EMOTIONAL INTELLIGENCE AND ACADEMIC PERFORMANCE: A CASE STUDY AT NAZARBAYEV UNIVERSITY AND KAZAKH-BRITISH TECHNICAL UNIVERSITY

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ABSTRACT

The purpose of this paper is to examine the relationship between academic performance and emotional intelligence using a primary dataset from Nazarbayev University (NU) and Kazakh-British Technical University (KBTU). We address the issue of low EQ scores associated with the performance of STEM students. For this, we adopt Trait Emotional Intelligence Questionnaire designed by Petrides (2009) and conduct descriptive statistics, multinomial logistic regression, ordered logistic regression, and binary logistic regression analyses. The sample consists of 245 undergraduate degree students' responses from two universities. We conclude that the effect of higher EQ scores on academic performance is: (a) positive for STEM students, (b) positive for female students, (c) negative for male students, (d) negative for female sophomores, and (e) positive for male sophomores. We argue this constitutes a national public policy problem given the high demand for emotionally intelligent STEM graduates in the labor market. We are unaware of primary studies on the EQ-academic performance relationship in Kazakhstan.

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INTRODUCTION AND PROBLEM STATEMENT

In this study, we examine emotional intelligence (EQ) and academic performance using data from two leading multidisciplinary Kazakhstani universities Nazarbayev University (NU) and Kazakh-British Technical University (KBTU).

Previously, scholars defined a successful individual as the one who possesses a high IQ score. This is because a high IQ usually coincided with academic success. Now, more scholars are adding the concept of emotional intelligence to the definition of a human performance formula. They argue that IQ alone cannot predict a person's academic and career performance. A successful individual also has to be able to differentiate and analyze humans' emotions, be resilient to mood swings, be sociable, have good communication skills, and be stress-resistant. Moreover, scholars argue that STEM students have lower EQ scores than non-STEM students. While the Kazakhstani government prioritizes STEM specialties by providing thousands of scholarships annually, emotional intelligence development among STEM students remains underrecognized in Kazakhstani universities.

Currently, we are unaware of any study on EQ and academic performance in Kazakhstan based on primary data. Our study considers such factors as gender, workload, stress, satisfaction with facilities for learning, distance and residency, and family support. When examining emotional intelligence and academic achievement, we focus on EQ as an essential factor for graduates' academic and career development. Hence, emotional skills development should be regarded as a national priority in the public policy framework.

We show that EQ level is negatively correlated with academic performance. STEM students who have more developed EQ skills score higher GPAs in their studies. However, we revealed that the EQ effect is not uniform across genders, specialties, and universities. While male students with higher EQ scores have lower chances of having a higher GPA, STEM male students with more advanced EQ skills are more probable to have higher GPAs. In contrast, female students with more developed EQ skills have better chances of having high GPAs. Nevertheless, sophomore students follow the opposite gender effect: female students with higher EQ scores tend to have lower GPAs, male students - higher GPAs. Also, we revealed significant indirect effects of EQ on academic

performance through parents' education, the time necessary to get to university, family support, and campus residency across gender, universities, and fields of study.

We developed survey questionnaires and distributed them online and through university administration. We operationalize EQ as emotional intelligence score (EQ score) and academic performance as cumulative GPA. Our data encompasses information on gender and fields of studies, and observations on family support, satisfaction, and workload.
Firstly, we test our hypotheses by means across gender and university subsamples to observe the sample representativeness and gender effect. Then, we use multinomial, ordered, and binary logistic regressions. While multinomial logistic model does not provide us sufficient results, ordered logistic regression predicts factors to affect academic standing. Multinomial and ordered models lead to shrinkage of the sample size in categories of GPA variable. Therefore, using binary logit, we observe the effect of EQ on GPA at a more general level.

Education is a crucial component of development. Kazakhstan has focused more intensely on education in the last 20 years (Decree of the President of the Republic of Kazakhstan, 2016). Education and human development form the basis that ultimately determines the most essential agendas for the short and long run progress. However, the level of education alone would not encompass the whole spectrum of a person's capacity for learning, succeeding, competing, and socializing. These particular requirements are the ones that new millennia demand from its citizens. Public perception in understanding the role model for an intelligent and educated person shifts to another dimension.

Emotional intelligence is a core instrument for students to receive and analyze all incoming and outgoing information, and perceptions of external sources. Studying at university requires not only intellectual skills but also cognitive skills for critical thinking and successful interaction with other students, professors, and administrative staff. There is still an ongoing debate in the literature on the EQ-academic performance relationship among undergraduate students. Some studies advocate a positive correlation between EQ and students' academic achievement in tertiary education. Others suggest factors that shape the EQ of students and hence affect their academic and professional progress. Besides, the effect of EQ can differ across disciplines and is different in relation to factors, such as gender, family support, and even extracurricular activities. Therefore, emotional

intelligence and its role in students' academic performance majoring in different fields of study are discussed in the following sections.

The literature suggested that the success was based on the IQ (Bar-On, 2007), majorly because of the high correlation of IQ score with school grades. However, the human performance formula (Bar-On, 2007), which was perceived with the task-solving abilities, lacks the highly critical social and emotional capacity for socialization, self-regulation, and stress management (Bar-On, 2007, p.5). In 1995, Goleman (1995) presented the innovative book "Emotional Intelligence – Why can it matter more than IQ?" that popularized the notion of EQ. Before him, the notion was conceptualized by pioneers in EQ studies - Salovey and Mayer, who defined EQ as the efficient management of "emotion in self and others, and the use of feelings to motivate, plan and achieve in one's life" (Salovey and Mayer 1990, p.185).

According to the Ministry of Education and Science of RK, STEM specialties in Kazakhstan are prioritized in national scholarship distribution. By 2019, the overwhelming part - 6000 scholarships - is provided for students majoring in technical specialties. There is an acute need for stress resistance skills of engineering and medical students as they are exposed to a high-stress level requiring a clinical approach (Behere, Yadav, & Behere, 2011). International perception of a modern engineer changes as well. Engineers should not only be qualified and proficient in respective construction, electrical, civil, or chemical branches but also acquire emotional intelligence skills with which they efficiently and successfully employed in the labor market (Riemer, 2003). Kazakhstani education system focuses on developing technical skills of STEM graduates, but the development of emotional intelligence is underrecognized at national universities. The level of EQ of STEM graduates is expected to be low, leading to low cumulative grades at universities as opposed to social science humanities students. Therefore, we treat it as a national public policy problem and evaluate Kazakhstani STEM students for their EQ competence and observe its linkage to academic achievement.

Particularly, literature suggests STEM students have comparatively lower emotional intelligence levels. Chadwick and Singh (2016) argue that soft skills such as communication and stress-resistance are demanded skills in the job market apart from academic knowledge. STEM students are known to lack these skills and thus have

difficulties when applying for jobs. Institute of Mathematics and applications scholars conducted an experiment with undergraduate STEM students. They added subjects focusing on developing EQ skills such as stress-resistance, sociability, communication, and overall emotional well-being to STEM students' curriculum. After one semester, the experiment showed that adding subjects focusing on the development of EQ positively affected students' performance by increasing attendance and participation. The feedback from students and staff on the degree program also became more positive than before. Researchers find that STEM students possess a comparatively lower level of EQ. However, when they are exposed to classes focusing on social skills, they are prone to improve their EQ level, increasing their chances of employability (Chadwick and Singh, 2016).

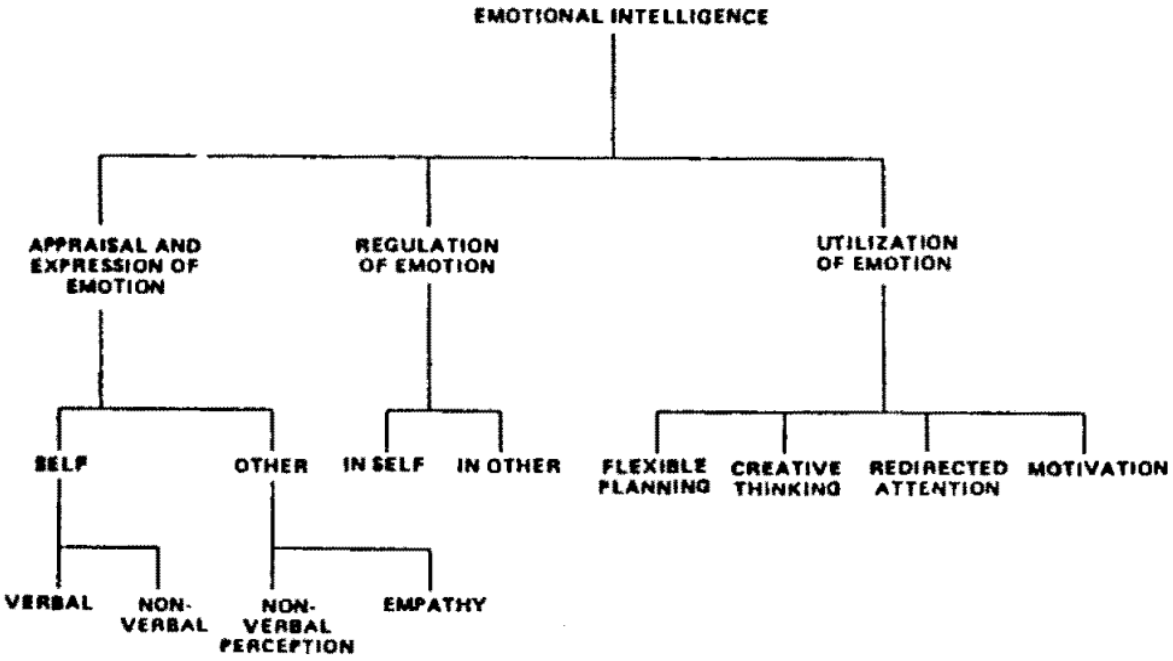
Sanchez-Ruiz, Perez-Gonzalez, and Petrides (2010) find that students majoring in social sciences have better social skills than engineering students. With absence of classes that cover human behavior and other social science subjects, engineering students tend to express less empathy and other emotions as opposed to social science students. The latters dedicate their degree programs to understanding patterns in behavior, cultural traits, and relationships of individuals and society. Therefore, these students are expected to score higher on the EQ test (Sanchez-Ruiz, Perez-Gonzalez, and Petrides, 2010).

Emotional intelligence

Emotional intelligence is a critical model of positioning soft skills, which analyzes the ability to recognize emotions, manage and use them to cope with potential goals or solve problems. EQ is considered as a single model with a cyclical process of performance between a person's inner and outer world (Goleman, 1998). EQ is a significant part of human well-being in social organisations. It is tightly linked with academic performance since it requires continuous interaction with people of different backgrounds, age-group, genders, and nationalities.

Figure 1

Conceptualization of Emotional Intelligence



Note. Adapted from *Emotional intelligence* (p.190), by P. Salovey and J.D. Mayer, 1990.

Mayer and Salovey introduce a new method of measuring the components of success other than IQ (Salovey & Mayer, 1990). That switches attention to personality characteristics, with people's individual soft skills. We face the evaluation of EQ with its characteristics and components in everyday life, starting with communication skills and ending with a performance in all spheres. EQ is conceptualized in four directions (Figure 1):

1. The ability to perceive emotions in oneself and others accurately;
2. The ability to use emotions to facilitate thinking;
3. The ability to understand emotions, emotional language, and the signals conveyed by emotions;
4. The ability to manage emotions to attain specific goals.

Emotional intelligence can keep a person on the right track, achieving better results in all beginnings, including academic and career results, since it requires highly efficient and rational time management, emotional balance, and proper identification of strong and weak sights. Thus, strong EQ is essential in providing opportunity and capacity to capture learning skills for self-development and self-assessment.

Effect of EQ across disciplines

Researchers examine the effect of EQ on children's development and adults' behavior. However, EQ's influence varies across academic and non-academic spheres. Since EQ can be responsible for *interpersonal and intrapersonal relationships, adaptability, moods, and stress management skills*, it significantly affects the students' academic performance (Fallahzadeh, 2011, p. 1461). So, EQ is a significant predictor in studies from different disciplines. Medical and nursing studies (Štiglica, et al, 2000; Fallahzadeh 2011; Cleary & Visentin et al., 2008) reveal that higher EQ level is associated with advanced resilience and stress management skills among undergraduate nursing and medical students. A similar positive tendency between EQ's level and academic performance is observed by the Pakistani study of Ahmed, Asim, and Pellitteri (2019). They discover that EQ level determines the academic standing among Pakistani management students. They employ the Trait Emotional Intelligence Questionnaire Short-Form (TEIQ) specially designated to measure emotional intelligence. TEIQ contains questions on components: sociability, well-being, self-control, and emotionality. The study shows a positive significant effect of sociability, well-being, and self-control on the CGPA score. Emotionality has a significant negative relationship with academic cumulative grade. The authors conclude that a high "degree of attention to emotions" which implies a high emotionality component, predicts lowering CGPA scores. So, there should be an optimal trade-off between emotional and academic environments. There is also growing interest in the EQ effect on engineering students. Ishkov and Magera (2015) insist on introducing the Emotional Competency Program (ECP) for construction engineering majors. Engineering students have difficulties in communication and responsibility while participating in risky projects, which negatively affects their career. Thereby, EQ affects various spheres in academics, thus, has its imprints on professional standing.

Emotional intelligence and academic performance

Academic performance is the common assessment of students in all educational institutions, which can be compared between the institutions, students, and departments. Scholars' major issue was whether it is possible to analyze what factor is responsible for

high and low academic performance. So, in a highly competitive academic environment, it is important to identify the multi-performance of students. Considering both basic and hard knowledge and cognitive and psychological ability to progress in studies (Preeti, 2013).

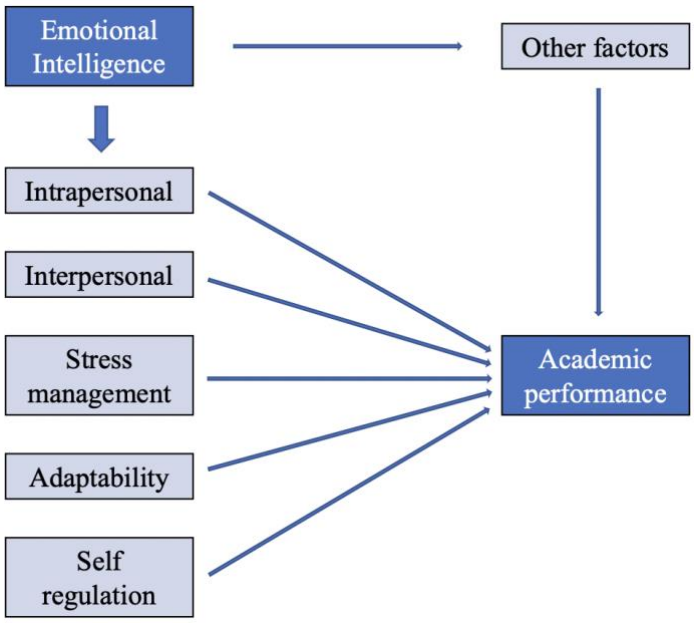
Giammarco, Higham, and McKean's study (2021) outlines employers' emphasis on social and emotional skills (SES). They claim SES play a key role in the employability of a person. The demand for SES is rising in the labor market. Schools and institutions produce programs that improve students' technical skills and academic knowledge but lack a curriculum that includes developing students' social and emotional skills. The authors analyze 131 post-secondary institutions' strategic plans in Canada and find that only 1 in 5 post-secondary institutions mention terms that are more or less near the SES. Some institutions put the development of SES into extracurricular activities, such as workshops where students are taught about intercultural awareness and given certificates of completion.

Meanwhile, Canadian institutions put SES developing programs as a required part of the academic curriculum (Giammarco, Higham, and McKean, 2021). Relatedly, Carvalho and Colvin's study (2015) reports the positive effects of emotional intelligence courses on the academic performance of 353 bachelor students at Prairie View A&M University. Therefore, all authors suggest a reconsideration of university curricula to emphasize SES development.

Meantime, the curriculum in universities worldwide is set up with an emphasis on a significant part of self-study, teamwork, and research. Students with stronger emotional conditions are more resilient to psychological stress from the academic schedule and pressure from deadlines and exams, and they are less afraid of teamwork. Students with stronger emotional conditions are more resilient to psychological stress from the academic schedule and pressure from deadlines and exams, and they are less afraid of teamwork. So, students need to develop EQ for understanding and post-working on incoming and outcoming information. Lam (2002) suggests the opposite direction - relatively high academic performance helps students cope with their previous problems with soft skills such as case solutions, critical thinking, and relationship abilities. Therefore, EQ significantly predicts students' academic performance because of its capacity for learning ability and a filter for accepting correspondence.

Figure 2

Direct and Indirect effects of Emotional Intelligence on Academic Performance



Other determinants of academic performance

Apart from emotional intelligence, workload, gender, participation in extracurricular activities, facilities for studying, and family support play a key role in determining students' academic performance. Hence, these explanatory variables must be considered in EQ-academic achievement connection.

Work outside the classes can interrupt the positive effect that strong emotional intelligence has on academic performance. If students with strong EQ have several part-time jobs, they may be physically unable to complete required assignments. Kurata, Bano, and Matias (2015) revealed strong psychosocial and physiological effects of work on learning. Working students have lower academic performance than non-working students because they have additional work-related stress and do not have enough time (Kurata, Bano & Matias, 2015). Nevertheless, our results show the opposite effect.

Gender is another factor that affects academic performance through EQ. Gender-based differences may be observed in separate facets of EQ. Petrides and Furnham (2000) and

found that females outscore males in the "social skills" trait of EQ. Males outscore women in "self-estimation". Measuring EQ as a whole instead of separate traits shows no significant variation. In study, men and women were asked to predict their EQs before the actual EQ test. Men and women evaluate their EQs differently, but the actual measurements do not vary across genders. This is contrary to the results of our study. Men tend to evaluate their EQs higher than women (Petrides & Furnham, 2000). Snowden et al. (2015) find similar results stating that women score higher in EQ traits related to social connections. Thereby, we examine the academic performance return to EQ across gender.

According to the definition of EQ, a student with a strong EQ score is very socially active and participates in various extracurricular activities. These activities may have various effects on the academic performance of students. Guilmette et al. (2019) state that students involved in extracurricular activities are more goal-oriented than those who do not participate in such activities. So, students aimed at succeeding in most aspects of life and possess a high sense of self-regulation (Guilmette et al., 2019). The authors find a positive relationship between the rate of participation in extracurricular activities and grades (Guilmette et al., 2019). Meanwhile, Fredricks (2012) find a negative relationship between academic performance and participation in extracurricular activities. This was consistent with our research findings as more socially active students are associated with lower academic performance.

Next, Amaratunga et al. (2016) argue that students' satisfaction with facilities provided by institutions has a significant impact on their academic performance and emotional intelligence scores. Not all characteristics of NU and KBTU are similar, evidently satisfaction with learning facilities can differ as well. The authors also discover family support contributes to higher academic performance.

We also controll for the time necessary to get to university, campus residency, city residence, and parents' education. We believe the time students spend on getting to the university affects their academic performance. With longer time students are often late for classes or arrive stressed which negatively impacts performance. Relatedly, on and off-campus placement of a student is a serious factor. Sometimes, campus is better because of access to the university. Otherwise, home might have a less stressful environment than university. The same applies to the city of residence. City might also

be destructive to academic achievement despite a student's level of emotional intelligence. Students who have a family in the same city they study usually feel safer. Otherwise, others feel freer and less stressed when they are not around their families. This significantly affects their academic performance. Next, the education of a students' parents might impact their academic performance and emotional intelligence. Students might have less developed emotional intelligence but have an inherent predisposition to strong logic and overall good comprehension.

Thereby, various factors affect the EQ-academic performance relationship which thus should be studied to encourage the development of Kazakhstani emotionally "intelligent" graduates.

CONCEPTUAL MODEL AND HYPOTHESES

In our study, we address the connection between academic performance and emotional intelligence: whether higher EQ leads to a higher GPA among STEM students.

We choose NU and KBTU because of similar traits: 1) they were both built to become leading institutions in STEM and research, 2) their programs follow western-style system with English as the language of instruction. So, we assume the level of difficulty of studies in these universities is similar.

According to the literature review on the relationship among EQ, academic achievements, and contributing factors, we test two hypotheses:

H_1: *Higher EQ level leads to a worse academic performance of STEM students*

H_2: *EQ of males and females have the same effect on their academic performance*

We test the first hypothesis since scholars argue whether strong emotional intelligence is positively or negatively related to academic performance. If a person is emotionally strong, has good social skills, and stress-resistant, this person is more likely to succeed in different aspects of life, including studies. However, EQ can be a negative factor if students are too distracted by overcommunication and socialization. The second hypothesis focuses on EQ return to academic achievement across genders. Some scholars find female students outscoring in many facets of EQ, while others find male students having considerably higher EQ scores because of differences in perceptions. Therefore, we define our research question as how does emotional intelligence affect the academic performance of STEM students at NU and KBTU.

METHODOLOGY AND DATA

We conduct descriptive statistics analysis and regression analysis to test two hypotheses. We conduct multifactor analysis, sample differences examination, multinomial, ordered, and binary logistic regression analyses. We do this by using the dataset collected through the survey among NU and KBTU students. The survey provides information on student demographics and the TEIQ test results developed by Petrides (2009) to detect EQ score. The information includes cumulative GPA, EQ, study major, workload, gender, extracurricular activities, satisfaction with facilities for learning (SFFL), family support, parents education, the time to get to university, on or off-campus living, and location of the university. We calculate the sample size as follows:

$$Sample\ size = \frac{Zscore^2 * St.dev.(1 - St.dev.)}{ME^2}$$

With a 1.96 Z-score at conventional for public policy research - 95% confidence level, ME equal to 5% to ensure that sample size is large enough for statistical analysis. The sample size of the total number of NU (3996 bachelor students) and KBTU (2715 bachelor students) (Data Digest 2021; About KBTU, 2019) corresponds to 364. However, considering possible difficulties that may occur during data collection procedure we consider sample size at 90% confidence level to be convenient as well. So, the sample size we targeted can be 261, given a lower confidence level.

The dependent variable is the cumulative **GPA** score ranging from the lowest to the highest (see Appendix B). We use EQ score as one of the main explanatory variables. The continuous variable **EQ score** is counted using TEIQ test score which ranges from 7 to 210 where the higher the score the stronger the EQ. A student's major is another important factor influencing the GPA outcome. We divide participants into **STEM** and non-STEM students and assign it a dummy variable's characteristics ("0" for non-STEM and "1" for STEM students). We also believe the effect of EQ score of particularly STEM students on CGPA outcome to be significant as per the study by Chadwick and Singh (2016). Therefore, we consider a moderator (interaction) variable **EQ*STEM** when conducting our analysis. The effect of a student's input to part-time jobs outside classes on their academic performance is also significant. Hence, a continuous variable "**part-time job (hours per week)**" is another important explanatory factor of our study. Study by Petrides and Furnham (2000) found an importance of gender in identifying the

emotional intelligence level. Thus, we take **female student** as a dummy variable in our analysis. We also take gender as a moderator (interaction term) together with EQ score (**EQ*female)** because we want to analyse the extent to which the EQ scores of female students affect their academic performance. We agree with Guilmette et. al (2019) and Fredrick's (2012) conclusion that the load of extracurricular activities (ECA) have an immense impact on students' academic performance. So, we add a continuous variable **ECA** to our analysis counted as the number of hours per week spent on activities such as social events, student association clubs, and hobbies. Amaratunga et. al (2016) point out that a student's satisfaction with facilities for learning (**SFFL**) and **family support** also have an impact on their academic performance that is why we also add them as categorical variables of our study(see Appendix B).

We also analyze several controls (instrumental) variables. We expect the level of parents' education to affect a student's academic performance. We take **parents' education** as a dummy variable where "1" refers to the student whose parents have a college education and "0" refers to no college degree. We also expect the time needed for a student to reach the university to have an effect on their grades. A long distance might result in frequent absences or lates for which some professors deduct points from students' grades. Therefore we add a continuous variable **university distance** measured in minutes to our study. Similarly, we expect academic performance to vary according to students' residency on- and off-campus. For instance, some campuses provide good learning facilities and short distance to the university while others might conversely create a stressful environment. To observe such a tendency, we add a dummy variable **campus** where "0" and "1" mean a student living off- and on-campus, respectively. Finally, we expect the city residency to have some impact on academic performance. We use a dummy variable **residency** to differentiate between students who live in a city different from the city their university is located in and those who live in the same city.

RESEARCH FINDINGS

Firstly, we conduct descriptive statistics analysis and study gender effects at both universities. Secondly, we perform multinomial logistic regression analysis across most striking factors. Next, we test our model in the ordered logistic regression across gender, major, and university subsamples. Finally, we recategorize GPA into a binary variable and conduct binary logistic regression.

Descriptive statistics

Our survey was distributed among STEM and social science & humanities students of NU and KBTU. All participants were informed of the anonymity of the survey in advance. From September 1st to December 9th in 2020, we collected 259 responses from NU and KBTU. Yet, to make the model more consistent with research design we reduced the sample size to 245 (dropped 14 empty responses) and dropped 51 responses of first-year students who do not have CGPA. So, descriptive statistics encompasses 194 observations for the GPA variable. We removed one NU student's response because it was a single observation for the lowest GPA group, which led to inflated standard errors in analysis. We admit our sample size is smaller than we targeted for 90% confidence level.

The sample consists of 177 observations from NU, 68 from KBTU, 136 of female, and 109 of male students. 19 students failed to indicate their primary specialization. So, 155 STEM and 71 non-STEM students participated in the study. STEM students at NU majored in Chemical, Mechanical, Electrical, and Chemical engineering, Computer science, Mathematics, Physics, Biology, and Chemistry while those at KBTU studied Petroleum Engineering, Geology and Exploration of Mineral Resources, Computer Systems and Software, and Chemical Technologies of Organic Substances. Non-STEM fields of study included Political Science and International Relations, Economics, Sociology, History, and World Languages and Literatures at NU and Finance, Economics, and Management at KBTU.

We summarize descriptive statistics in Table 1:

Table 1

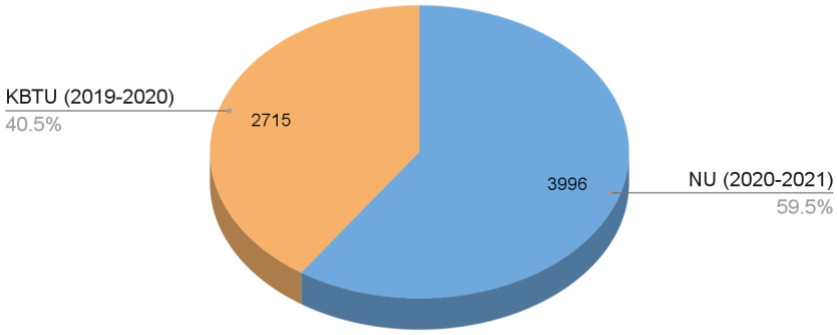
Data Structure

Variable	Obs	Mean	Std. Dev.	NU		KBTU		Min	Max
				Obs	Mean	Obs	Mean		

All students	245	1	0	177	1	68	1	1.00	1.00
Female student	136	0.56	0.50	177	0.58	68	0.49	0.00	1.00
STEM student	226	0.69	0.47	175	0.67	51	0.73	0.00	1.00
STEM student (female)	124	0.58	0.49	102	0.57	22	0.64	0.00	1.00
STEM student (male)	102	0.81	0.39	73	0.82	29	0.79	0.00	1.00

Figure 3

Comparison of the Number of Undergraduate Students at Nazarbayev University and Kazakh-British Technical University



Note. Adapted from Data Digest NU 2020-2021 and About KBTU 2019-2020.

Figure 3 compares the total number of undergraduate students studying at NU by 2021 and KBTU by 2020. Although the data on NU students is more recent than KBTU, we consider the number of KBTU undergraduate students for 2020-2021 does not differ significantly from previous years. It should not affect our sample representativeness. By 2021, the ratio of undergraduate NU students to KBTU students is 3:2.

Figure 4

Comparison of Nazarbayev University and Kazakh-British Technical University Responses

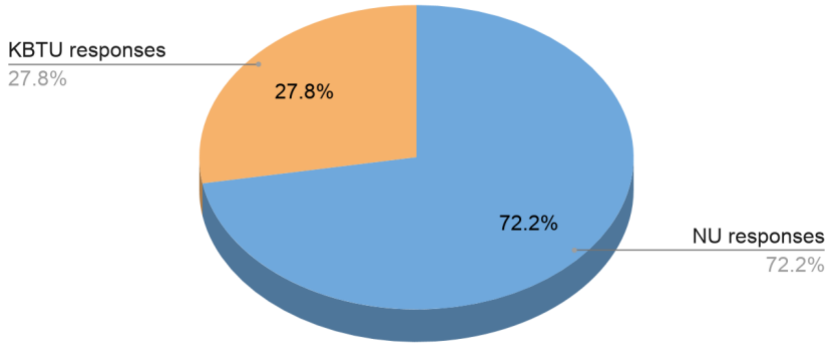
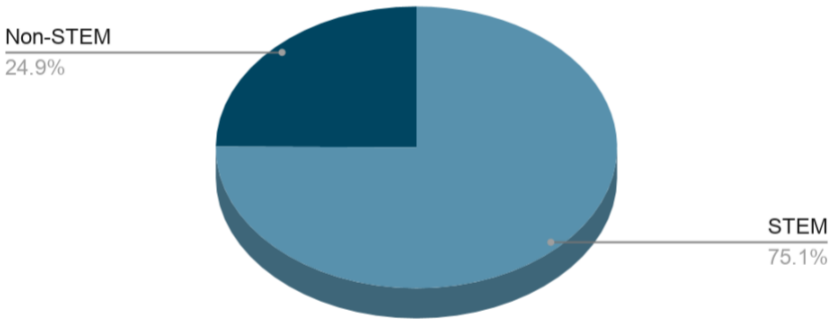


Figure 4 compares the number of undergraduate NU and KBTU students in our sample. The proportion of NU students to KBTU students is almost 3:2, while in our sample, it is 3:1. Hence our sample is over-representative for NU students and under-representative of KBTU students.

Figure 5

Undergraduate Students Distributed by STEM and non-STEM Specialization at Nazarbayev University (Fall 2020)

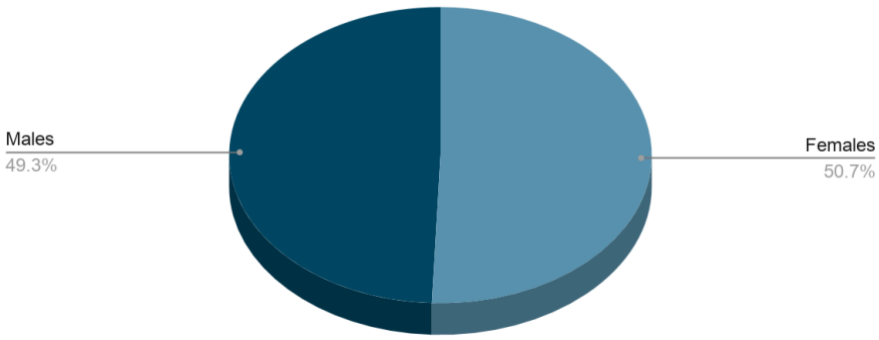


Note. Adapted from Data Digest NU 2020-2021.

The number of STEM students studying at NU is three times larger than non-STEM students (Data Digest, 2020). Similarly, there are 67% of STEM students and 33% of non-STEM students in our NU subsample (Table 1), which resembles the actual pattern of specialty distribution at NU. Hence the sample is a bit under-representative of NU for STEM specialization distribution (Figure 5).

Figure 6

Undergraduate Students Distribution by Gender at Nazarbayev University (Fall 2020)



Note. Adapted from the Data Digest NU 2020-2021.

Female students' proportion to male students at NU is 50.7% and 49.3%. Meanwhile, this proportion in our sample is 58% and 42%, respectively. Female students in our sample are slightly over-representative, and male distribution is under-representative.

We struggled to find the actual statistics on KBTU gender and STEM specialty distribution. The KBTU administration has not replied to our official requests. Therefore we could not examine the representativeness of gender and STEM distribution at KBTU for our sample.

Next, we examined variation of variables across NU and KBTU and the extent to which gender effect is responsible for potential differences (Table 2).

Table 2

Descriptive Statistics with Gender Effect

Variable	Obs	Mean	Std. Dev.	NU		KBTU		Min	Max
				Obs	Mean	Obs	Mean		
All students	245	1	70.87	177	1	68	1	1	245
Female student	136	0.56	0.50	177	0.58	68	0.49	0.00	1.00
Male student	109	0.44	0.50	177	0.42	68	0.51	0.00	1.00
STEM student	226	0.69	0.47	175	0.67	51	0.73	0.00	1.00
female	124	0.58	0.49	102	0.57	22	0.64	0.00	1.00

male	102	0.81	0.39	73	0.82	29	0.79	0.00	1.00
GPA categories	194	3.70	1.73	126	3.83	68	3.47	0.00	5.00
female	108	3.81	0.94	75	3.93	33	3.54	2.00	5.00
male	86	3.56	0.95	51	3.67	35	3.4	2.00	5.00
Part-time job	245	4.72	8.23	177	4.78	68	4.58	0.00	50.00
female	136	4.34	7.25	103	4.32	33	4.39	0.00	30.00
male	109	5.20	9.32	74	5.41	35	4.74	0.00	50.00
ECA	245	4.94	7.36	177	5.19	68	4.31	0.00	48.00
female	136	4.90	7.60	103	5.16	33	4.09	0.00	48.00
male	109	4.99	7.08	74	5.22	35	4.51	0.00	35.00
SFFL	245	3.60	1.39	177	3.41	68	4.07	0.00	5.00
female	136	3.54	1.52	103	3.30	33	4.30	0.00	5.00
male	109	3.66	1.22	74	3.57	35	3.86	0.00	5.00
Family support	245	4.10	0.90	177	4.01	68	4.34	2.00	5.00
female	136	4.15	0.91	103	4.03	33	4.54	2.00	5.00
male	109	4.04	0.89	74	3.99	35	4.14	2.00	5.00
Campus residency	245	0.56	0.50	177	0.73	68	0.10	0.00	1.00
female	136	0.56	0.50	103	0.69	33	0.15	0.00	1.00
male	109	0.56	0.50	74	0.80	35	0.06	0.00	1.00
City residency	245	0.36	0.48	177	0.31	68	0.51	0.00	1.00

female	136	0.38	0.49	103	0.36	33	0.45	0.00	1.00
male	109	0.34	0.47	74	0.23	35	0.57	0.00	1.00
University distance	245	27.11	138.44	177	27.46	68	26.21	0.00	2160.00
female	136	34.35	184.78	103	37.24	33	25.33	0.00	2160.00
male	109	18.09	21.73	74	13.85	35	27.03	0.00	130.00
Parents' education	245	0.54	0.50	177	0.68	68	0.18	0.00	1.00
female	136	0.58	0.49	103	0.67	33	0.30	0.00	1.00
male	109	0.49	0.50	74	0.70	35	0.06	0.00	1.00
EQ score	245	123.97	11.05	177	125.90	68	118.96	85.00	166.00
female	136	124.76	10.14	103	126.35	33	119.79	102.00	153.00
male	109	122.08	12.06	74	125.26	35	118.17	85.00	166.00
EQ*female (Moderator 1)	136	124.76	10.14	103	126.36	33	119.79	0.00	153.00
EQ*male (Moderator 1)	109	122.98	12.06	74	125.26	35	118.17	85.00	166.00
EQ*STEM (Moderator 2)	155	122.94	10.71	118	123.85	37	120.05	0.00	151.00
female	124	71.58	61.50	102	70.28	22	77.59	0.00	149.00
male	102	99.80	49.13	73	101.99	29	94.31	0.00	151.00

Female and male students

Hypothesis testing across means reveals the difference between the number of NU male students and NU female students is not statistically significant. Yet, weak evidence at 10% of significance levels shows there are more female students than male students at NU and KBTU.

STEM students

Next, there is no subtle difference in the number of STEM and non-STEM students at both NU and KBTU in the sample. However, hypothesis testing discloses gender effects as there are more male students than female students who study STEM. The same trend holds for NU. For KBTU STEM students, there is no statistical difference in the numbers of male and female students.

GPA category

Strong evidence shows the mean of GPA at NU is larger than that of the KBTU. Also, we infer female students' average GPA category is larger than that of male students. Similarly, female students at NU have on average a higher GPA compared to male students, although it is weak evidence. Female NU students tend to have a higher GPA than female KBTU students. The difference between KBTU male and female students is not statistically significant.

The average GPA category of male students at both NU and KBTU does not differ significantly. There is no significant difference between female and male STEM students' average GPA at both NU and KBTU. Female STEM students' average GPA does not differ statistically from non-STEM students' GPA. However, female non-STEM students score a statistically higher GPA than male non-STEM students.

Time spent on a part-time job, hours

Table 2 shows no substantial differences between the time spent on part-time jobs across students from two universities and gender. Hypothesis testing shows the difference between the number of hours NU and KBTU female students spend on part-time jobs is not statistically significant. The test on the difference of means showed no statistical difference in time spent by male NU and KBTU students.

Time spent on extracurricular activities, hours

Time spent on extracurricular activities varies greatly across students from two universities and gender (Table 2). Yet, the difference is not statistically significant in hypothesis testing. Difference of means test shows no statistical difference in the average

number of hours spent by female NU students and female KBTU students, male NU students, and male KBTU students.

Satisfaction with FFL

Average level of satisfaction with facilities for learning in the institutions differs remarkably. This difference is statistically significant: on average, KBTU students are more satisfied rather than NU students.
The average level of satisfaction also varies significantly across genders but we found no evidence suggesting this difference. On average, female students at KBTU are more satisfied with FFL than those at NU. Male students, the difference in the average level of satisfaction with facilities for learning of male students at NU and KBTU is not statistically significant.

Family support

Strong evidence suggests that similarly to descriptive statistics, female and male students from KBTU report higher family support than NU students. The same tendency holds across female students: female students at KBTU reported higher family support than at NU. Male students from KBTU indicated that they receive less family support than female students. The difference for male students is not statistically significant.

Campus residency

The mean of NU students living on campus is notably higher than that of KBTU students in the sample (73% as opposed to 10%). The statistical evidence supports this difference. 80% of male NU students live on campus as opposed to only 6% of male KBTU students. There is no statistical evidence to prove that female NU students living on campus outweigh female KBTU students.

City residency

Descriptive statistics shows 36% of 245 students live in the same city where their universities are located. Almost 70% of NU students are not from Nur-Sultan, but there is an equal distribution of Almaty and non-Almaty residents who study at KBTU. We found no evidence for the number of students who live in the same city where their

university is located to differ by gender. More male KBTU students live in Almaty than male NU students in Nur-Sultan, although this is weak evidence.

University distance, minutes

The average time of students to get to university from our sample is 27 minutes. There is no evidence for this to differ across universities. Male KBTU students require more time to get to university than male NU students. We found no evidence suggesting a difference between the university distance by female students across universities.

Parents' education

68% of NU students' parents have college degrees as opposed to just 18% of KBTU students' parents. This indicator for female NU students also outweighs female KBTU students (67% and 30%, respectively). The same difference: 70% of NU students' parents and 6% of KBTU students' parents completed college education. However, strong evidence shows there are more students from KBTU whose parents have college degrees than students from NU (similar tendency across genders).

EQ score

The average EQ score in our sample is 123.97. Descriptive statistics provides a striking difference between the EQ scores of NU and KBTU students and across genders. Testing across universities shows STEM NU students receive higher EQ scores than STEM KBTU students. But, there is no statistical difference among female STEM students at NU and KBTU. Male NU students score higher EQ than males KBTU. Male non-STEM students from NU outscore non-STEM students from KBTU. Hypothesis testing proves NU students have higher EQ scores than KBTU students (but no statistical gender difference). Also, non-STEM students have higher EQ levels than STEM students of both genders at NU. Female and male students at NU and KBTU do not show statistically significant differences.

EQ score of female (Moderator 1)

The average EQ score of female students in the sample is 124.77, which is slightly higher than the all students' average EQ score. Hypothesis testing shows NU female students'

average EQ score is higher than that of KBTU female students. Nevertheless, EQ scores of female STEM students from NU and KBTU do not differ statistically.

EQ score of STEM student (Moderator 2)

The average EQ score of STEM students in the sample is 122.94, which is slightly lower than the females' average EQ score. STEM students at NU have higher EQ scores than STEM students at KBTU (Table), but there is no evidence supporting this claim. Also, no evidence that female NU STEM students have higher EQ scores than those at KBTU. We discover strong evidence that male NU STEM students, on average, have higher EQ scores than those at KBTU.

Overall observations

Firstly, the prevailing number of male students major in STEM. Female students, on average, score higher GPA categories. Female non-STEM students have a higher GPA than male non-STEM students.

Secondly, NU students have a higher average GPA and EQ scores than KBTU students and NU STEM students receive higher EQ scores than KBTU STEM students. There is a gender effect: 1) NU females have higher GPA and EQ scores than KBTU female students; 2) male NU STEM students demonstrate higher EQ scores than male KBTU STEM students. 3) Non-STEM students of both genders score higher EQ scores than STEM students at both universities.

Thirdly, we noticed there are more KBTU students whose parents have college degrees than NU students.

Finally, there are striking differences in SFFL, family support, city and campus residency. KBTU students tend to have more family support, and higher SFFL than NU students. Moreover, the proportion of KBTU students living in Almaty is larger than that of NU students living in Nur-Sultan. Relatedly, male KBTU students spend more time getting to university than male NU students. Lastly, more NU students living on campus than KBTU students coincided with NU students having less family support and SFFL than KBTU students.

Regression analysis

In descriptive analysis we underline five factors that provide distinct patterns across genders and universities: gender, STEM, EQ score, parents' education, and SFFL. To determine their effects on probabilities for having a certain level of GPA, we conduct multinomial logistic regression (MNLM) in 11 models of specification, holding control for: EQ, female, male, and STEM.

Pairwise correlation for multinomial logistic regression model

Pairwise correlation illustrates a weak correlation between GPA categories and EQ scores, gender, satisfaction with FFL, field of study, and parents' education of NU and KBTU students. Therefore, we suggest that there is no multicollinearity issue among the five variables. However, there is a negative correlation between GPA categories and STEM students: a lower GPA is weakly correlated with STEM major (Table 3).

Table 3

Pairwise correlation for MNLM

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) GPA category	1.000					
(2) EQ score	0.047	1.000				
(3) STEM student	-0.045	-0.195*	1.000			
(4) female student	0.151*	0.080	-0.250*	1.000		
(5) SFFL	0.065	0.015	-0.062	-0.042	1.000	
(6) Parents' education	0.074	0.111	-0.015	0.085	-0.143*	1.000

**** p<0.01, ** p<0.05, * p<0.1*

MNLM

We employ five variables that showed the highest differences in descriptive statistical evaluation across gender and universities. The following regression equation indicates five factors that might affect the cumulative GPA to be in either of the categories:

$$GPA = \beta_0 + \beta_1 EQ\ score + \beta_2 STEM\ student + \beta_3\ Female + \beta_4 SFFL + + \beta_6 Parents'\ education$$

We conduct various models with specifications controlling for EQ scores, female, male, and STEM students. We find no no statistically significant coefficients that would explain the probabilities of having a particular GPA category (see Tables 1-7 in Appendix C).

Pairwise correlation for the ordered logistic regression model

To define the effects of the fully specified model with 13 variables, we analyze ordered logistic regression model (ORLM), which accounts for ordered positions of GPA levels:

$$GPA = \beta_0 + \beta_1 EQ\ score + \beta_2 STEM\ student + \beta_3 EQ*STEM\ student + \beta_4 Part\text{-}time\ job\ (hrsperweek) + \beta_5\ female + \beta_6\ EQ*female\ student + \beta_7 ECA\ (hrsperweek) + \beta_8 SFFL + + \beta_9 Family\ support + \beta_{10} Parents'\ education + \beta_{11} University\ Distance\ (min) + \beta_{12} Campus\ residency + \beta_{13} City\ residency$$

The whole model proves no substantial multicollinearity problems in pairwise check (see Figure 2 in Appendix A).

We check the parallel regression assumption where we find that the model has not violated the proportional odds assumption. Hence the relationship between all pairs of groups is the same, so that we can use ORLM.

ORLM

To analyze the predictors' effect on the changes in probabilities of ordered levels of GPA we conduct ORLM. Firstly, we examine ORLM without looking at the years of study. Then, we monitor changes in EQ and GPA across years. We exclude foundation year students and first year students because they do not have cumulative GPA. Hence, the 2nd to the 5th ORLM models focus on EQ and GPA relationships across students of all years of study, 2nd year (Sophomores), 3rd year (Juniors), and 4th year (Seniors). Model 5 is of low sample size (28), which is the subject of cautious interpretation (Table 4).

Firstly, good and high family support and campus residency have a positive effect on academic performance in models with and without considering the year of study as well as in a separate model for sophomore students. These relationships are statistically significant at all significance levels. Next, we observe sophomore students' academic performance to be negatively affected by their EQ scores

Model 4 illustrates that we can reject the 2nd hypothesis: EQ levels have different effects on female and male students in their 3rd year of studies. While female junior students are more likely to have higher GPA compared to male students, EQ affects positively male students' academic performance and negatively affects female students. This is consistent with Petrides and Furnham (2000) study, where EQ affects women and men differently. Moreover, opposite to Kurata, Bano, and Matias (2015), part-time jobs are positively correlated with academic performance of junior students. Next, similar to Amaratunga et al. (2016) SFFL significantly impacts the probability of having a good GPA. Finally, as we supposed university distance and city residence significantly affect academic performance: the higher the distance to university and the higher probability of studying in a non-home city, the lower GPA students might have.

Lastly, despite the small sample size of senior students, we observed good family support to positively affect their academic performance.

Table 4

ORLM across Years of Studies

	Model (1) Without years (175)	Model (2) Years included (152)	Model (3) **Sophomores** (73)	Model (4) **Juniors** (51)	Model (5) **Senior** (28)
EQ score	0-.015 (0.031)	-0.013 (0.033)	**-0.081*** **(0.049)**	0.095 (0.072)	-0.45 (0.19)
STEM student	-0.18 (3.79)	-4.28 (4.011)	-6.0097 (7.27)	1.94 (8.03)	-12.36 (27.82)
EQ*STEM	0.0030 (.030)	0.036 (0.032)	0.047 (0.057)	-0.0034 (0.066)	0.099 (0.23)
Part-time job	0.018 (0.016)	0.027 (0.019)	0.027 (0.031)	**0.11**** **(0.052)**	-0.049 (0.089)
Female	-1.39 (3.53)	2.24 (3.90)	-9.54 (7.10)	**25.95***** **(8.99)**	11.09 (22.90)

EQ*Female	0.016 (0.028)	-0.012 (0.031)	0.079 (0.055)	**-0.21***** **(0.073)**	-0.077 (0.19)
Male				**-25.95***** **(8.99)**	
EQ*Male				**0.21***** **(0.073)**	
ECA	-0.013 (0.019)	-0.015 (0.021)	0.079 (0.056)	-0.0065 (0.033)	-0.079 (0.086)
SFFL					
Very dissatisfied	0.250 (1.75)	0.478 (1.85)	15.33 (886.42)	-	-
Dissatisfied	0.16 (1.62)	0 .419 (1.71)	-0.27 (1.71)	**4.46**** **(2.06)**	-
Neither	0.78 (1.59)	1.45 (1.68)	0.60 (1.65)	**6.12***** **(1.91)**	-2.42 (3.90)
Satisfied	0.29 (1.56)	0.29 (1.65)	-0.54 (1.60)	**5.09***** **(1.74)**	-4.64 (3.89)
Very satisfied	0.39 (1.58)	0.46 (1.67)	-0.80 (1.62)	**5.54***** **(1.72)**	-4.81 (4.31)
Family support		.			
Adequate	0.28 (0.71)	0.14 (0.76)	0.060 (1.31)	-1.48 (1.44)	3.90 (2.95)
Good	**1.62**** **(0.65)**	**1.69**** **(0.69)**	**1.83*** **(1.053)**	1.01 (1.39)	**7.19**** **(3.37)**
High	**1.83***** **(1.83)**	**2.07***** **(0.72)**	**2.27**** **(1.13)**	0.21 (1.34)	4.36 (2.75)
Parents' education	0.0068 (0.32)	-0.13 (0.35)	-0.78 (0.57)	.069 (0.82)	2.43 (1.51)
University distance	0.0012 (0.0016)	0.0014 (0.0021)	0.0043 (0.016)	**-0.085***** **(0.029)**	0.016 (0.042)
Campus residency	**0.79**** **(0.36)**	**0.68*** **(0.41)**	**1.71**** **(0.77)**	-1.37 (0.98)	1.29 (1.73)
City residency	0.23 0.34	.62 (.37)	0.47 (0.64)	**2.63***** **(1.00)**	2.76 (1.82)
Sophomores *base*					

Juniors	-.036 (0.65)
Seniors	0.65 (0.45)

Note: *p < 0.10, **p < 0.05, ***p<0.01

Family support

Next, we examine predicted probabilities for each of the values of the statistically significant variables from the Model 1. This allows us to see how the probabilities of membership to each category of GPA change as we vary levels of family support and keep other variables at their means (Table 5), while keeping the years of study constant.

Table 5

Probability of Scoring GPA Depending on the Level of Family Support a Student Receives

Family support	**GPA category**			
	Low (2.0-2.5)	Middle (2.5-3.0)	High (3.0-3.5)	Highest (3.5-4.0)
Poor	**0.31****	**0.38*****	0.25**	0.06*
Adequate	0.25***	**0.38*****	0.30***	0.07**
Good	0.08***	0.23***	**0.45*****	0.24***
High	0.07***	0.20***	**0.45*****	0.28***

Note. *p < 0.10, **p < 0.05, ***p<0.01

The predicted probability of having low GPA is 0.31 if students receive poor family support, 0.25 if they receive adequate support, 0.08 with good support, and 0.07 if they receive high support.

For the middle GPA, the predicted probability of students receiving poor support and adequate support is 0.38, good family support is 0.23 and 0.20 if they receive high support.

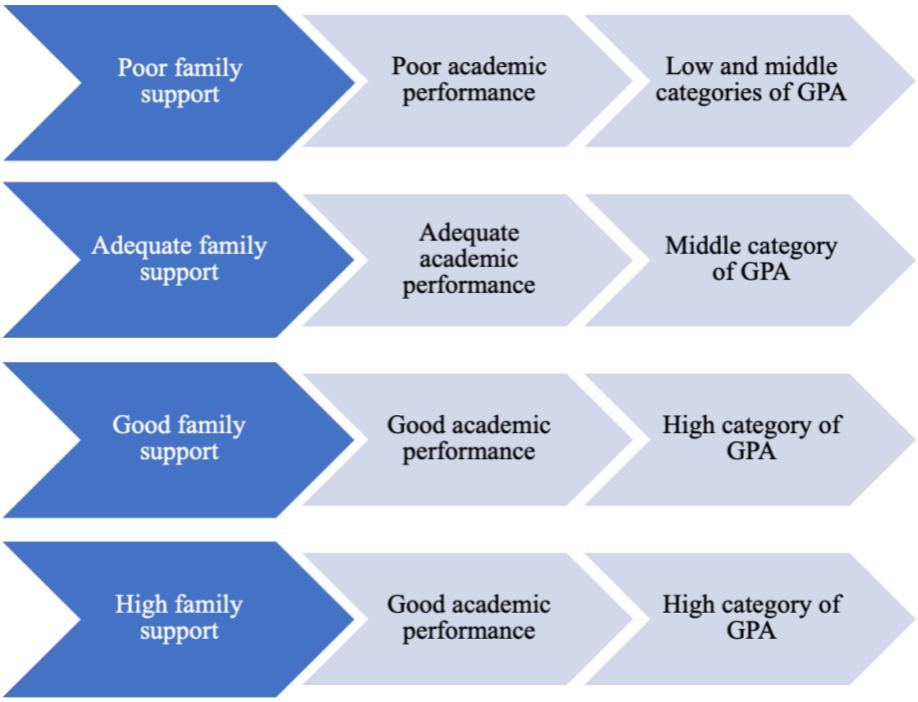
The predicted probability of having high GPA is 0.25 if students receive poor support, 0.30 if they receive adequate support, and 0.45 if students receive good support or high support.

Finally, the predicted probability of having the highest GPA is negligible 0.06 if students receive poor support, 0.07 if they receive adequate support, 0.24 with good support, and 0.28 if they receive high support.

Overall, it is clear that low family support is associated with low GPA. Similarly, for students who receive higher family support, the predicted probabilities of having lower GPA decreases and higher GPA increases. These quantitative results are summed up in Figure 7.

Figure 7

Prevailing GPA Category Associated with Each Level of Family Support



We discover that family support's effect on academic performance might change across genders (Table 6), universities (Table 7), and specializations (Table 8).

Table 6

Probability of Scoring GPA Depending on the Level of Family Support a Student Receives across Genders

Family support	**GPA category**			
	Low (2.0-2.5)	Middle (2.5-3.0)	High (3.0-3.5)	Highest (3.5-4.0)
Poor				
female	**0.21**	0.39	0.33	0.07
male	0.18	**0.34*** **	**0.35** **	0.12
Adequate				

	female	0.17	0.37	0.37	0.087
	male	**0.31****	**0.37*****	**0.25****	0.066
Good					
	female	0.035	0.14	0.47	0.36
	male	**0.11*****	**0.27*****	**0.42*****	**0.20*****
High					
	female	0.027	0.11	0.44	0.42
	male	**0.12****	0.29	**0.41*****	**0.18****

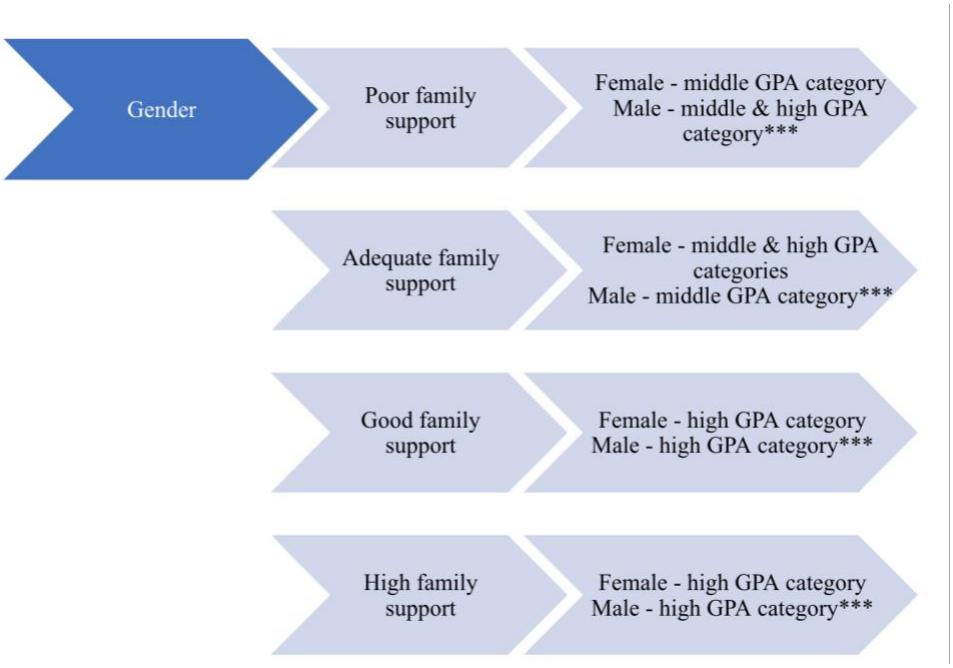
Note: *p < 0.10, **p < 0.05, ***p<0.01

We find no statistical difference among female and male students in predicted probabilities of having low GPA given low family support. There is also a difference in male students receiving poor family support. They also have a lower probability of having a high GPA than female students if they receive adequate, good, or high family support. Finally, there are no gender differences in the predicted probabilities of having the highest GPA if students receive poor or adequate family support. Male students have much lower predicted chances of having tthe highest GPA compared to female students with good or high family support.

The marginal effect of family support on academic performance across genders can be summarized as follows (Figure 8):

Figure 8

The Marginal Effect of Family Support on Academic Performance across Genders



Secondly, we analyze subsamples to find patterns across universities. The analysis reveals results only on NU students (Table 7) because of insufficient KBTU sample size.

Table 7

Probability of Scoring GPA Depending on the Level of Family Support a Student Receives across Universities

Family support	**GPA category**			
	Low (2.0-2.5)	Middle (2.5-3.0)	High (3.0-3.5)	Highest (3.5-4.0)
Poor				
NU	0.25**	**0.39*** **	0.31***	0.054
KBTU	-	-	-	-
Adequate				
NU	0.22**	**0.38*** **	0.33***	0.063**
KBTU	-	-	-	-
Good				
NU	0.051**	0.18***	**0.51*** **	0.26***
KBTU	-	-	-	-
High				
NU	0.034**	0.13***	**0.49*** **	0.34***
KBTU	-	-	-	-

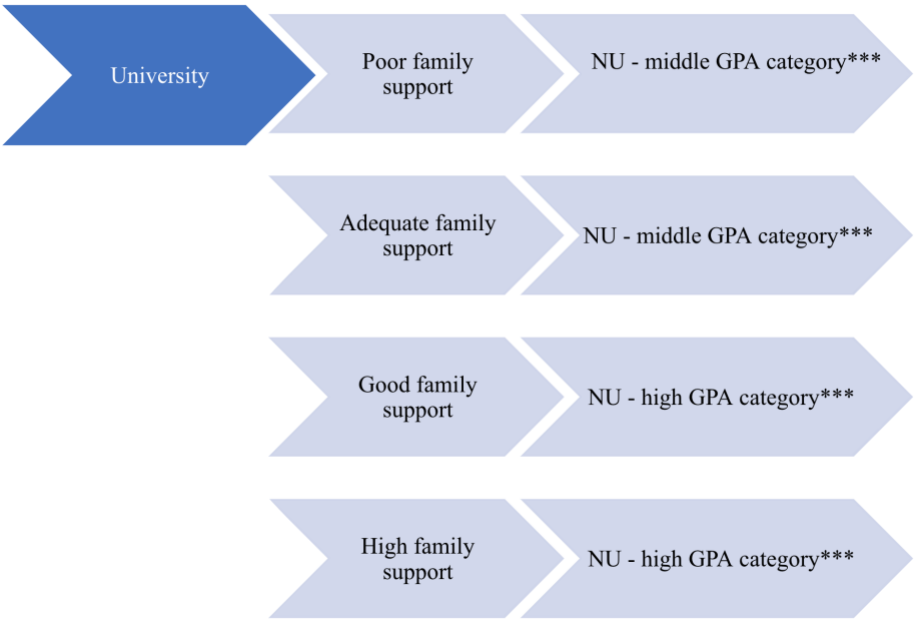
Note: *p < 0.10, **p < 0.05, ***p<0.01

NU students receiving poor and adequate support are most likely to have a middle GPA category and least likely to have the highest GPA. NU students with good and high family support are most likely to score high GPA and least likely to score low GPA. All these results are statistically significant at 1% level of significance.

Thereby, predicted probabilities of GPA levels of students from NU and KBTU given any level of family support is depicted in the following figure (Figure 9):

Figure 9

The Marginal Effect of Family Support in Academic Performance across Universities



Thirdly, we analyze family support's marginal effect on GPA across STEM and non-STEM subsamples (Table 8).

Table 8

Probability of Scoring GPA Depending on the Level of Family Support a Student Receives across STEM and non-STEM students

Family support	**GPA category**			
	Low (2.0-2.5)	Middle (2.5-3.0)	High (3.0-3.5)	Highest (3.5-4.0)
Poor				
NU	0.25**	**0.39*** **	0.31***	0.054
KBTU	-	-	-	-

Adequate				
NU	0.22**	**0.38*** **	0.33***	0.063**
KBTU	-	-	-	-
Good				
NU	0.051**	0.18***	**0.51*** **	0.26***
KBTU	-	-	-	-
High				
NU	0.034**	0.13***	**0.49*** **	0.34***
KBTU	-	-	-	-

Note: *p < 0.10, **p < 0.05, ***p<0.01

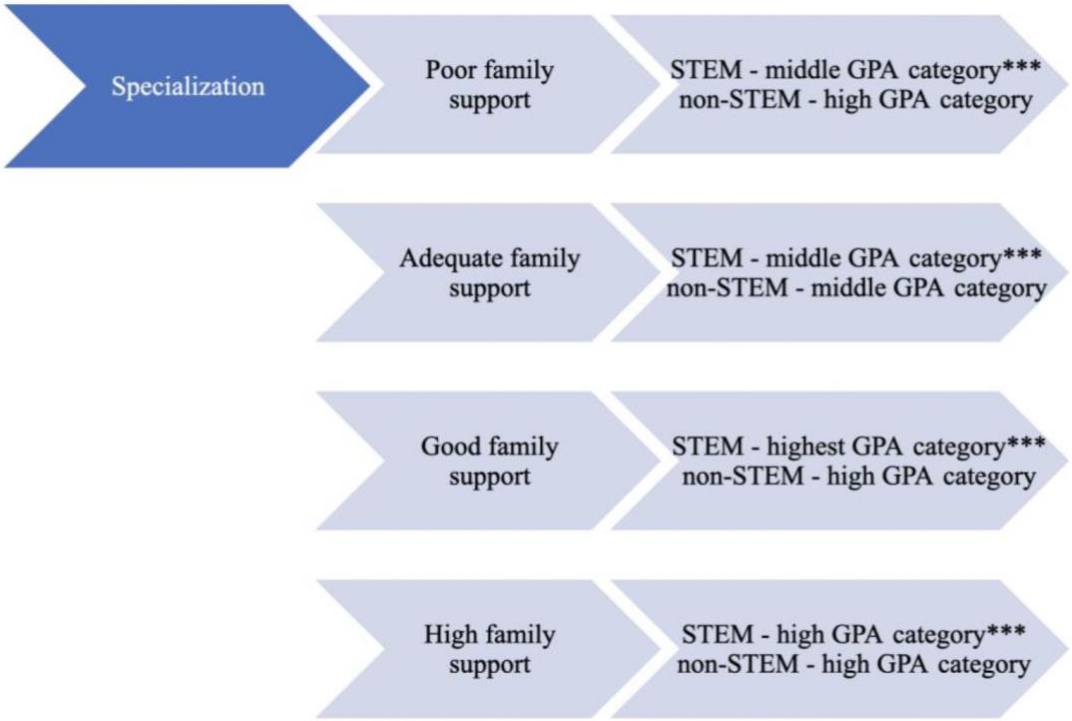
Non-STEM students' marginal effects are not statistically significant. This shows no effect of predicted probabilities of having a certain GPA depending on family support. Nevertheless, for STEM students, the highest predicted probability of having middle-level GPA associates with poor family support. Also, STEM students tend to have lower predicted probabilities of having either level of GPA compared to non-statistically significant non-STEM students. Next, the predicted probability of having a low level of GPA is lower across STEM students than non-STEM students, given any level of family support. Furthermore, for STEM students who receive poor or adequate family support levels, the predicted probabilities of having a middle GPA are lower compared to non-STEM students.

If STEM students receive adequate support their predicted probabilities outweigh the non-STEM students' high GPA. Finally, there is no difference between STEM and non-STEM students having the highest level of GPA if they receive poor family support. However, the differences in marginal effects of having the highest level of GPA occur across specializations if students receive adequate, good, or poor family support.

Therefore we summarize the family support's marginal effects on the change of GPA levels' predicted probabilities across specializations in the following diagram (Figure 10):

Figure 10

The Marginal Effect of Family Support on Academic Performance across Specialties



Campus residency

We now examine the effect of statistically significant campus residency variable on the probability of having a certain GPA category (Table 9):

Table 9

Probability of Scoring GPA Depending on on- and off-Campus Residency

Family support	**GPA category**			
	Low (2.0-2.5)	Middle (2.5-3.0)	High (3.0-3.5)	Highest (3.5-4.0)
Poor				
NU	0.25**	**0.39*** **	0.31***	0.054
KBTU	-	-	-	-
Adequate				
NU	0.22**	**0.38*** **	0.33***	0.063**
KBTU	-	-	-	-
Good				
NU	0.051**	0.18***	**0.51*** **	0.26***
KBTU	-	-	-	-
High				
NU	0.034**	0.13***	**0.49*** **	0.34***

KBTU	-	-	-	-

Note: *p < 0.10, **p < 0.05, ***p<0.01

So, the predicted probability of having the lowest GPA category is 0.15 if a student lives on campus and 0.07 if they do not.

Next, the predicted probabilities of having GPA in the range of 2.5-3.0 for students residing on campus is 0.32 and 0.21 otherwise. For students residing on campus and off campus the predicted probabilities of having 4th category GPA are 0.39 and 0.45 respectively.

Finally, the probability of a student having GPA in the range between 3.5 and 4.0 is 0.14 if they live on campus and 0.27 if they live off campus.

Next, we analyze the effect of campus residency across gender, universities, and specialization subsamples (Table 10) :

Table 10

Probability of Scoring GPA Depending on On- and Off-campus Residency by Subsamples

Residency	**GPA category**			
	Low (2.0-2.5)	Middle (2.5-3.0)	High (3.0-3.5)	Highest (3.5-4.0)
On-campus				
Female	0.094	0.27	0.46	0.17
Male	0.13	0.30	0.40	0.17
NU	0.085*	0.24***	**0.49*** **	0.17**
KBTU	0.12**	**0.43*** **	0.34***	0.11**
STEM	0.12**	0.29***	**0.39*** **	0.20***
non-STEM	0.033	0.19	0.62	0.16
Off-campus				

Female	0.033	0.12	0.45	0.38
Male	0.15	0.31	0.39	0.15
NU	0.064**	0.20***	**0.51*** **	0.22***
KBTU	0.067	0.33*	**0.41*** **	0.19
STEM	0.10***	0.27***	**0.40*** **	0.23***
non-STEM	0.13	0.086	0.58	0.32

Note: *p < 0.10, **p < 0.05, ***p<0.01

Table 10 shows no difference in predicted probabilities of both male and female students living on campus and off campus, given absence of statistical significance at any level of significance.

More striking differences are observed when analyzing university subsamples. We firstly analyze students living on campus. We found that NU students are least likely to score a low GPA category while KBTU students are least likely to have the highest GPA category. Also, a student from NU living on campus is most likely to score a high GPA category while a student from KBTU residing on campus is most likely to score in the middle GPA category.

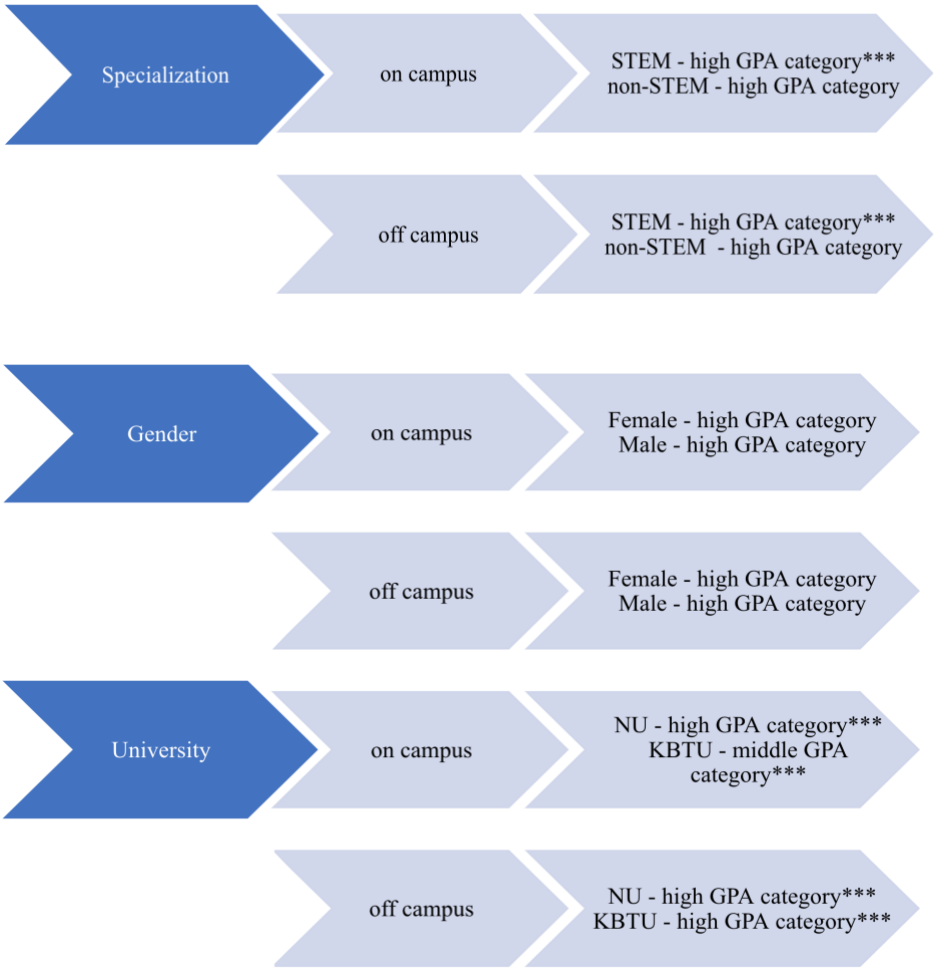
Students from both universities residing off campus are most likely to have a high GPA category with NU slightly outweighing KBTU. This difference is statistically significant at all levels. Meanwhile, an NU and KBTU student living off campus is least likely to score low GPA category but results on NU are statistically significant at 1% significance level as opposed to KBTU results which are not statistically significant at any level.

Inter-major analysis showed that STEM students living on campus are least likely to score low GPA category and most likely to score high GPA category. The same pattern was observed for STEM students living off campus. All differences are statistically significant at 1% significance level. Non-STEM subsamples did not provide statistically significant differences in predicted probabilities for GPA.

To sum, marginal effect analysis of campus residency impact on GPA levels' predicted probabilities across gender dimension, universities, and specialization is outlined below (Figure 11):

Figure 11

Marginal Effect of Campus Residency on Academic Performance across Genders, Universities, and Specialties



Binary logistic regression model

MNLM and OLRM analyses produce substantial shrinkage of the sample size. Consequently, multicategorical treatment of GPA causes inflated standard error and overlooks overall tendencies. Therefore, we redefine GPA into binary variable and examine the binary logit to control the effect of EQ on GPA at general level, through the variation of low and high GPA with a cut-off point at 2.5.

Moreover, we specify models across genders, universities, and specialties. However, only five models demonstrate statistically significant coefficients, and others: the subsamples across females and non-STEM students either does not provide any statistical significant evidence to test hypotheses or the sample size is insufficient for statistical analysis (Table 11).

Table 11

Binary Logit Models for Predicting Changes in GPA

GPA binary	Model 1 (176)	Model 2 (Male students) (79)	Model 3 (NU students) (116)	Model 4 (KBTU students) (46)	Model 5 (STEM students) (114)
EQ score	-0.098* (0.056)	-0.18** (0.084)	-0.18** (0.09)	0.10 (0.34)	0.0063 (0.034)
STEM student	-10.27 (7.36)	-24.23** (11.90)	-29.17** (13.40)	25.73 (41.55)	-
EQ*STEM	0.081 (0.058)	0.19** (0.093)	0.23** (0.10)	-0.22 (0.35)	-
Part-time job	0.026 (0.031)	0.034 (0.048)	0.108* (0.062)	0.048 (0.091)	0.016 (0.035)
Female	-10.39 (6.55)	-	-10.72 (8.905)	-1.94 (24.60)	0.80 (8.21)
EQ*Female	0.092* (0.054)	-	0.099 (0.073)	0.023 (0.20)	-0.0017 (0.068)
ECA	0.018 (0.31)	0.046 (0.059)	0.016 (0.04)	0.025 (0.11)	-0.010 (0.068)
SFFL					
Very dissatisfied	3.29 (2.56)	-	4.14 (3.10)	-	2.59 (2.46)
Dissatisfied	3.30 (2.39)	-0.15 (2.022)	(empty)	-22.35 (2891.69)	(empty)
Neither	3.31 (2.19)	1.44 (1.97)	7.068** (3.35)	-4.93** (2.29)	2.43 (1.97)
Satisfied	3.16 (2.13)	1.067 (1.86)	4.18 (2.79)	21.56 (891.68)	2.41 (1.91)

Very satisfied	4.095* (2.23)	1.50 (1.92)	5.19* (2.98)	-	3.01 (1.99)
Family support					
Adequate	0.029 (1.15)	-0.86 (1.98)	-1.25 (1.52)	-	1.25 (1.31)
Good	2.12* (1.15)	1.41 (1.85)	1.39 (1.34)	5.34 (3.24)	2.31* (1.28)
High	0.51 (1.099)	-0.84 (1.93)	5.19* (2.98)	-17.31 (2891.68)	0.94 (1.24)
Parents' education	0.34 (0.57)	1.25 (0.93)	0.41 (0.85)	-2.10 (2.22)	-0.15 (0.66)
University distance	0.00036 (0.0027)	-0.019 (0.021)	-0.00037 (0.0063)	-0.014 (0.039)	-0.018 (0.018)
Campus residency	0.34 (0.62)	-0.59 (1.046)	-0.73 (1.064)	-	0.47 (0.80)
City residency	-0.36 (0.59)	-0.48 (0.87)	-0.29 (1.018)	1.82 (1.62)	-0.059 (0.66)

Note: *p < 0.10, **p < 0.05, ***p<0.01

Model 1 with all variables included shows a negative relationship between EQ scores and GPA. Students receiving higher EQ tend to have lower GPA. Female students receiving higher EQ scores tend to have higher GPAs. If students are very satisfied with SFFL or receive a good level of family support, then they tend to have higher GPAs.

Model 2 across male students shows statistical significance of EQ score, STEM student, and moderators of EQ and STEM student. Male students with higher EQ scores and STEM male students have lower GPAs. While STEM male students scoring high EQ tend to score higher GPAs.

Model 3 across NU students reveals EQ scores are negatively correlated with GPA levels (as Model 1 and 2). Also, as in Model 2, STEM NU students might have lower GPAs. However, if STEM NU students demonstrate higher EQ scores, then their chances for GPA higher than 2.5 increases. Opposite to the Kurata, Bano, and Matias (2015) study NU working students have higher chances for higher GPA than non-working students. High family support and neutral SFFL lead to higher GPA.

Model 4 across KBTU students shows neutral SFFL leads to lower GPA lower. Model 5 reveals STEM students from both universities who receive a good level of family support score higher GPAs.

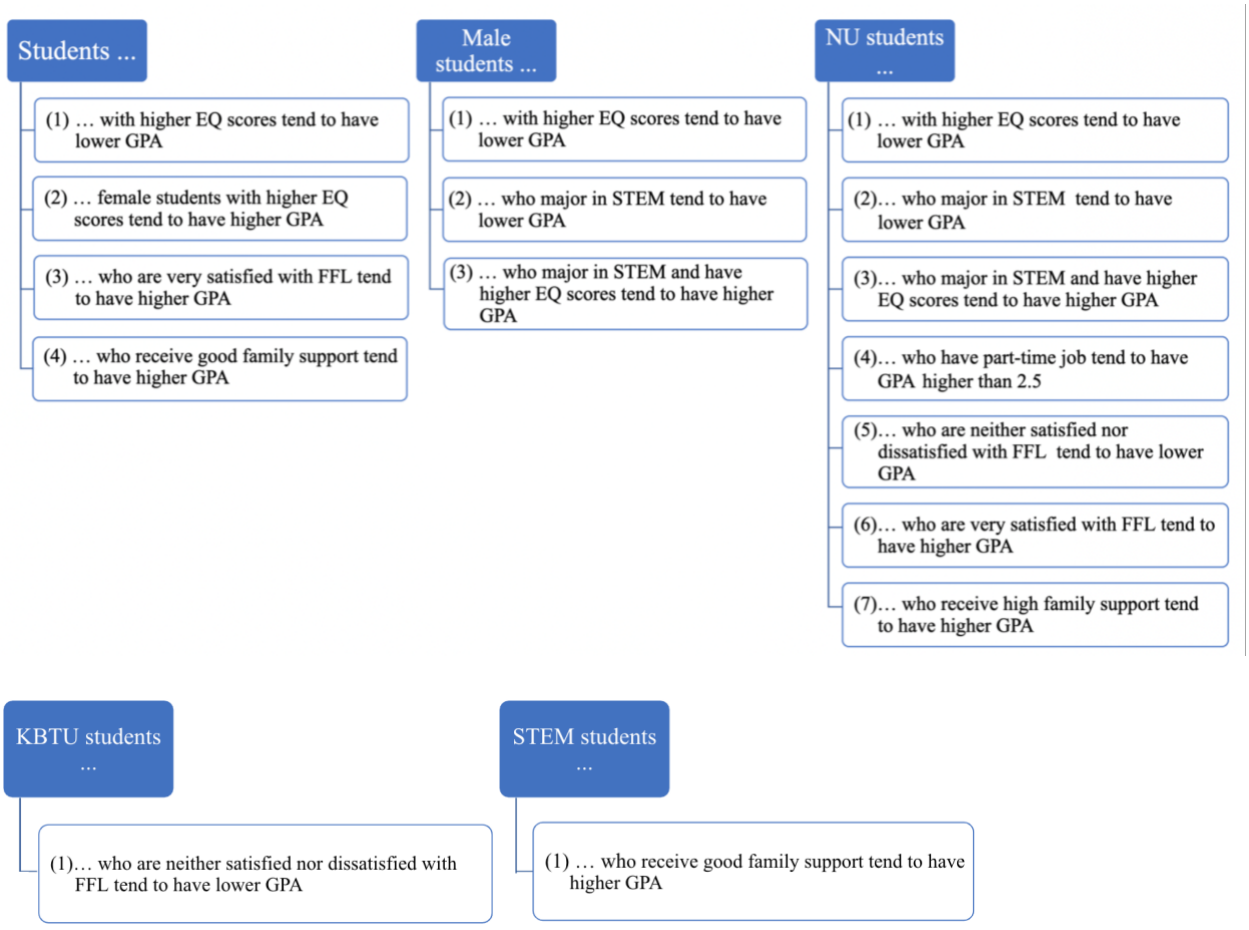
Analysis across years discovers sophomore STEM students tend to have lower GPAs, but if they advance their EQ skills, GPA becomes positively affected. Subsample binary analysis across junior and senior students was not possible due to insufficient sample size (see Table 8 in Appendix C).

Similar to descriptive and ORLM models, binary logit reveals higher levels of SFFL and family support lead to a higher GPA. Opposite to literature, NU students who spend more time on part-time jobs score higher GPA.

We summarized binary logistic results in Figure 12:

Figure 12

Summary of Binary Logistic Regression



Thereby, binary logistic regression allows us to test two hypotheses. Firstly, we discover higher EQ scores lead to better academic performance of STEM students at NU. Secondly, we reveal EQ of males and females have different effects on their academic performance. Male students with higher EQ scores tend to have lower GPAs, yet STEM male students with more developed EQ skills can have higher GPAs. Female students with higher EQ skills will have higher GPAs. However, ORLM across years of studies revealed the opposite gender effect: higher EQ scores lead to a worse academic performance of sophomore female students and better academic performance of sophomore male students. Nonetheless, higher EQ level leads to lower GPA.

We summarize revisited hypotheses in Table 12:

Table 12

Revisited Research Hypotheses

Hypotheses	Result	Conclusion
Higher EQ level leads to a worse academic performance of STEM students	Rejected:	Higher EQ scores lead to a better academic performance of STEM students at NU - Direct and indirect effects of EQ of STEM students on GPA - But negative correlation between EQ and GPA of undergraduate students
EQ of males and females have the same effect on their academic performance	Rejected:	EQ of males and females have different effect on their academic performance - Higher EQ scores lead to a better academic performance of female students - Higher EQ scores lead to a worse academic performance of male students - Opposite gender effect was observed among sophomore students

To summarize, firstly, we examined direct and indirect effects of independent factors on academic performance and sample representativeness. Secondly, we analyzed gender effects. Female NU students have higher GPA and EQ scores than female KBTU students. Male NU STEM students score higher EQ than male KBTU STEM students. Also, we discovered campus residency positively predicts GPA levels of NU students and negatively of KBTU students.

Next, neither of selected factors from descriptive analysis were statistically significant to explain changes in GPA levels. ORLM provided robust and consistent results for family support and campus residency. High GPA students are associated with receiving good and high family support. Subsample analysis proved consistency in family support-GPA relationship across genders, universities, and specialization, except that we failed to define the subsample difference across NU and KBTU because of the insufficient sample size of KBTU. Analysis across years of studies showed EQ scores of sophomore female students negatively, of male students positively affect the academic performance. This allowed us to reject the 2nd hypothesis.

Finally, we recategorized GPA into binary variable which allowed us to monitor the overall tendencies in the GPA's variation and guaranteed the sufficiency of sample size for logistic regression, the problem which was present in MLNM and OLRM. The binary model provided strong evidence to test first and second research hypotheses. Firstly, we revealed that higher EQ scores lead to higher GPA of STEM students at NU, and STEM male students at NU. Secondly, similar to ORLM, EQ has a different effect across genders. Males scoring higher EQ score tend to have lower GPA level, and females scoring higher EQ score tend to have higher GPA level. This was consistent with literature we studied. Finally, SFFL and family support similarly to OLRM results proved to positively affect changes for higher GPA. Lastly, parents' education, time necessary to get to university, campus residency,and part-time jobs have considerable effects on GPA of students. This can be attributed to the indirect effect of emotional intelligence.

LIMITATIONS

We acknowledge the existence of several limitations in our study and recommend considering them in further studies.

Sample representativeness

We suppose the students who received our surveys would have zero incentives to participate in the survey. If the survey was conducted offline as opposed to the COVID-19 lockdown and quarantine measures, then we could provide them more incentives (rewards, etc.) and collect enough responses.

Our dataset consists of 245 responses, which is a bit lower than we targeted for the sample size with 90% confidence level (261 responses). Nevertheless, our model is still feasible for quantitative analysis given lower confidence in estimations.

Next, unbalanced NU and KBTU subsample sizes represent a serious threat for reliability of our results. Firstly, we are unsure on the representativeness of KBTU gender and STEM specialties distribution. Secondly, NU gender and STEM specialties distribution is not perfectly representative of true population.

Data quality

We admit two issues with data collection procedure. Firstly, since the data collection for NU students took part in social messengers, study experiences the selective bias to those who have access to social messengers. Secondly, we faced administrative problems and given COVID-19 pandemic restrictions we failed to collect and monitor the data collection progress at both universities.

Omitted variable bias

Omitted variable bias is the serious threat which our study experiences. We have not collected data on some factors and hence our results can be biased because of their absence.

Firstly, a student's individual and family income level should be studied as they can affect EQ and hence GPA. Secondly, if students are loaded with academic assignments, the more time pressure they might experience which thus affect academic performance. So, academic workload (how many hours does a student devote for studies outside the classroom) is the next omitted variable. Thirdly, psychological and mental support that a

student receives from family is omitted. Coronavirus pandemic in 2020 revealed living with family members can either be helpful or be a serious challenge during studies. Family relations should be analyzed in the question of EQ's effect on GPA.

Multicollinearity

In analyses we tried to be very careful with multicollinearity, by checking pairwise correlation and variance inflation factors. We have not observed extremely high intercorrelations between variables, which ensured low risk of multicollinearity issues in our model.

CONCLUSION

We studied the relationship between emotional intelligence and the academic performance of STEM students from NU and KBTU. We divided students into those studying STEM and non-STEM. We are unaware of existing literature focusing on the relationship between these two concepts in the Kazakhstani context. Therefore, our study has an important contribution to this field.

More scholars are now emphasizing the importance of emotional intelligence in students' academic performances and their employability after graduation. EQ skills include mood stability, sociability, stress management, and other related soft skills.

We expected emotional intelligence to have a direct effect on academic performance. From the literature review, we learned that this effect could be overlapped with other factors. For instance, a student with strong emotional intelligence might be overloaded with part-time jobs which negatively affects their grades. Moreover, additional stress might be caused by the time it takes them to get to the university, quality of facilities for learning, campus residency, home city, and family support.

We developed two research hypotheses to test the relationship between EQ and academic performance of STEM students and the gender effect in the EQ-GPA relationship.
GPA, the main independent variable, was presented as a categorical variable with five levels. Due to inflation of standard error caused by the single observation in the lowest GPA category, we had to reduce to 4 levels of GPA. Students' EQ test scores were used as a main independent variable, and other explanatory variables were collected from the questionnaire. These explanatory variables include a student's major, gender, number of hours they spend on part-time jobs and extracurricular activities per week, level of satisfaction with facilities for learning, level of family support they receive, their parents' education level, distance from university, and campus and city residency.

We conducted descriptive statistics analysis and multinomial, ordered, and binary logistic regression analyses to find the connection between emotional intelligence and academic performance across subsamples based on gender, university, and field of study.
We found strong evidence to test two hypotheses through ordered and binary logit. STEM students who possess better EQ skills tend to have higher GPA levels, but EQ’s effect

differs across genders. Also, EQ negatively affects GPA, in contrast to reviewed literature. Similar results were obtained in the analysis controlling the year of study. Moreover, we obtained interesting results of the indirect effect of EQ on GPA through family support and campus residency in ordered and binary logistic regressions. Finally, ordered logit and binary subsample investigation revealed gender differences across years and among statistically significant family support, campus residency, SFFL's effect on GPA across NU and KBTU, and STEM and non-STEM students.

RECOMMENDATIONS

Policy goals and constraints

Evidence-based policy is the key to successful reforms. We discover academic performance of STEM students is affected by direct and indirect effects of EQ development. Therefore, we suggest assertive governmental action to encourage the improvement of emotional intelligence at Kazakhstani universities for STEM students.

We focus on three criteria to propose recommendations: efficiency to each stakeholder, economic viability, and administrative feasibility in short and long terms. We prioritize efficient policy alternative since it should bring the most desired results: graduates will develop EQ skills and will achieve academic and career goals. Economic viability is important since we want to capture externalities' impact, and avoid policy's costs outweighing the benefits. Lastly, the policy alternative must be administratively feasible, so the resources and capacity of stakeholders must be taken into account.

To conduct a more comprehensive comparative analysis, we assigned ranking for each of the policy options with respect to evaluative criteria. The policy can meet the policy goal in the range of: 1/3 Very weakly, 1.5/3 Weakly, 1.75/3 Moderately, 2/3 Somewhat strongly, 2.5/3 Strongly, 3/3 Very strongly. Numerical rankings were assigned for convenience in comparative analysis.

Policy alternatives

We analyze four policy alternatives to encourage EQ skills improvement at universities. The first policy alternative is the status quo, the second is the introduction of extracurricular activities to develop EQ skills, the third is the adding of required courses on EQ skills development to the university curriculum, and the fourth is the improvement of on-campus living conditions and universities' learning facilities.

Alternative 1: Status quo

Currently, the two universities do not provide additional courses or activities focusing on the development of soft skills. However, NU students score on average a higher GPA and EQ scores in comparison to KBTU students. Hence, with this policy alternative, we suggest keeping the status quo.

Efficiency

Current EQ indicators are relatively low as GPA for KBTU students. The absence of any exogenous factors facilitating the improvement of EQ is associated with no progress in academic performance and employability rate.

Efficiency for students: 1

Efficiency for employers: 1

Efficiency for employers: 3

Economic viability

This policy alternative is economically viable because universities do not have to reallocate the current budget or seek new financial resources.

Economic viability: 3

Administrative feasibility

Keeping the system as it is bears no financial costs, system rearrangement costs, or any other assistance in short and long terms.

Short-term: 3

Long-term: 3

Alternative 2: Extracurricular activities

Hypothesis testing proves non-STEM students have higher EQ scores than STEM students. Students exposed to social science courses tend to have better EQ skills. So, students' EQ skills are subject to change. Our results show that although STEM students score lower GPAs than non-STEM students, they might improve their GPA if they advance their EQ skills.

Hence, we suggest adding extracurricular activities that focus on developing emotional intelligence (courses, workshops). Both options of extracurricular activities will be free of charge and not mandatory. Literature review shows the significant impact of such activities.

Efficiency

This alternative is more efficient than the first one because students will have an opportunity to develop emotional intelligence. International experience suggests good efficiency of extracurricular activities since students tend to develop EQ skills upon completion or attending the workshops. Employers benefit from this policy because more emotionally intelligent (e.g., more stress-resistant, sociable, adaptable, and emotionally

stable) graduates will apply for jobs. University administration benefits from the policy by increasing its graduates' employability rankings, and universities' reputation.
Efficiency to students: 2
Efficiency to employers: 2
Efficiency to university administration: 2

Economic viability

The policy requires a budget allocated to provide classrooms, pieces of equipment, and services of teaching instructors. The addition of the course to the Office of the Registrar system and development of curriculum bears certain costs. Hence, the policy is more costly than the first option.
Economic viability: 1.75

Administrative feasibility

The policy brings more bureaucratic costs than the first policy. Therefore, this policy option is less administratively feasible. However, these costs are compensated in the long run. Kaldor-Hicks efficiency principle suggests the cost, in the long run, is paid off by more emotionally intelligent students with higher school grades and better employability rates.
Short term: 2.5
Long-term: 3

Alternative 3: Required courses

We admit non-required EQ courses lack enough capacity to meet all students interested in learning how to develop EQ skills. Hence, similar to Giammarco, Higham, and McKean (2021), we recommend introducing the required curricula courses on the development of EQ skills. Credit-bearing or pass/fail courses can train EQ and help students cope with personal, academic, and professional challenges. The official status of such courses ensures the supply of enough class capacity and qualified specialists.
Moreover, we suggest tracking the EQ scores in universities after enrollment and prior to graduation because this helps monitor and study the effectiveness and/or importance of EQ development courses. Open data encourages careful investigation of EQ's impact on graduate's academic and professional success in Kazakhstan and attracts employers.

Efficiency

The policy is strongly efficient for students and employers because courses provide equal opportunities for every student to register and complete the course and hence train EQ skills. The impact of these courses should be analyzed, but we believe that they satisfy criteria for efficiency and the interests of the majority of involved stakeholders. However, we follow the Kaldor-Hicks efficiency principle: increased competitiveness of graduates pays off to the university's increased costs.

Efficient to students: 3/3

Efficient to employers: 3/3

Efficient to administration:1.5/3

Economic viability

This policy leads to increased university expenses (hiring specialists, operating and maintenance costs of classrooms). Nevertheless, employers and fresh graduates enjoy a positive externality of faster matches with each other due to open EQ data. Employers hire students with developed EQ skills highly demanded in the labor market.

Economic viability: 1.5

Administrative feasibility

In the short and long terms, universities face an increased volume of administrative and analytical work (office of the Registrar, analysts for monitoring EQ data), and universities' curricula are to be updated (classroom capacity, academic hours). So, this option is less administratively feasible than option 2.

Short term: 2

Long term: 2.5

Alternative 4: Improvement of on-campus living conditions & facilities for learning

Our study reveals that NU students residing on-campus tend to have higher GPAs than KBTU students residing on campus. More students live on campus and can spend more time on extracurricular studies and social life. So, a better campus environment at NU is the explanation. At KBTU, students who have neutral SFFL levels have lower GPAs. We assume that since we are not sure of the confidentiality of KBTU responses, these students might have felt that their responses are monitored and hence replied with neither option when they felt negatively regarding FFL. Therefore, we recommend not only improving on-campus living conditions but also improving the facilities learning environment for

STEM students at Kazakhstani universities because these are important factors in improving students' GPA and EQ.

Efficiency

This option is highly efficient for students and employers since better on-campus conditions and learning facilities can improve student performance. Alas, the option is less efficient for university administration because resources spent on the improvement of campus and learning facilities can be doubted in the Kazakhstani context.

Efficient to students: 3

Efficient to employers: 3

Efficient to administration: 1.5

Economic viability

This option is the most expensive among all four policy alternatives because it involves major improvements in university infrastructure. Moreover, operation and maintenance costs are increased.

Economic viability: 1.5

Administrative feasibility

In the short run, the option bears not only significant expenses but also more administrative work to ensure the improvement procedures. In the long run, managers deal with as much work as under option 3. Therefore, this policy is less administratively feasible in the short term than the previous policy but ranked similarly to the previous policy in the long run.

Short term: 1

Long term: 2.5

Thereby, we summarized our analysis in the criteria decision matrix (Table 12), where policy alternative 3, introduction of required courses, scored the highest as the most optimal policy.

Table 13

Criteria Decision Matrix

Criteria Decision Matrix

Policy goal	**Policy Alternative 1:** Status quo	**Policy Alternative 2:** Extracurricular courses at university level	**Policy Alternative 3:** Required courses at university level	**Policy Alternative 4:** Improvement of on-campus living conditions & Improvement of facilities for learning
Efficiency				
Efficient to Students	Ranking: 1 Weight: 0.50 **Total: 0.50**	Ranking: 2 Weight: 0.50 **Total: 1.00**	Ranking: 3 Weight: 0.50 **Total: 1.50**	Ranking: 3 Weight: 0.50 **Total: 1.50**
Efficient to Employer	Ranking: 1 Weight: 0.50 **Total: 0.50**	Ranking: 2 Weight: 0.50 **Total: 1.00**	Ranking:: 3 Weight: 0.50 **Total: 1.50**	Ranking: 3 Weight: 0.50 **Total: 1.50**
Efficient to University administration	Ranking: 3 Weight: 0.50 **Total: 1.50**	Ranking: 2 Weight: 0.50 **Total: 1.00**	Ranking:: 1.5 Weight: 0.50 **Total: 0.75**	Ranking: 1.5 Weight: 0.50 **Total: 0.75**
Economic viability	Ranking: 3 Weight: 0.30 **Total: 0.90**	Ranking: 1.75 Weight: 0.30 **Total: 0.53**	Ranking:: 1.5 Weight: 0.30 **Total: 0.45**	Ranking: 1 Weight: 0.30 **Total: 0.30**
Short-term	Ranking: 3 Weight: 0.20 **Total: 0.60**	Ranking: 2.5 Weight: 0.20 **Total: 0.50**	Ranking: 2 Weight: 0.20 **Total: 0.40**	Ranking: 1 Weight: 0.20 **Total: 0.20**
Long-term	Ranking: 3 Weight: 0.20 **Total: 0.60**	Ranking: 3 Weight: 0.20 **Total: 0.60**	Ranking: 2.5 Weight: 0.20 **Total: 0.50**	Ranking: 2.5 Weight: 0.20 **Total: 0.50**
Total	4.6	4.63	**5.1**	4.75

Status quo and elective course alternatives are less optimal even though they are

economically viable and administratively feasible. Improvement of on-campus conditions and learning facilities scored the second most optimal policy; our research suggests that this option can significantly improve the academic performance of students. Still, high expenses associated with this alternative should be taken into account. Eventually, economic viability and administrative feasibility remain the main source of possible disagreement with our recommendation. Nevertheless, we recommend introducing required university courses to train EQ skills, given its national importance for Kazakhstani students.

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APPENDIX A

Survey text

Dear respondent,

We are Zarina Malik and Zhanel Sembayeva, second-year GSPP students majoring in Public Policy. Currently, we are collecting data for our Master thesis to study the effect of emotional intelligence on the academic performance of students. Particularly, we are interested in finding whether higher scores of emotional intelligence lead to better academic performance among engineering students at two Kazakhstani universities: Nazarbayev University and Kazakh-British Technical University.

The survey is strictly ANONYMOUS and will take about 10-15 minutes. We also assure that the results of the survey will only be used for academic purposes and will not be transferred to third parties. We thank you in advance for taking your time. This is an immensely valuable contribution to the study of the importance of emotional well-being in the lives of students.

Thank you for your assistance.

The first part of the survey consists of 14 questions and the approximate time to complete it is 5 minutes.

1. Please, indicate your gender (male or female)

female male

2. Please indicate your university, year of study, and major (Example of answer: NU, 2nd year, Civil engineering)

3. Are you 18 years old or over?

Yes

No

4. Which category does your CGPA (cumulative GPA) belong to?

Category 1: CGPA scores less than 2.0

Category 2: CGPA scores between 2.0-2.5

Category 3: CGPA scores between 2.5-3.0

Category 4: CGPA scores between 3.0-3.5

Category 5: CGPA scores between 3.5-4.0

- I do not have CGPA yet (I am 1st year student and now study the first semester)

5. Do you have a part-time job?

Yes

No

6. If Yes, on average how many hours per week do you spend on it? (Clarification: in case if you have more than one part-time job, indicate the time you spend on them in total). If No, please write 0 (zero)

7. Do you participate in some extracurricular activities?

Yes

No

8. If yes, how many hours per week do you spend on them? (Clarification: extracurricular activities refer to the activities in the university such as social events, student association clubs, hobbies, etc.) If No, please write 0 (zero)

9. On a scale from 1 to 5, rate how satisfied are you with the facilities for learning provided by your institution? 1-very dissatisfied 2-dissatisfied 3-neither 4-satisfied 5-very satisfied and 0 - you are 1st year student and study now online

- 0
- 1
- 2
- 3
- 4
- 5

10. On a scale from 1 to 5, rate the level of support you receive from your family? 1 - extremely poor or no support, 5 - strong support. (Clarification: you may define "family" as your birth family, or, in case if such is absent, any person or a group you perceive as close as a family)

- 1
- 2
- 3

- 4
- 5

11. Do you live on campus (before COVID-19 pandemic)?

- Yes
- No

12. Do you live in the city where your university is? (For example NU-Nur-Sultan, KBTU-Almaty)

- Yes
- No

13. How many minutes does it take to get to university (before COVID-19 pandemic)?

14. Did your parents or any person or a group you perceive as close as a family go to college?

- Yes
- No

In the second part of the survey, we ask you to complete the Emotional Intelligence Questionnaire. On the basis of your results, we could estimate your Emotional Intelligence score. The approximate time to complete this part of the survey is 10 minutes.

Thank you in advance!

The test consists of 30 questions. Each question must be answered with numbers from 1 to 7, where 1 stands for “completely disagree”, 4 means "neither" and 7 means “completely agree”.

1. Expressing my emotions with words is not a problem for me

- 1
- 2
- 3
- 4
- 5

- 6
- 7

2. I often find it difficult to see things from another person's viewpoint

- 1
- 2
- 3
- 4
- 5
- 6
- 7

3. On the whole, I am a highly motivated person

- 1
- 2
- 3
- 4
- 5
- 6
- 7

4. I usually find it difficult to regulate my emotions

- 1
- 2
- 3
- 4
- 5
- 6
- 7

5. I generally don’t find life enjoyable

- 1
- 2
- 3
- 4
- 5
- 6
- 7

6. I can deal effectively with people

- 1
- 2
- 3
- 4
- 5
- 6
- 7

7. I tend to change my mind frequently

- 1
- 2
- 3
- 4
- 5
- 6
- 7

8. Many times, I can’t figure out what emotion I'm feeling

- 1
- 2
- 3

- 4
- 5
- 6
- 7

9. I feel that I have a number of good qualities

- 1
- 2
- 3
- 4
- 5
- 6
- 7

10. I often find it difficult to stand up for my rights

- 1
- 2
- 3
- 4
- 5
- 6
- 7

11. I’m usually able to influence the way other people feel

- 1
- 2
- 3
- 4
- 5
- 6

- 7

12. On the whole, I have a gloomy perspective on most things

- 1
- 2
- 3
- 4
- 5
- 6
- 7

13. Those close to me often complain that I don’t treat them right

- 1
- 2
- 3
- 4
- 5
- 6
- 7

14. I often find it difficult to adjust my life according to the circumstances

- 1
- 2
- 3
- 4
- 5
- 6
- 7

15. On the whole, I’m able to deal with stress

- 1

- 2
- 3
- 4
- 5
- 6
- 7

16. I often find it difficult to show my affection to those close to me

- 1
- 2
- 3
- 4
- 5
- 6
- 7

17. I'm normally able to "get into someone's shoes" and experience their emotions

- 1
- 2
- 3
- 4
- 5
- 6
- 7

18. I normally find it difficult to keep myself motivated

- 1
- 2
- 3
- 4

- 5
- 6
- 7

19. I’m usually able to find ways to control my emotions when I want to

- 1
- 2
- 3
- 4
- 5
- 6
- 7

20. On the whole, I’m pleased with my life

- 1
- 2
- 3
- 4
- 5
- 6
- 7

21. I would describe myself as a good negotiator

- 1
- 2
- 3
- 4
- 5
- 6
- 7

22. I tend to get involved in things I later wish I could get out of

- 1
- 2
- 3
- 4
- 5
- 6
- 7

23. I often pause and think about my feelings

- 1
- 2
- 3
- 4
- 5
- 6
- 7

24. I believe I’m full of personal strengths

- 1
- 2
- 3
- 4
- 5
- 6
- 7

25. I tend to “back down” even if I know I’m right

- 1
- 2

- 3
- 4
- 5
- 6
- 7

26. I don’t seem to have any power at all over other people’s feelings

- 1
- 2
- 3
- 4
- 5
- 6
- 7

27. I generally believe that things will work out fine in my life

- 1
- 2
- 3
- 4
- 5
- 6
- 7

28. I find it difficult to bond well even with those close to me

- 1
- 2
- 3
- 4
- 5

- 6
- 7

29. Generally, I’m able to adapt to new environments

- 1
- 2
- 3
- 4
- 5
- 6
- 7

30. Others admire me for being relaxed

- 1
- 2
- 3
- 4
- 5
- 6
- 7

APPENDIX B

GPA categories

We assume that for some students it can be challenging to reveal true scores of their CGPA (even though the survey is anonymous). Hence we decided to collect data on CGPA through asking to which category does their CGPA score belong to. We then named names of the categories for a better comprehension in the paper as follows:

Category 1: Lowest GPA category (GPA scores less than 2.0),
Category 2: Lowest GPA category (GPA scores between 2.0-2.5),
Category 3: Lowest GPA category (GPA scores between 2.5-3.0),
Category 4: Lowest GPA category (GPA scores between 3.0-3.5), and
Category 5: Lowest GPA category (GPA scores between 3.5-4.0).

On a scale from 1 to 5, rate how satisfied are you with the facilities for learning provided by your institution? 1-very dissatisfied 2-dissatisfied 3-neither 4-satisfied 5-very satisfied and 0 - you are 1st year student and study now online

SFFL categories:

SFFL is another categorical variable of our study. We asked students to rate their satisfaction with the facilities for learning provided by their institutions on a scale from 1 to 5, where:
1 - very dissatisfied,
2 - dissatisfied,
3 - neither satisfied nor dissatisfied,
4 - satisfied, and
5 - very satisfied.

Family support categories:

We also asked respondents to rate the level of support they receive from their family on a scale from 1 to 5, where:

1 - no support,

2 - poor support,

3 - adequate support,

4 - good support, and

5 - high support.

APPENDIX C

Table 1

Multinomial Regression Results Controlling for EQ Score. Model with Specifications. Low GPA vs High GPA

	1	**2**	**3**	**4**	**5**
N	193	175	175	175	175
EQ score	-.0093 (.023)	-.0038 (.023)	-.0026 (.023)	-.0034 (.023)	-.0028 (.024)
STEM student	-	.68 (.58)	.50 (.59)	.25 (.62)	.24 (.62)
female	-	-	-.71 (.53)	-.84 (.55)	-.82 (.56)
SFFL *Very dissatisfied*	-	-	-	-3.11 (2837.63)	-3.22 (2837.70)
Dissatisfied	-	-	-	-18.22 (2733.41)	-18.27 (2733.42)
Neither	-	-	-	-17.14 (2733.41)	-17.22 (2733.42)
Satisfied	-	-	-	-17.35 (2733.41)	-17.43 (2733.42)
Very satisfied	-	-	-	-17.79 (2733.41)	-17.86 (2733.42)
Parents education	-	-	-	-	-.17 (.53)

Table 2

Multinomial Regression Results Controlling for EQ Score. Model with Specifications. Middle GPA vs High GPA

	1	**2**	**3**	**4**	**5**
N	193	175	175	175	175
EQ score	-.0083	-.0022	-.00160	-.0034	-.0033

	(.017)	(.018)	(.018)	(.018)	(.019)
STEM student	-	.51 (.43)	.42 (.44)	.36 (.45)	.37 (.045)
female	-	-	-.34 (.40)	-.29 (.41)	-.29 (.41)
SFFL *Very dissatisfied*	-	-	-	14.70 (4465.26)	14.69 (4465.32)
Dissatisfied	-	-	-	-.84 (4399.76)	-.84 (4399.78)
Neither	-	-	-	-.49 (4399.76)	-.51 (4399.78)
Satisfied	-	-	-	.22 (4399.76)	.21 (4399.78)
Very satisfied	-	-	-	-.16 (4399.76)	-.17 (4399.78)
Parents education	-	-	-	-	-.021 (.40)

Table 3

Multinomial Regression Results Controlling for EQ Score. Model with Specifications. Highest GPA vs High GPA

	1	**2**	**3**	**4**	**5**
N	193	175	175	175	175
EQ score	.0022 (.018)	-.0038 (.023)	.0035 (.019)	.0046 (.019)	.0045 (.019)
STEM student	-	.68 (.58)	.62 (.45)	.50 (.47)	.49 (.47)
female	-	-	.41 (.42)	.38 (.44)	.38 (.44)
SFFL *Very dissatisfied*	-	-	-	-1.51 (2837.63)	-1.47 (2837.70)
Dissatisfied	-	-	-	-17.41	-17.40

				(2733.41)	(2733.42)
Neither	-	-	-	-15.70 (2733.41)	-15.68 (2733.42)
Satisfied	-	-	-	-16.04 (2733.41)	-16.01 (2733.42)
Very satisfied	-	-	-	-16.29 (2733.41)	-16.26 (2733.42)
Parents education	-	-	-	-	.062 (.42)

Table 4

Multinomial Regression Specifications Models Controlling for Female Students

N = 96	Low GPA vs High GPA	Middle GPA vs High GPA	Highest GPA vs High GPA
EQ score	-.0086 (.044)	.041 (.029)	.023 (.027)
STEM student	.79 (.95)	.766 (.585)	.774 (.570)
SFFL *Very dissatisfied*	-22.48 (41929.1)	.28 (70764.53)	-3.87 (41202.59)
Dissatisfied	-38.29 (41140.06)	-15.46 (70515.32)	-22.36 (41042.8)
Neither	-22.13 (41042.8)	.49 (70493.06)	-20.85 (41042.8)
Satisfied	-22.19 (41042.8)	.63 (70493.06)	-21.36 (41042.8)
Very satisfied	-23.79 (41042.8)	.608 (70493.06)	-21.63 (41042.8)
Parents education	-.017 (.86)	.028 (.56)	-.087 (.55)

Table 5

Multinomial Regression Specifications Model Controlling for Male Students

N=79	Low GPA vs High GPA	Middle GPA vs High GPA	Highest GPA vs High GPA
EQ score	-.00012 (.031)	-.033 (.026)	-.017 (.028)
STEM student	-.33 (.86)	-.028 (.77)	.30 (.95)
SFFL *Very dissatisfied*	-	-	-
Dissatisfied	-16.90 (2702.15)	-17.27 (2702.15)	-15.64 (5200.84)
Neither	-16.46 (2702.15)	-18.07 (2702.15)	.29 (4736.32)
Satisfied	-16.79 (2702.15)	-16.72 (2702.15)	.19 (4736.32)
Very satisfied	-16.62 (2702.15)	-17.63 (2702.15)	.0042 (4736.32)
Parents education	-.36 (.72)	.10 (.61)	.22 (.68)

Table 6

Multinomial Regression Specifications Model Controlling for STEM.

N=120	Low GPA vs High GPA	Middle GPA vs High GPA	Highest GPA vs High GPA
EQ score	-.016 (.028)	-.0030 (.023)	-.01 (.023)
female	-.54 (.65)	-.22 (.50)	.40 (.51)
SFFL *Very dissatisfied*	-2.31 (5371.18)	16.51 (7903.47)	-1.42 (5371.18)
Dissatisfied	-34.63 (5579.77)	-1.42 (7656.99)	-18.42 (5001.42)
Neither	-18.29 (5001.42)	-.63 (7656.99)	-17.05 (5001.42)
Satisfied	-18.32	.15	-16.95

	(5001.42)	(7656.99	(5001.42)
Very satisfied	-18.34 (5001.42)	.13 (7656.99)	-17.25 (5001.42)
Parents education	.25 (.63)	.27 (.50)	.44 (.52)

Table 7

Multinomial Regression Specifications Model Controlling for non-STEM students

N=35	Low GPA vs High GPA	Middle GPA vs High GPA	Highest GPA vs High GPA
EQ score	.074 (.056)	-.00024 (.034)	.044 (.041)
female	-2.633 (1.36)	-.62 (.82)	-.12 (.99)
SFFL *Very dissatisfied*	-	-	-
Dissatisfied	1.86 (11819.45)	.16 (8422.65)	31.00 (4856.75)
Neither	2.76 (11819.45)	.43 (8422.65)	-15.17 (4672.05)
Satisfied	1.35 (11819.45)	.69 (8422.65)	17.32 (4672.05)
Very satisfied	-.16 (11819.45)	-.37 (8422.65)	-16.82 (4672.05)
Parents education	-1.80 (1.29)	-.59 (.73)	-.61 (.80)

Figure 1

Pairwise Correlation of the Full Model OLRM

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)

(1) GPA categories	1.00											
(2) EQ score	0.05	1.000										
(3) STEM student	-0.05	-0.195*	1.000									
(4) EQ score of STEM student	-0.04	-0.071	0.988*	1.000								
(5) Time spent for part-time job (hrs)	0.06	0.081	0.019	0.025	1.000							
(6) Female student	0.15*	0.080	-0.250*	-0.243*	-0.052	1.000						
(7) EQ score of female	0.16*	0.162*	-0.269*	-0.255*	-0.038	0.993*	1.000					
(8) Time spent on ECA (hrs)	-0.06	0.029	0.015	0.023	0.021	-0.006	-0.008	1.000				
(9) SFFL	0.07	0.015	-0.062	-0.066	0.052	-0.042	-0.047	0.065	1.000			
(10) Family support	0.23*	0.119	-0.095	-0.078	-0.012	0.065	0.061	0.051	0.265*	1.000		
(11) Parents' college degree	0.07	0.111	-0.015	0.001	0.021	0.085	0.089	0.048	-0.143*	-0.023	1.000	
(12) Time to get to university	0.08	0.031	-0.115	-0.113	-0.027	0.059	0.062	0.019	-0.023	0.074	0.043	1.000
(13) Do you live on campus?	0.15*	0.115	0.035	0.042	0.153*	-0.001	0.008	0.060	-0.004	-0.183*	0.307*	-0.007	1.000

(14) The same city	-0.04	0.006	-0.117	-0.120	-0.051	0.044	0.054	0.027	0.036	0.065	-0.039	0.011	-0.355*	1.000

***
*p<0.01, **p<0.05, *p<0.1*

Table 8

Ordered Logistic Regression Summary Results across years of study

GPA binary	Model 1 (153)	Model 2 (Male Sophomore students) (64)	Model 3 (NU Sophomore students) (44)	Model 4 (STEM Sophomore students) (43)
EQ score	-0.107** (.059)	-0.14 (0.098)	-.66 (0 .70)	0.18 (0.14)
STEM student	-20.33** (8.64)	-30.00** (14.86)	-117.20 (86.72)	-
EQ*STEM	0.16** (0.068)	0.25** (0.12)	0 .92 (.67)	-
Part-time job	0.045 (.039)	.094 (0.084)	0.17 (0.12)	-0.024 (0.069)
Female	-6.75 (7.36)	-	-7.05 (31.06)	3.14 (20.89)
EQ*Female	0.064 (.060)	-	0.088 (0.25)	-0.0085 (0.17)
ECA	.014 (.033)	0.046 (0.076)	-0.067 (0.21)	0.26 (0.19)
SFFL				
Very dissatisfied	2.91 (2.66)	-	-	-
Dissatisfied	3.12 (2.52)	-0.055 (2.42)	-	-
Neither	4.94* (2.53)	4.66 (3.31)	-	5.30 (3.64)
Satisfied	2.83 (2.29)	0.82 (2.25)	6.75 (4.23)	5.10 (3.36)

Very satisfied	4.26* (2.45)	1.58* (2.29)	7.30 (4.21)	4.75 (3.60)
Family support				
Adequate	-1.30 (1.41)	-2.44 (2.77)	-9.61* (5.81)	2.70 (3.38)
Good	1.67 (1.18)	1.05 (1.96)	-0.63 (3.89)	4.32 (2.76)
High	0.38 (1.22)	-0.48 (2.16)	-2.11 (2.77)	0.39 (2.72)
Parents' education	.046 (0.70)	0.81 (1.21)	-1.80 (2.49)	-2.33 (2.035)
University distance	0.0041 (0.022)	0.014 (0.046)	-0.069 (0 .081)	0.039 (0.13)
Campus residency	-0.059 (0.82)	-1.043 (1.51)	-4.22 (4.62)	4.95 (4.95)
City residency	0.13 (0.82)	0.48 (1.45)	6.45 (4.32)	5.26 (4.12)
Junior	0.090 (0.73)			
Senior	1.89 (1.31)			