Depression and stress among architecture students - scale, causes, and solutions to improve the learning environment and students' mental wellbeing

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ABSTRACT: The psychological comfort felt by students during their architectural studies is part of the quality of teaching offered by the university. An insufficiently comfortable learning environment can lead to excessive stress, exhaustion, depression, resulting in poorer academic performance. The aim of this research was to assess the scale of depression among students in an architecture faculty in Poland, identify factors specific to architectural studies that have a negative impact on students' psychological wellbeing, and offer suggestions from the students themselves that could reduce the negative impact of these factors. Findings indicate a high incidence of depression, and point to the most important external factors, such as: overwork, lack of sleep, financial pressure, inadequate curriculum, competition, problematic timetable, criticism. Suggested solutions include: changes to the curriculum and teaching methods, re-arranging timetables, reducing financial pressure, raising awareness, facilitating access to psychological care. To improve students' mental wellbeing equal emphasis should be placed on providing appropriate study conditions by the university and directly helping those affected by depressive disorders.

INTRODUCTION

It is the duty of every higher education institution to ensure the highest possible quality of teaching. An important factor in this quality is the concern of university authorities and teachers for the psychological comfort of students during their studies. Failure to provide sufficiently comfortable learning conditions results, among other things, in increased stress levels and fatigue among students, which may contribute to the development of depressive disorders [1][2]. Depression manifests itself in many ways. Symptoms of depression have a negative impact on motivation, work organisation, emotions, cognitive abilities and even motor skills resulting not only in poorer academic performance, but also in an overall decrease in students' quality of life [3-5].

Students comprise a group that is particularly prone to depression [6][7]. Being a student involves more than just the stress of passing classes. Aspiring professionals face social and financial issues during their studies. Finding oneself in a new reality can be just as stressful as coping with the demands of didactics.

The severity of depression among students varies depending on, among other things, the gender structure, the financial status of the students and the field of study [8].

Depression has a strong negative impact on the academic performance of engineering students because it interferes with the cognitive and executive abilities of those affected by it, limiting the problem-solving, memorising and organising skills that are essential during technical studies [9]. Within engineering/technical studies, architecture occupies a unique place, as it combines aspects of the humanities, technology and creative work. Considering this specificity, depression has a particularly devastating effect on architecture students, who are required not only to possess the aforementioned skills, but also the motor skills that allow future architects to create drawings, paintings and models with which they communicate ideas. Psychomotor retardation, which is one of the symptoms of depression, can impair hand movement which limits the ability to effectively express one's ideas [10]. There is, therefore, a need to identify the extend of depression, the causes and underlying factors specific to architectural studies that have a negative impact on students' psychological wellbeing in order to counteract them, and thus effectively improve the quality of teaching in faculties of architecture.

Observations of architecture students at Kielce University of Technology (KUT), Kielce, Poland, and own teaching experience, reveal that a surprisingly large proportion of the students seem to have depressed moods, suffer from fatigue and attendance problems, which may lead to depressive disorders, and could be indicative of an inadequate learning environment at the university.

Hence, this study has been focused on identifying the extent of depression among architecture students at the KUT and examining the underlying factors to better understand and help those students who, due to psychological discomfort and

related disorders, are unable to fully develop their skills. It has been assumed that the solutions to the problem of depression proposed by the students themselves would be most valuable and effective when actioned, hence these solutions are a key part of this study.

METHODS

The methodology used in this study consists of quantitative research and in-depth qualitative research in the form of an on-line survey. The quantitative research and in-depth qualitative research were conducted on a sample of 87 architecture students at the KUT. The on-line survey consisted of closed-ended questions, open-ended questions and one multiple-choice question.

Closed-ended questions were used to determine the gender and year structure of the respondents' studies and to self-identify the impact of architectural on their mental health. The Polish version of the Beck Depression Inventory (BDI) was also part of the closed-ended questions regarding the respondents' mental health condition. The Polish version of the BDI is a diagnostic tool characterised by a sensitivity of 92% for detecting depressive symptoms and for determining their severity [11-13].

The tool consists of 21 closed questions about particular symptoms. Each answer identifies the severity of a particular symptom. Four responses are assigned to each question.

A response indicating the absence of a symptom receives zero points and a response indicating the highest severity of a symptom receives three points. The sum of all the points collected from the BDI questions indicates the severity of depression. The entire inventory can be scored from 0 to 63 points. A number of scale ratings and ranges are used in diagnostic practice. In this study, the following scale was adopted:

- 0-11 p. - healthy person,
- 12-19 p. - disturbing mood disorders,
- 20-25 p. - moderate depression,
- 26-63 p. - severe depression.

Both moderate and severe depression could be considered clinically significant conditions [14].

A multiple-choice response question was used to identify environmental factors having a negative impact on the mental health of architecture students. Based on the responses from the open-ended questions and the student's own experience, the factors related to architectural studies were selected and determined to be the reason for the presence or severity of the impact of other factors.

In the open-ended questions, students were given the opportunity to describe more broadly the impact of factors on their mental wellbeing and the links between them. Furthermore, in the open-ended questions, students were able to suggest solutions that they felt could reduce the scale of depression among architecture students.

In order to structure the study, it was divided into four sections:

1) characterisation of respondents' demographics and determination of the scale of depression;
2) identification of factors negatively affecting students' mental health and relevant to architectural studies;
3) exploration of students' reflections on negative environmental factors and the links between them;
4) presentation of solutions proposed by students.

RESULTS

Demography of Respondents and Scale and Structure of the Depression Problem

As shown in Table 1, the study sample consisted of 87 respondents of whom 85.06% were women. The percentage of women having symptoms of clinically significant depression is 32.43% which is about 1.4 times higher than the same level of depression among men, which is 23.08%. The lowest severity of depressive symptoms can be observed among first-year architectural students. Only 20% of them have symptoms of clinically significant depression, and only one of the students in this subgroup has symptoms of major depression.

The proportion of those with symptoms of clinically significant depression increases among second-year students to 30.77%. In the following year, the proportion decreases slightly (25.00%) to return in the fourth year to a level similar to the second-year students (30.00%).

Symptoms of clinically significant depression are most frequently observed in fifth-year students where more than half of the students (52.94%) may suffer from severe (35.29%) and moderate (17.65%) depression. It is also worth noting that among the 17 fifth-year students that participated in the study, only one person had a low intensity of depressive symptoms indicative of no mood disorder.

First-year students formed the largest subgroup of the survey participants (28.74%) and had the greatest impact on the overall survey results. Second- (14.94%) and third-year students (13.79%) had the lowest impact on the survey. The proportion of students with symptoms of clinically significant depression among all respondents was 31.03% (Table 1).

Table 1: Characteristics of the sample and BDI results for different subgroups.

Number of respondents	No mood disorders	Mild depression	Moderate depression	Severe depression	Percentage of students with clinically significant depressive symptoms	
87	28	32	13	14	31.03%	
Gender	No mood disorders	Mild depression	Moderate depression	Severe depression	Total	Percentage of students with clinically significant depressive symptoms	Percentage share of the survey
Male	5	5	1	2	13	23.08%	14.94%
Female	23	27	12	12	74	32.43%	85.06%
Year of study	No mood disorders	Mild depression	Moderate depression	Severe depression	Total	Percentage of students with clinically significant depressive symptoms	Percentage share of the survey
I	8	12	4	1	25	20.00%	28.74%
II	4	5	1	3	13	30.77%	14.94%
III	4	5	2	1	12	25.00%	13.79%
IV	11	3	3	3	20	30.00%	22.99%
V	1	7	3	6	17	52.94%	19.54%

Environmental Factors Affecting Students' Mental Health

In a multiple-choice question, students identified the environmental factors they felt had a negative impact on their mental health. Respondents also had the opportunity to indicate factors not mentioned in the survey by adding an answer. The environmental factors identified by the students and the number of people who mentioned each factor are shown in Figure 1.

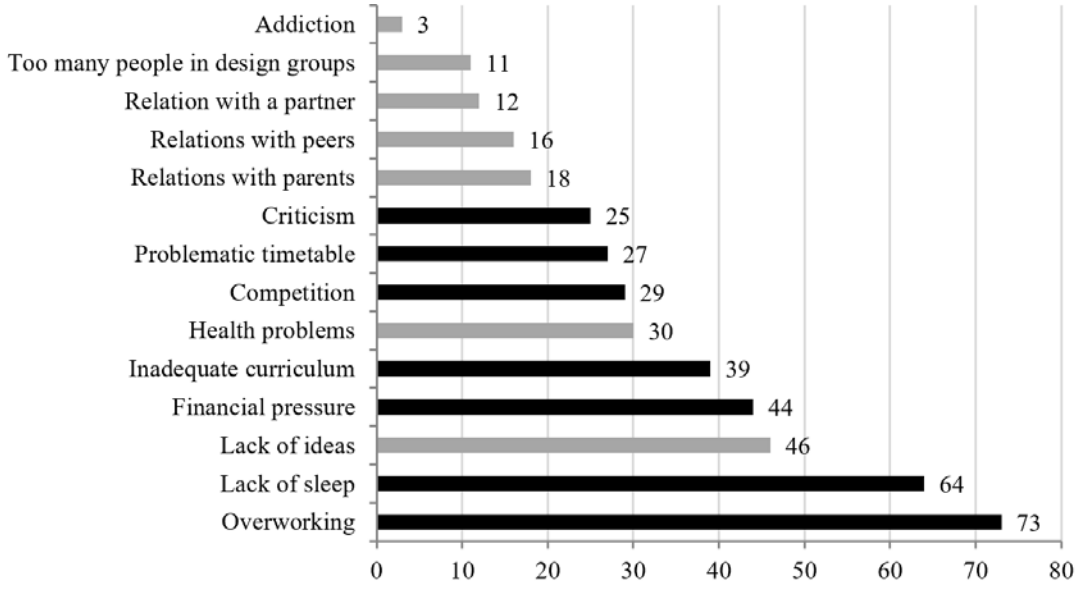

Figure 1: Environmental factors negatively affecting the mental health of architecture students of the KUT.

As demonstrated in Figure 1, those factors that are related to architectural studies and impact on the extent of other factors have been marked in black. The selection was made on the basis of the authors' own experiences as teachers and former students, as well as on the basis of interviews with students in the form of answers to open-ended questions. The factor most often bothering students is overwork. It was identified as an environmental factor negatively affecting mental health by 73 students, which is 83.91% of all the respondents. The remaining factors are: lack of sleep (64); financial pressure (44); inadequate coursework (39); rivalry (29); problematic schedule (27); and criticism (25).

Students' Reflections on Negative External Factors and the Links Between them

This question was part of the survey …*Write which factors have most significant influence on your wellbeing and why*. Students were given the opportunity to provide an open-ended response to this question and had an option not to respond. Seventy-six students responded to the question.

The most common topic raised by students is the issue of overwork. According to them, overwork results from having too many responsibilities and not being able to carry out those responsibilities during class time. Students who feel overwhelmed by their responsibilities complain of a constant feeling of stress and fear of failure. Moreover, they lack leisure time in which they could relax, cultivate interests and maintain their relationships. The lack of leisure time is also linked to the inability to work, which translates into the financial pressure some students feel.

Overwork relates to the second most frequently discussed factor by students, namely lack of sleep. Respondents describe their problem with a lack of sleep and overwork as a kind of *vicious circle*. They are often forced to work through the night due to their busy schedules. The next day, they experience fatigue due to a lack of or insufficient sleep. Fatigue impairs their cognitive abilities, which results in a build-up of backlog. The second reason for sleep deprivation among architecture students are poorly structured schedules. Students noted that important design classes should not be held as the first class of the day. In addition, two or more important design classes should not be scheduled on the same day. The last problem with the timetable mentioned by respondents were too long breaks between classes. Students believe that the mentioned problems with the timetable are making it difficult to manage time effectively.

The next factor to which students gave considerable attention is financial pressure. The reason for this factor is primarily due to the specific nature of architectural studies. The need for a high-end computer to ensure hassle-free work on projects and to print out documentation for each design class were cited as the most important reasons for financial pressure in architectural studies. Those experiencing financial pressure complain of malnutrition and exclusion from social life due to a lack of sufficient financial resources to participate in certain activities with their peers. Furthermore, those with limited financial resources feel that they are less productive due to a lack of sufficient equipment. Students suffering from financial pressure associate it with reduced self-esteem and pessimism, which affect their productivity, relationships and mental health.

Another negative environmental factor discussed by students was the inadequate curriculum. According to the students, there are too many subjects in the curricula that are not closely related to the architectural profession, and too much emphasis is placed on them. Moreover, students believe that the curricula should include more practical classes conducted in co-operation with architectural offices/studios, which would allow students to form relations within the architectural community and develop skills that will be useful in the labour market.

Students also feel uncomfortable about the competitive atmosphere that prevails in architectural studies. This atmosphere has a negative impact on students' wellbeing and relationships. Respondents complained about the stress of constant competition, problems finding friends, lack of co-operation and even undermining each other's work. Students who cannot boast about their good academic results feel socially isolated.

The last factor discussed in detail was criticism. In their open-ended responses, students emphasised that they understand the importance of constructive criticism in architectural studies. However, this does not change the fact that even constructive criticism is painful for them, and they are unable to deal with it. In their opinion, negative comments should be as gentle as possible, delivered without unnecessary malice and interspersed with positive commentary. Respondents also indicated that it is difficult to accept negative comments about a project they had put a lot of work into, and that criticism in the project group is perceived as demeaning and can contribute to the isolation of the person being criticised.

Solutions to Inadequate Learning Conditions proposed by Students

The final question of the survey was …*What can educators and university authorities do to reduce the scale of depression and stress among architecture students?* Students were given the opportunity to provide an open-ended response to this question and had an option not to respond. Seventy-five students responded to the question. From the suggestions made by these students, the solutions discussed by a minimum of three respondents were selected and then divided into four categories: changes to the curricula and timetables; solutions to the problem of financial pressure; raising awareness about mental health; solutions to improve relationships between students.

According to the students, the material in the curricula is too extensive for a five-year degree programme and some subjects are given too much emphasis or are unnecessary. The first solution to these problems given by students is to extend the first- and second-degree programmes by one semester, which would result in more time to study the material and work on architectural conceptual designs. The second solution is to reduce the number of hours or remove some theoretical subjects or practical subjects not directly related to the architectural profession. According to the students, such solutions would help them focus on the development of skills that will affect their competitiveness in the labour market. The third curricular solution is to give students the opportunity to do projects during the classes. This approach would reduce the work that students have to do at home. Moreover, according to the students, the university should establish close

co-operation with architectural offices/studios in the creation of the curricula so that the design classes would give an insight into the reality of working in an office. The curricula are also closely linked to the timetable. Students believe that timetables should be arranged in a way to avoid placing several important design classes on the same day. Without reducing the amount of material or extending the course of study this is difficult to do. In addition, schedules should avoid breaks between classes, which for a large proportion of students is the time in which they could work on projects.

The second category of solutions are suggestions to address the problem of financial pressure. Students feel that printing projects for all reviews and consultations is a significant burden for them. Their proposed solution is to be able to display the projects on an overhead projector or print them on smaller paper formats. Another suggestion is the creation of a *design zone*, which would allow students with inferior computers to perform more demanding tasks on campus. This zone should be accessible to all students during university hours, designed as part of a horizontal communication space, equipped with appropriately theft-secured computers and group work areas. This solution would not only make it easier for the economically disadvantaged students to work, but would also allow for a better use of time during breaks between classes and strengthen bonds between students.

The third category of solutions are solutions for raising awareness about mental health. Students suggested introducing lectures, training sessions and organising events to raise awareness among staff and students about depression and contact with people affected by the condition. A second suggestion is the introduction of free psychological consultations on the university campus.

The final category of solutions relates to improving relationships between students. According to the students, educators should promote co-operation more often and fuel rivalry less often. To achieve this, students suggest changing the way classes are conducted, especially avoiding statements that divide students into categories of *better* and *worse*. In addition, students believe that the university should provide more opportunities for student integration. Such occasions could be group projects, group trips and integration events.

DISCUSSION

Demography of Respondents and Scale and Structure of the Depression Problem

The first aim of the study was to determine the extent of depression among architecture students at the KUT. Determining the scale of the problem is an important step in the process of taking care of students' mental health. Knowing the scale of the problem allows identified issues to be prioritised, while creating a better environment for architecture students.

The study found that 31.03% of the students may be suffering from clinically significant depression. Although there is a paucity of studies using the BDI determining the scale of depression among architecture students, there are studies that have used this method to determine the extent of depression among technical (24.37%) and medical (27.27%) students in Poland [15]. The same study determined the percentage of technical students suffering from symptoms of clinically significant depression in Germany (15.73%) and Portugal (14.09%) [15]. A similar study was also conducted in Lublin, Poland where, out of 591 students from various faculties, 31.87% had symptoms of moderate to severe depression [16].

When comparing the results of the present study to those studies conducted in Poland [15][16], it can be seen that the relevant percentages are similar or slightly higher. Furthermore, the results of studies conducted in other European countries are significantly lower. However, this comparison is not completely binding due to the difference between architectural studies, other technical studies and medical studies. Comparison of the results of the current study with the results of other studies conducted on architecture students is difficult due to the lack of similar studies conducted in Poland or Europe. For this reason and because of the small study group, further research addressing this issue should be conducted. Knowing, however, that almost one in three architecture students experiences clinically significant depressive symptoms, it can be assumed that measures taken to improve psychological wellbeing during architectural studies should not be limited to improving the learning environment, but also to actively helping those who may be suffering from depressive symptoms.

Environmental Factors Affecting Students' Mental Health and the Links between them

The results of the study have made it possible to identify external factors specific to architectural studies and the links between them. This objective is important because knowledge of such factors allows the researchers to understand the impact of architectural studies on students' mental health and to select solutions that can counteract their occurrence.

The external factors identified are as follows: overwork; lack of sleep; financial pressure; inadequate curriculum; rivalry; problematic timetable; criticism. The greatest influence on the other factors has an inadequate curriculum and poorly arranged timetables, which cause overwork, lack of sleep, contribute to an intensified atmosphere of rivalry and compound the sense of wasted time and unpreparedness for the profession. The second most important factor is overwork itself, which directly affects the quality of students' work and private lives. Financial pressure, rivalry and criticism are characteristic factors of architectural studies, which are closely related to the creative work of future

architects. These factors primarily have a negative impact on students' perceived stress levels, social exclusion and self-esteem. The results of the present study coincide with the findings of a review study addressing the issue of factors affecting students' mental health and their associations [17]. The negative impact of the factors identified in this study has also been confirmed in a number of quantitative studies [18-20].

The results obtained are not representative for the group of all architecture students in Poland due to the scope of the study, which was conducted with a group of architecture students at the KUT. For this reason, there is a need to conduct similar research among architecture students at other Polish universities.

Solutions to Inadequate Learning Conditions proposed by Students

The last aim of the research is to present the solutions proposed by students to reduce the impact of negative external factors on their mental health. The proposals highlight specific problems that connected with external factors, thus having a strong impact on the way classes are taught, the scope of knowledge included in the curriculum, the relationship between students, as well as between students and teachers, and the functioning of the university. However, it must be taken into account that the authors of the proposed solutions are exclusively students of architecture at the KUT. The proposals should be confronted with educators, university authorities and psychologists in order to assess the possible effects of their implementation. Moreover, the proposals do not relate to the situation of architecture students at other universities, and therefore there is a need for broader research.

CONCLUSIONS

The scale of depression-related problems among architecture students may be slightly greater than the scale of these problems among medical and other technical students in Poland. However, these problems may be significantly greater than the ones experienced by their counterparts in other European countries. Students in their fifth year of architectural studies are most likely to suffer from symptoms indicative of clinically significant depression, and students in their first year are least likely to suffer from depression. Given the increase in depressive symptoms over the time of architectural studies, it can be concluded that these studies have a significant impact on students' mental health. Furthermore, based on the results, it can be deduced that the steps taken to improve students' mental wellbeing should place equal emphasis on providing appropriate study conditions and helping those affected by depressive disorders.

The most important external factors negatively affecting students' mental health are: overwork; lack of sleep; financial pressure; inadequate curriculum; competition; problematic timetable; criticism. Students suggested solutions that could reduce the impact of these factors. Suggested solutions included changing the way classes are taught, arranging efficient timetables, reducing the financial pressure on architecture students, changing the scope and type of knowledge included in the curriculum, raising awareness of depression among teachers and students, and facilitating access to psychological care. The range of proposals put forward by the students demonstrates the need to take steps to improve teaching conditions, as well as the wide extent of possibilities for solving the problems affecting students.

With the above in mind, the introductory research presented in this article can be highly important in future architectural studies, and more broadly in engineering education. In this context, it is crucial that in the teaching process of future architectural engineers issues and needs specific to technical studies are properly addressed, including:

- expenses related to the creation and presentation of technical drawings and visualisations of architectural concepts (need for alternative solutions);
- access to professional equipment and specialised software (need for organisation, experts and practitioners to provide appropriate tools);
- overwork associated with significant effort and time-consuming preparation of projects, competitive atmosphere and criticism of work (need to adapt and select appropriate study programmes, create friendly conditions for effective work and learning, specialist psychological support).

According to the results of this study, the modernisation and adaptation of the curriculum to the demands placed on professionals in today's labour market is becoming an important aspect of engineering education, along with the teaching methods. Engineering professions require continuous development of knowledge and skills related to new technologies used by the industry. Technological development is particularly evident in the architectural sector, where building information modelling (BIM) technology, programming (e.g. parametric modelling software), graphics software, artificial intelligence and technologies enabling the creation of physical models of architectural concepts are growing in importance. Adapting the curriculum and teaching methods to the challenges posed to graduates by the development of new technologies can enhance students' sense of validity of the technical studies they have undertaken, and thus improve the psychological comfort of teaching. Moreover, a graduate familiar with the technologies used in the industry will have a better chance of finding his or her place in the labour market.

It becomes essential over the education period to address these problems, which represent only a small part of the set of factors negatively affecting students' psychological comfort and ability to learn. This article presents a number of alternatives to the current way in which technical universities operate and design classes are taught. It is worth

articulating once again that a key part of the architectural design process - at all stages - is to introduce and provide students with access to a variety of tools, digital creation techniques and state-of-the-art technologies to support the architectural design and 3D modelling process. These elements play a significant role in both design and architectural education, and the results of this study clearly show that students need such developments. This is confirmed by previous research indicating, among other things, robotics streamlining the time-consuming design and teaching process and driving the development of the discipline of architecture [21].

Nevertheless, the scope of the study limited only to architecture students at Kielce University of Technology does not allow conclusions to be drawn relating to all architecture students in Poland. For this reason, the present study is a starting point and highlights the need for conducting research among architecture students at other Polish universities, which would allow determining the extent of depression, external factors and systemic solutions that could reduce its impact on a national scale.

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