employed} + \beta_2 \text{Birthyear} + \beta_3 \text{Female} + \beta_4 \text{Tuition} + \beta_5 \text{Level} + \beta_6 \log \text{Inc} + \beta_7 \text{Ssup} + \beta_8 \text{Residence} + \beta_9 \text{Grant})}{1 + \exp(\beta_0 + \beta_1 \text{Employed} + \beta_2 \text{Birthyear} + \beta_3 \text{Female} + \beta_4 \text{Tuition} + \beta_5 \text{Level} + \beta_6 \log \text{Inc} + \beta_7 \text{Ssup} + \beta_8 \text{Residence} + \beta_9 \text{Grant})} \quad (1)$$

$$p = \frac{\exp(\beta_0 + \beta_1 \text{Hours} + \beta_2 \text{Birthyear} + \beta_3 \text{Female} + \beta_4 \text{Tuition} + \beta_5 \text{Level} + \beta_6 \log \text{Inc} + \beta_7 \text{Social} + \beta_8 \text{Residence} + \beta_9 \text{Grant})}{1 + \exp(\beta_0 + \beta_1 \text{Hours} + \beta_2 \text{Birthyear} + \beta_3 \text{Female} + \beta_4 \text{Tuition} + \beta_5 \text{Level} + \beta_6 \log \text{Inc} + \beta_7 \text{Social} + \beta_8 \text{Residence} + \beta_9 \text{Grant})} \quad (2)$$

p denotes the probability of the cases in particular depression category. β_0 denotes constant term. constant term. Set of control variables of both equations are attributed to relevant depression research.

4. Results and Discussion

PHQ-9 depression scale is the response variable in the multinomial logistic regression model. Underneath PHQ are three replicates of the predictor variables, referring the three models that are estimated: moderate depression relative to base model, moderately severe depression relative to base model and severe depression model relative to base model. Since the parameter estimates are relative to referent group all parameter interpretation of a unit change in predictor variable cause estimated coefficient change in the dependent variable relative to referring group in terms of given variables in the model are held constant. Non-depressed part of the subjects is taken as the base model.

Table 5. Regression results for subsamples

	(1)	(2)	(3)
VARIABLES	Moderate	Moderately severe	Severe
Employed	-0.0200 (0.254)	0.0834 (0.309)	0.774* (0.403)
Vocational	15.63 (2,243)	-0.886 (1.218)	15.76 (3,933)
Faculty	16.13 (2,243)	-0.123 (1.211)	16.70 (3,933)
Graduate	15.15 (2,243)	-0.738 (1.438)	16.39 (4,214)
Female	-0.193 (0.236)	0.229 (0.297)	0.673 (0.420)
1999.birthyear	-0.116 (0.601)	0.185 (0.647)	16.28 (712.7)
2000.birthyear	1.002** (0.485)	0.385 (0.569)	14.38 (712.7)
2001.birthyear	0.0505 (0.448)	-0.0926 (0.498)	15.66 (712.7)
2002.birthyear	0.364 (0.406)	0.433 (0.466)	15.64 (712.7)
2003.birthyear	0.822** (0.381)	-0.00124 (0.498)	16.11 (712.7)
2004.birthyear	0.192 (0.493)	0.169 (0.577)	15.51 (712.7)
2018cohort	-1.330 (0.999)	-16.47 (2,179)	-1.341 (2,844)
2019cohort	-1.271 (0.785)	0.143 (0.915)	13.58 (1,381)
2020cohort	-1.272* (0.744)	-0.497 (0.905)	14.16 (1,381)
2021.cohort	-1.341** (0.653)	-0.906 (0.831)	13.27 (1,381)
2022Cohort	-1.637*** (0.634)	-1.184 (0.802)	13.19 (1,381)

lnIncome	-0.301	-0.895*	0.829
	(0.389)	(0.470)	(0.655)
Having grant	-0.00113	-0.0511	0.421
	(0.238)	(0.289)	(0.406)
Tuition	0.0914	0.374	0.278
	(0.238)	(0.287)	(0.395)
Residence	-0.164	-0.157	0.672
	(0.425)	(0.495)	(0.606)
Social support	-0.464***	-0.753***	-0.959***
	(0.142)	(0.177)	(0.271)
Constant	-13.54	4.457*	-50.35
	(2,243)	(2.580)	(4,256)
Observations	529	529	529

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The results demonstrates that neither female students nor male students vulnerable to poor health conditions than their peers due to statistically insignificant gender coefficients in all three sections. As seen in the results having reliable friends have huge positive impact on mental well-being.

Table 6. Regression results for subsamples

	(1)	(2)	(3)
VARIABLES	Moderate	Moderately severe	Severe
Hours worked	0.0509***	0.0524**	0.0179
	(0.0188)	(0.0232)	(0.0215)
Faculty	1.231**	1.700**	1.285
	(0.582)	(0.756)	(0.786)
Graduate	0.354	2.766	2.680
	(1.241)	(1.714)	(1,877)
Female	-0.620	0.608	0.778
	(0.566)	(0.694)	(0.863)
1999.birthyear	0.562	1.809	17.12
	(1.248)	(1.592)	(905.6)
2000.birthyear	1.281	-1.471	17.12
	(1.052)	(1.640)	(905.6)
2001.birthyear	0.345	-1.308	16.49

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	(1.044)	(1.508)	(905.6)
2002.birthyear	1.052	2.710**	15.46
	(0.946)	(1.254)	(905.6)
2003.birthyear	0.855	2.547*	18.47
	(0.893)	(1.303)	(905.6)
2004.birthyear	0.386	2.805**	16.52
	(1.150)	(1.425)	(905.6)
2018.cohort	16.28	15.74	11.60
	(4,632)	(10,147)	(10,983)
2019.cohort	-2.636	20.44	-4.261
	(2.066)	(2,342)	(4,551)
2020.cohort	-3.163*	16.68	14.79
	(1.776)	(2,342)	(2,327)
2021.cohort	-1.919	15.66	12.93
	(1.398)	(2,342)	(2,327)
2022.cohort	-1.766	14.98	12.57
	(1.346)	(2,342)	(2,327)
LnIncome	-0.620	-1.800	1.541
	(0.893)	(1.247)	(1.223)
Having grant	-0.218	-1.855**	0.822
	(0.563)	(0.741)	(0.878)
Tuition	0.130	0.211	1.049
	(0.559)	(0.649)	(0.832)
Residence	0.478	1.122	1.717
	(0.908)	(1.192)	(1.673)
Social support	-0.606**	-0.570	-1.047*
	(0.301)	(0.369)	(0.582)
Constant	1.390	-12.86	-39.65
	(4.416)	(2,342)	(2,497)
Observations	145	145	145

Standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

a. Moderate Depression

Given the other variables in the model are held constant, the presence of social support measured by the number of reliable friends, has a negative impact on experiencing moderate depression compared to non-depression. If a subject(student) were to increase his/her reliable score by one point, being in the mood of moderate depression relative to non-depression would be decreased by 0.46 unit. The year of registration seems to have statistically significant negative effect for 2020 (-1.272*), 2021 (-1.341**) and 2022 (-1.637***), it can be interpreted as the freshman and sophomore cohorts are in the mood of moderate depression relative to non-depression would be decreased by 1.27,1.34 and 1.63 unit respectively. In other words, closer the registration year which equals to far from the graduation have statistically negative impact on depression category. On the other hand, general household income, financial supporting by grants or loan, paying tuition fee, gender, student status (undergraduate, graduate, post graduate) and being employed have statistically insignificant impact on the mood of depression. Considering the birth year of subject as the date of birth year converge to date, regression coefficients take statistically significant negative value. It can be interpreted as younger students are more prone to non-depression compared to their elder counterparts. Besides that, given the one unit increase in employment, the relative risk ratio for being in the mood of moderate depression would 0.980 times more likely when the other variables in the model are held constant. It can be interpreted as if subject were to increase his/her employment score, we would expect his/her to be more likely in the mood of non-depression rather than moderate depression.

One unit increase in working hours for moderate depression relative to non-depression while other variables held constant in the model would be expected to increase moderate depression by 0.0509 point. Working hours of subject seems to have statistically significant positive effect (0.0509***) which means that longer the working hours more prone to be depressed. The relative risk ratio for one unit increases in working hours of subject being moderate depression relative to non-depression would be expected to increase by a factor of 1.052 given all other variables are held constant. More generally we can say that if a subject were to increase his/her working hours score, we would expect her to be more likely in the mood of moderate depression rather than non-depression.

b. Moderately Severe Depression

If a subject (student) were to increase his/her social support score by one point, being in the mood of moderately severe depression relative to non-depression, would be decreased by 0.75 unit while other variables held constant. General household income differs from other models by having statistically significant negative coefficient. If a subject (student) were to increase his/her household income score by one point, being in the mood of moderately severe depression relative to non-depression, would be expected to decrease by 0.89 unit, which means higher the household income lessens the depression rate. On the

contrary, the regression coefficients for student status (undergraduate, graduate, postgraduate), gender, birth year of students', students' registration year to the university, financial supporting by grants or loan, paying tuition fee and being employed during the online education period have not been found to be statistically different from zero. Additionally, if subject were to increase his/her employment score by one unit, the relative risk for being moderately severe depression rather than non-depression would be expected to increase by factor of 1.086 given that all other variables in the model are held constant. Generally, we can say employed student is expected to be in the case of moderately severe depression.

Considering the case of employment, if a subject (student) were to increase his/her working hours by one point, being moderately severe depression relative to non-depression, would be increased by 0.0524** point, given all other predictor variables in the model are held constant. In other words, increased working hours make it easier to become depressed. The relative risk ratio for one unit increases in working hours is 1.053. given that all other variables in the model are held constant. If subject were to increase his/her working hours by one unit the relative risk for being in the mood of moderately severe depression rather than non-depression, would be expected to increase by factor of 1.053 given the other variables are held constant. Generally, we can say that if a subject were to increase his/her working hours, we would expect his/her to be more likely in the mood of moderately severe depression rather than non-depression.

c. Severe Depression

If a subject (student) were to increase his/her reliable score by one point, being in the mood of severe depression relative to non-depression, would be decreased by 0.95 unit while holding all other variables constant. Besides that, being employed in the period of data covered have statistically positive impact on the depression mood of the subject (student) as expected. If a subject (student) were to increase his/her employed score by one point, being in the mood of severe depression relative to non-depression, would be increased by 0.77 unit given all other predictor variables held constant. Given one unit increase in employment, the relative risk of being in the mood of severe depression would be 2.168*times more likely when the other variables in the model held constant. It can be said that if a subject were to increase his/her employment score we would expect his/her to be more likely in the mood of severe depression.

Conversely, we couldn't find statistically significant evidence for gender, general household income, financial supporting by grants or loan, paying tuition fee, student status (undergraduate, graduate, postgraduate), birth year of students', students registration year of the university or student residence during online education period.

Unexpectedly, longer working hours do not have a statistically significant impact on the occurrence of severe depression compared to non-depression, when all other factors are kept equal. Comparing the mood of severe depression with non-depression, the relative risk for being in the mood of severe depression would be expected to increase by factor of

1.018 given the other variables in the model are held in constant. In other words, subjects are more likely to be in the mood of severe depression.

5. Conclusion

Based on our analysis, statistically significant relationship is observed between in-term employment and mood of severe depression whereas there is no association between in-term employment and depression levels of moderate depression and moderately severe depression. Furthermore, the presence of social support demonstrates a statistically significant association with lower depression rates, as indicated by significant coefficients across all depression categories. Essentially, our expectations are affirmed as there is a negative statistically significant relationship between having social support and the likelihood of experiencing mental health problems.

Unexpectedly, increased working hours have no statistically significant effect in the event of being severe depression relative to non-depression, whereas increasing working hours have the opposite effect in the moderate and moderately severe depression categories due to statistically significant positive coefficients. Longer the working hours, the more likely students have depression problems. Additionally, some of predictors have partially effective such as year of registration and birth year shows statistically significant relationship in the moderate depression rate while in the other categories not.

Moreover, results suggest that there is no statistical evidence related to students' gender, financial supporting by grants or loan, paying tuition fee, unicity and student status (undergraduate, graduate, postgraduate) in all depression groups which is unexpected especially in terms of gender.

Considering the performance of relative risk ratio for working hours score, under the terms of increased working hours, students are more likely in the mood of moderate depression moderately severe depression and severe depression rather than non-depression as expected. Besides that, relative risk ratio for employment in terms of one unit increase in employment score, students are more likely in the mood of non-depression rather than moderate depression whereas students are more likely to be in the mood of severe depression and moderately severe depression unexpectedly.

According to the results increased level of household income is associated with higher level of student's mental health only in terms of moderately severe depression. In contrast to existing literature, our results diverge, indicating a lack of statistically significant evidence supporting a relationship between students' mental health and household income in terms of moderate and severe depression categories. In conclusion, this analysis indicates the imperative for universities and associated entities, encompassing healthcare providers and families, to undertake proactive measures in support of students' mental health. Descriptive statistics underscore the noteworthy elevation of mean depression scores within all subsamples.

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