Factors associated with depression among university students: the role of students' satisfaction

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Abstract

University education is recognized as an important period of life that determines the future trajectories and success of individuals. It is also the time when the onset of depression peaks. In this paper, we use data on 4,182 students from a selective university to identify the main factors associated with symptoms of depression among this cohort. Besides socio-demographic characteristics that are largely out of the university's control, we pay specific attention to the role of students' satisfaction with various aspects of their university life. We find that controlling for potential confounders, satisfaction is negatively associated with depression. We also find that survey data routinely collected by the university could be used to identify individuals at high risk of future depression.

Keywords

students mental health, depression, students satisfaction, universities, Russia

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Introduction

Depression is recognized as one of the major public health issues affecting millions of people worldwide (James et al., 2017). In this regard, one particularly vulnerable group is young adults. Several studies have highlighted the increasing levels of depression symptoms among young individuals aged 18-25 (13.1% vs 7.1% of all adults) (NIMH, 2019) and specifically among university students (Cvetkovski, Reavley & Jorm, 2012; Ibrahim, Kelly, Adams, Glazebrook, 2013). For people younger than 24 years old, mental disorders are the most important cause of disability corresponding to 45% of the YLDs (year of healthy life lost due to disability) (Gore et al., 2011).

The increasing share of students with depression symptoms should warrant attention from universities for multiple reasons. Firstly, depression is associated with various health issues. For the most part, depression symptoms at this age is a predictor of severe depression episodes later in life (Sonawalla, Fava, 2001). Depression is also related to obesity (Mannan, Mamun, Doi, Clavarino, 2016), diabetes complications (De Groot, Anderson, Freedland, Clouse, Lustman, 2001), and heart disease (Carney, Freedland, 2017) among other health issues (Moussavi, Chatterji, Verdes, Tandon, Patel, Ustun, 2007). Depressive symptoms are a significant predictor of suicidal behavior and ideations (Cukrowicz et al. 2011; Nam, Hilimire, Jahn, Lehmann, DeVlyder, 2018). In addition to negative health effects, depressive symptoms are associated with lower academic performance (Andrews, Wilding, 2004; Hysenbegasi, Hass, Rowland, 2005; Stallman, 2010; Dendle et.al. 2018) and the likelihood of dropout (Fletcher 2010; Naylor, Baik, Arkoudis, 2017). Depression also negatively affects relationships with peers and teachers (Das, Mishra, 2010).

Many studies have focused on depression to identify at-risk groups of students who are more likely to be depressed to provide them with proper support. Studies reveal that university students are not a homogeneous group and average depression levels vary depending on the field of study (Rotenstein et.al. 2016; Dendle et.al. 2018); place of residence (Mojs et al., 2012), regions and countries (Ibrahim et.al., 2013); gender groups (McIntyre, Worsley, Corcoran, Harrison, Woods & Bentall 2018; Cahuas, He, Zhang, Chen, 2020), etc. Some of the predictors of depression include the challenges that students face during their studies, such as heavy workload (Das, Mishra, 2010), lack of physical activity and sleep (Cahuas, He, Zhang, Chen 2020), financial issues (Andrews, Wilding, 2004; Kim, Chatterjee, 2019), isolation and lack of social support (Bitsika, Sharpley, Rubenstein, 2010). Another group of factors includes different aspects of the studying process such as students motivation (Silva et.al., 2017), students' sense of competence and course satisfaction (Naylor 2020). Further, psychological factors such as anxiety traits, relationship patterns (Silva et.al., 2017), sense of loneliness (McIntyre et. al., 2018), and self-esteem (Michalak, Teismann, Heidenreich, Ströhle, Vocks, 2011) are known to be associated with depression among university students.

It is important not only to identify factors that are associated with depression but also to suggest potential strategies that universities could adopt to mitigate its negative consequences. The majority

of relevant studies stress the importance of continuous monitoring of students' well-being and providing them with psychological counseling and support e.g., by establishing psychological support services (Bewick, Koutsopoulou, Miles, Slaa, Barkham, 2010; Stallman, 2010; Beiter et al., 2015). Reducing the risk of depression before it occurs is harder because most of the factors associated with the condition are outside of university control. As such, in this paper, we pay specific attention to the satisfaction of students with various aspects of their university life, which we assume could be influenced by the university settings.

Data Context

There is little statistical data on depression prevalence in Russia. The Russian Ministry of Health does not include depression in the statistics of mental health disorders. However, the World Health Organization estimates the level of depression in Russia to be 5.5% (WHO 2017), one of the highest in the world. Non-representative studies conducted in selected regions report a prevalence rate (PHQ-9 $\geq$ 10) equal to 10.7% in women and 5.4% in men (Cook et al. 2020). The Russian context is characterized by a plethora of factors contributing to high levels of depression such as increasing poverty rate, declining standards of living, complex socio-political background (Averina et al., 2005; Cook et al. 2020, World Bank 2021) and at the same time, negative attitudes toward both depression and seeking professional help (Turvey, Jogerst, Kim, Frolova, 2012; Nersessova, Jurcik, Hulse, 2019). National-level study representative for 20-21-year-olds report the prevalence of depression (PHQ-9 $\geq$ 10) at 20% for women and 12% for men (Dementeva, Smirnov, 2021). The estimates of depression level among Russian students are rare and usually based on limited samples.

While there is no hard and direct evidence, public opinion polls suggest that depression might be a rising problem in Russia. Russians more often report experiencing depressive feelings (38% in 2014 vs 48% in 2018) and increasingly notice them in other people (41% in 2014 vs 48% in 2018) (Levada-center 2021). In the university studied, the number of requests to the Centre for Psychological Counselling steadily increases through the years, see Figure 1.

Sample

We utilised the data from the Student Life Survey, an annual survey conducted among students from one of the leading Russian research universities. The main purpose of this online survey was to collect students' feedback about their life at the university. In 2018, a questionnaire to assess symptoms of depression among students was included in the study. This part of the survey was preceded by a disclosure provision that reminded students that participation is voluntary, warned them that some questions could be sensitive and asked them to provide consent to use the collected data for research purposes. Out of 6,631 students who started the Student Life Survey, the depression questionnaire was completed by 4,182.

Figure 1. The number of requests to the Centre for Psychological Counselling. For 2020, the number is estimated based on data available from January to September.

Variables and analysis

A Patient Health Questionnaire was used to assess depressive symptoms among participants (Kroenke, Spitzer, Williams, Löwe, 2010). The questionnaire has been shown to be valid not only in medical settings but also among the general population (Martin, Rief, Klaiberg, Braehler, 2006). We used an eight-item version of the Patient Health Questionnaire depression scale (PHQ-8) (Kroenke, Strine, Spitzer, Williams, Berry, Mokdad, 2009).

Since using conventional threshold of $\text{PHQ-8} \geq 10$ results in an unusually high prevalence of depression (see Results), we have used for our analysis a PHQ-8 severity score as a continuous variable instead of converting it to dichotomous. Generally, depression severity score is known to be strongly associated with other indicators of depression and mental health, and also with the different aspects of health-related quality of life (Kroenke, Spitzer, Williams, 2001) and can be used in addition to the categorical diagnostic groups.

As a first step, we analyzed the relationship between PHQ-8 scores and key socio-demographic variables to identify potential confounders. These variables include gender, financial situation, occupation and health status. We also controlled for year of study, type of accommodation, mode of study, and academic performance.

We then studied the relationship between symptoms of depression and students' satisfaction. As part of the Student Life Survey, participants answered 98 questions regarding their satisfaction with different aspects of their student life from their educational program to dormitories and canteens.

For each question, answers ranged from scales 1 (completely unsatisfied) to 5 (completely satisfied). Given the large number of questions, we combined questions related to the same aspect of student life into one variable by averaging the answers. This resulted in 26 variables. We then computed the correlation between depression and these variables both independently and by combining them into a single index. As the direction of correlation was the same and strength was similar for all variables, we used the single index at the later stages of the analysis. We also checked if the relationship between depression and student's satisfaction level holds controlling for potential confounders identified at the first stage.

The main limitation of this study is that the direction of the relationship could not be clearly identified i.e., the negative correlation could mean that dissatisfaction leads to depression but also that depressed students tend to report lower satisfaction. To partly address this issue, we included into our analysis students' satisfaction measured in the previous wave of Student Life Survey conducted during the preceding year. While this may not demonstrate a clear causal link, it nevertheless would be valuable to understand if dissatisfaction reported by students could predict their depression symptoms one year later. It is, however, noteworthy, that the sample size for this analysis is substantially smaller, as freshmen were not enrolled in the university one year before. Also, different students participate in Student Life Survey in different years, which further reduces the size of the intersection of two waves.

Finally, we assessed the extent to which it is possible to predict depression from all variables used in the analysis. For that purpose, we trained a regression model and checked its ability to distinguish between students with no symptoms of depression and moderately severe depression using conventional thresholds i.e., $\text{PHQ-8} < 5$ and $\text{PHQ-8} \geq 15$ respectively. The performance of the model is measured as Area Under the ROC Curve (AUC).

Results

Prevalence and determinants of depression

The prevalence of depression ($\text{PHQ-8} \geq 10$) in our sample is 58% for women and 42% for men. The level of depression is higher for women than for men ($d = 0.36$), for students who pay for their studies ($d = 0.20$), those who live with their parents ($d = 0.07$), and bachelor students compared to master students ($d = 0.47$). The depression level is the lowest among students working full time, higher for those working part-time, and the highest for students who are not employed. See Table 1 for information on respective groups sizes and statistical significance.

Table 1. Average PHQ–8 scores for different groups of students. For binary variables effect sizes are computed as Cohen’s d and P-values are from the Student’s t-test. For academic performance and financial situation, P-values are computed as the significance of the correlation coefficients and effect size is $2r / (1 - r^2)$ where r is Pearson’s correlation coefficient.

Variable	Options	Average PHQ–8 score (N)	P-value	Effect size
Gender	Women	11.61 (2946)	8.8×10^{-26}	0.36
	Men	9.48 (1236)		
Form of study	Budget	10.46 (2331)	3.8×10^{-10}	0.20
	Commercial	11.63 (1848)		
Living	In dormitory	10.78 (1357)	0.148	0.05
	Not in dormitory	11.07 (2825)		
	With parents	11.23 (1820)	0.018	0.07
	Not with parent	10.78 (2362)		
Working	Is working	9.74 (1146)	2.2×10^{-16}	0.29
	Not working	11.44 (3036)		
	Working full time	8.83 (451)	2.2×10^{-05}	0.26
	Working part time	10.33 (695)		
Financial situation	1 (worse off)	15.79 (19)	0.0004	0.32
	2	12.22 (73)		
	3	11.06 (330)		
	4 (better off)	10.38 (82)		
Level of study	Bachelor	11.61 (3222)	8.4×10^{-37}	0.47

	Master	8.84 (960)		
Self-reported health-related problems	Yes	12.28 (2913)	1.9×10^{-105}	0.76
	No	7.99 (1269)		
Academic performance	Q1	12.19 (380)	3.5×10^{-13}	0.23
	Q2	10.34 (379)		
	Q3	10.13 (379)		
	Q4	10.10 (380)		

Academic performance is negatively associated with depression i.e., higher-performing students are less depressed ($d = 0.23$). In Table 1, we report average PHQ-8 scores depending on academic performance quartiles for comparability but we used grade point averages (GPA) as a continuous variable for further analysis. For some students, information about their self-reported financial situation was also available. They were asked to select one of four options that better describe their financial situation (see SI). The well-off students are less depressed ($d = 0.32$). According to self-reports, we also found that the strongest predictor of depression is having health-related problems ($d = 0.76$).

Students' satisfaction

We found that almost all the items from the satisfaction survey are negatively correlated with depression i.e., students who report higher satisfaction are less depressed. Figure 2a shows the distribution of correlations between depression and all 98 items, the median value is $r = -0.12$. Most of the correlations are statistically significant after Bonferroni Correction for multiple comparisons i.e., after the significance threshold is lowered from 0.05 to 0.0005; see Figure 2b for the corresponding Manhattan plot.

Figure 2. The relationship between depression and satisfaction. Most of the 98 original satisfaction items negatively (a) and statistically significantly (b) correlate with depression. All 26 combined items are negatively correlated with depression (c), this correlation is significant for 21 of them after correcting for multiple comparisons (d).

All 26 combined variables are negatively correlated with depression (Figure 2c, 2d) with the median value of $r = -0.15$; see SI for the list of corresponding questions. Given the large number of satisfaction items and their general agreement, we combined them into a single index by averaging the values. As average has lower variation than the original items, we rescaled the index to

correspond to the original scale for easier interpretation. This satisfaction variable negatively correlated with depression, $r = -0.24$ ($P = 9.1 \times 10^{-58}$).

We found that this relationship holds controlling for potential confounders using the OLS regression model (see Table 2). The effect of one point change in satisfaction is comparable to the difference between genders, the difference between master and bachelor students, or to two points in GPA (GPA is measured on a 10-point scale).

Table 2. Results from OLS regression models predicting depression (PHQ-8 score) for satisfaction measured at the same year as depression (M1) and one year before (M2).

	Same year (M1)		Year before (M2)	
	Coefficient	P-value	Coefficient	P-value
Satisfaction	-1.453	9.0×10^{-43}	-0.849	4.2×10^{-7}
Gender	-1.874	4.9×10^{-23}	-1.386	3.6×10^{-4}
Is Master	-1.349	1.6×10^{-9}	-1.928	1.2×10^{-5}
Is commercial	0.515	0.004	1.083	0.004
Living in dormitory	-0.018	0.937	-0.120	0.794
Living with parents	0.016	0.941	0.052	.900
Is working	-1.126	4.2×10^{-8}	-0.675	0.079
Report health problems	3.385	1.8×10^{-69}	3.564	4.3×10^{-20}
GPA	-0.647	1.1×10^{-15}	-0.437	0.017
Intercept	23.442	4.5×10^{-23}	17.887	2.3×10^{-19}
N = 4156			N = 1076	
$R^2 = 0.201$			$R^2 = 0.175$	

Using satisfaction measured one year before leads to the same results (Table 2, M2).

The model could distinguish between students with no symptoms of depression and those with moderately severe depression with an accuracy of 84%. Students who are in the bottom quintile by

the predicted score have an 8% risk of reaching the threshold for the moderately severe depression ($\text{PHQ-8} \geq 15$) while students from the top quintile have a 47% risk.

For the severe depression ($\text{PHQ-8} \geq 20$), the respective risks are 1% from the bottom quintile and 20% for the top quintile.

Discussion

Our study provides further evidence that university students might be at particularly high risk of depression. Using a conventional threshold for PHQ-8 scores, we found an unusually high prevalence of depression: 58% for women and 42% for men. This is substantially higher than had been previously found in communities from different countries (12.9% on average) (Lim, et al., 2018). This is also higher than the figures previously reported for the Russian nationally representative sample of young adults of similar age with 20% for women and 11% for men (Dementeva, Smirnov, 2021). However, university students are known to experience rates of depression that are higher than those found in the general population with a weighted mean prevalence of 30.6% and some studies reporting the prevalence as high as 85% (Ibrahim, Kelly, Adams, Glazebrook, 2013).

Several factors might contribute to the high rates of depression among university students. Students experience a wide range of psychological stressors caused by high workload (Smith, 2019) and pressure from the competitive aspects of learning such as grades and ratings (Beiter, Nash McCrady Rhoades, Linscomb, Clarahan, & Sammut, 2015; Farrer, Gulliver, Bennett, Fassnacht & Griffiths, 2016). Studying at university is already a difficult and intellectually challenging process, but students have also to adjust to new circumstances and often face difficulties arising from adaptation (Dyson & Renk, 2006). Students experience separation from family and friends, often feel homesick (Thurber, Walton, 2012) and isolated (Hefner & Eisenberg, 2009; Liu, Zhang, Yang & Yu 2020). It has been also found that students' eating (He, Huang, Yan, Wu, Cai & Fan, 2018) and sleeping (Pascoe, Hetrick & Parker, 2020) habits change, especially during exam period (Campbell, Soenens, Beyers & Vansteenkiste, 2018). This change in activity is known to be a predictor of mental health problems (Rykov et al., 2021). Unclear career prospects after graduation and anxiety related to an uncertain future also contribute to student stress (Beiter, Nash McCrady Rhoades, Linscomb, Clarahan, & Sammut, 2015).

Despite being an important aspect of university life, students' stress is often neglected by university administration. In some countries, including Russia, governments attempt to improve national higher education by launching excellence initiatives and providing competitive funding based on clear-cut indicators often tied to positions in global university rankings (Lovakov, Panova, Sterligov & Yudkevich, 2021; Matveeva, Sterligov & Yudkevich, 2021). The students' well-being is notably absent from these indicators making it less of a priority for higher education administrators. Discussions on the need to include well-being indicators into performance metrics take place at the

high school level (Bonell, Fletcher, Sorhaindo, Wells & McKee, 2012) but are still rare in higher education.

In our sample, we have found that consistent with previous research, depression risks are higher for women (Kessler, 2003; Gao, Ping & Liu, 2020), individuals who face financial difficulties (Andrews, Wilding, 2004; Kim, Chatterjee, 2019), and those with health-related issues (Stephoe, 2006). We have also found that controlling for these and other socio-demographic factors, satisfaction with various aspects of university life is negatively associated with depression. These results were surprisingly robust: pointing in the same direction for all measured aspects and reaching statistical significance after correcting for multiple comparisons for almost all of the aspects. The exceptions are aspects with a small sample size e.g., satisfaction with the military training program that is undergone only by a few students. There might be multiple reasons for this association. Depressed students might feel less satisfied with all aspects of their life and as a result report lower satisfaction in the university survey. For example, it has been found that life satisfaction is related to student stress (Saleh, Camart & Romo, 2017). However, we have also found that satisfaction measured one year before screening for depression still has a predictive power, making it a useful predictor regardless of the reasons underlying this relationship.

It is probably not surprising that satisfaction with university life is closely related to students' well-being as universities play an important role in the life of their students. Young adults spend from 18 to 40 hours studying per week (Maloshonok 2020). During this period they acquire professional competence and important soft skills, gain independence, and establish meaningful relationships (Pascarella, 1996; Patton et. al. 2016). Given the outsized role that universities play in the students' life, they should take responsibility for their well-being. That might be especially important in Russia where services for psychological support did not exist until recently and are still not widespread (Griffin & Karepova, 2011). In such circumstances, universities could step up and play a more active role in caring for students. While universities cannot perform a function or substitute public health institutions, they could still play a vital role in students' mental health by promoting the importance of well-being, helping students to navigate through difficult situations, providing information about on-campus and off-campus services and access to them (Duffy, Saunders, Malhi, Patten, Cipriani, McNevin, MacDonald, Geddes, 2019). Studies show that students do not always know about available psychological services (Eisenberg, Golberstein & Gollust, 2007) and might not recognize that they need help (Thomas, Caputi & Wilson, 2013). Many students report that they would not seek professional help even if they are in distress. It is especially relevant for male students (ibid), minority students, international students (Golberstein, Eisenberg & Gollust, 2008), and students from families with low socio-economic status (ibid).

As we have shown, the data that is already routinely collected by the university allows identifying individuals at higher risk of depression with certain accuracy. This information could be used to

provide targeted support to students at the highest risk of depression and allow the regular monitoring of students well-being.

Further research is needed to clarify the relationship between students' satisfaction with their experience and depression. However, our findings suggest that the university environment might play a certain role in students' depression. Thus, reducing the number of stressors and providing students — especially the most vulnerable ones — with a supporting environment should become a priority for university administrators.

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Conflicts of interest

Authors declare no conflict of interest.

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Supplementary Information

Financial situation categories

1	We try to save money on everything, we have enough for daily expenses but buying clothes already present a difficulty
2	We have enough for food and clothes but buying large household appliances without applying for a loan is problematic
3	In general, we are well provided but we cannot afford expensive purchases (for example, a car) without applying for a loan or without saving for a prolonged period of time
4	We are well provided, we can afford to buy a car or an expensive vacation quite easily

List of all satisfactions ordered by significance of correlation with depression

Educational program	4.1×10^{-42}
Support of educational process	4.9×10^{-37}
Conditions for extracurricular activities	9.5×10^{-30}
Getting a student bank card	1.0×10^{-16}
Getting a student pass	2.4×10^{-16}

Living in dormitory	2.6×10^{-13}
Getting documents confirming student status	4.8×10^{-12}
Information regarding studying abroad	4.3×10^{-8}
Safety Living Basics Course	8.5×10^{-8}
Safety Living Basics Course (meeting with curators)	1.7×10^{-7}
Using library	2.4×10^{-7}
Getting library pass	3.5×10^{-7}
Information about student life	1.2×10^{-6}
Everyday issues in dormitories	2.2×10^{-6}
Student councils	3.1×10^{-6}
Individual learning plan	3.2×10^{-6}
Information about scholarship	5.5×10^{-6}
Paying for dormitories	1.1×10^{-5}
Dormitory placement	4.4×10^{-5}
Getting need based scholarships	1.7×10^{-4}
Information about career opportunities	4.5×10^{-4}
Getting medical help at the university	6.8×10^{-3}
Getting house registration	0.011

Getting psychological help at the university	0.024
Using report button	0.069
Military training	0.186