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Who is a tired student? Fatigue and its predictors from a gender perspective.

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Who is a tired student? Fatigue and its predictors from a gender perspective.

Abstract

The level of fatigue among medical students is increasing. Exhaustion is an essential symptom of burnout, which may occur even while a student. Our exploratory study sought to identify the characteristics of tired students and to describe factors determining fatigue among medical students. The studied group consisted of second-year medical students (N=193) from a Polish medical university. Statistically significant differences in fatigue appeared between male and female students. We obtained positive correlations between intensity of fatigue and sleepiness, pain intensity, stress, anxiety, depression and negative health conditions, life satisfaction, emotional stability, conscientiousness, and self-efficacy. Predictors relevant for female fatigue were sleepiness, health condition, depression, and conscientiousness (the whole model explains 46% of variance in fatigue). Predictors relevant for male fatigue were sleepiness, health condition, anxiety, and agreeableness (the whole model explains 55% of variance in fatigue). We did not observe differences in fatigue between sleepless, overloaded, or stressed people. Explaining the differences between male and female predictors and levels of fatigue in terms of personality traits through the prism of defined stereotypical social roles is worth considering.

Practitioner Notes

1. When designing programmes to support the well-being of students and counteract fatigue, it is definitely worth going beyond the interventions to restore good sleep and habits that serve this purpose.
2. Equally important is effective stress management.
3. In our research women were more tired, and different factors allowed prediction of fatigue in women sleepiness, health condition, depression, and conscientiousness.
4. In men, sleepiness, health condition, anxiety and agreeableness.
5. It is important to consider gender when designing research about fatigue or burnout and before planning practical interventions for reducing exhaustion.

Keywords

Fatigue, exhaustion, burnout, gender, students

Introduction

Fatigue is a very common and openly communicated complaint among medical students. Fatigue may be a natural condition during highly demanding and stressful studies, but the pathological intensity and negative influence of prolonged study-related fatigue may be problematic. A more severe expression of study-related fatigue might be a symptom of burnout. Burnout was originally reserved only for people performing work in the human services domain, but currently it can be applied to employees in various professions, as well as students (Schaufeli et al., 2002). Fatigue is widely acknowledged as an essential symptom of burnout. Freudenberger (1974) first described the process of gradual emotional depletion. According to Maslach and Leiter, exhaustion is the core symptom of burnout and its most obvious manifestation (Leiter et al., 2015). Using PubMed, one finds a growing number of scientific reports connected with the topic of fatigue among students, which might reflect the perception of a growing problem. Between 1946 and 1989, 144 articles were published on this topic; between 1990 and 2018 there were 1624 articles about tired students, while from 2019 and early 2020 there have already been 286 publications.

There are also data suggesting that the level of exhaustion among students is comparable or even higher than in occupations commonly considered tiresome (Law, 2007). It seems that the problem of burnout increasingly affects not only students but also is observable among younger and younger age groups, e.g., among high school students (Aypay, 2017).

Opposite to burnout, work engagement assumes the existence of vigour, a high level of energy connected with mental resilience and willingness to invest effort in one's work (Schaufeli et al., 2006). Exploring and supporting students' well-being becomes a very important issue for both scientists (Crawford & Johns, 2018) and practitioners who implement the idea of constant professional development to increase student satisfaction ratings, at the end of this process (Kehoe et al., 2018). This effort is worth considering, especially with strong evidence for successfully fostering students' well-being and study skills even with an online intervention (Asikainen et al., 2019). Increasing well-being and reducing or preventing burnout at every level of education is becoming extremely important to prevent students who have already been burnt out from entering work life. Burnout observed in a doctor who is just starting their career in a profession that requires empathic contact with the patient seems to be a special problem. The results of the study conducted by Bollani et.al. (2018) indicate that energy and fatigue are separate constructs that are predicted by different variables (in the case of fatigue, with more precision). Since it is possible that small lifestyle changes may be necessary to improve feelings of fatigue compared to comprehensive interventions that may be necessary to improve well-being and the level of energy, we have decided to concentrate on the first topic (Bollani et al., 2018).

Literature review

Although simpler, yet we find mixed evidence about the most effective interventions reducing psychological distress and fatigue (Daya & Hearn, 2018), which encourages a more thorough exploration of the topic of what lies behind students fatigue. Most of the studies examining fatigue and stress among students globally have focused on sleep patterns or disturbed sleep (Lund et al., 2010; Kaur & Sing, 2017; Herawati & Gayatri, 2019; Tobi Seun-Fadipe et al., 2017). The other variable with a clear connection with both sleep disturbances and fatigue is a health condition. Assessing the intensity of pain and fatigue is a routine clinical activity on which clinicians build the whole treatment programme. Such estimations are popular in connection with many diseases, especially in the field of oncology where the phenomenon of cancer-related fatigue is a special area of interest (Wagner & Cella, 2004). In our research we focus on the potentially healthy group –

students with severe diseases would probably have difficulty continuing with academic activity, but still we have some studies confirming that even a slight deterioration of health or health-related quality of life connected with complaints of fatigue or pain strongly affect daily life and habits, school participation and fulfilment of academic requirements (Gold et al., 2009).

The deterioration of health associated with fatigue does not only affect the physical area but also the mental one. Strong connections between fatigue and mental disorders, such as depression or anxiety disorders, are well documented in the literature. An approach that emphasises the similarities between depression and fatigue is very popular, yet we still need to explain the possible pathophysiological mechanism linking them (Arnold, 2008). The link between stress, anxiety/anxiety disorders and fatigue is clearer. The history of research about stress underlines that prolonged periods of stress or suffering from tension in connection with fear, might lead to the deterioration of resources and severe exhaustion (Jackson, 2014).

The idea that gender might be related to fatigue came from the analysis of "the hurried woman syndrome". This colloquial term comes from the observation of the functioning of young and middle-aged women in modern society. Stress, workloads and busy, hectic schedules are factors potentially responsible for this syndrome. This phenomenon seems to have not been regularly explored, and so far its presence has been observed mainly in the form of popular guidebooks proposals that are addressed to women who feel excessively tired. However, this prompted us to ask questions about the links between gender and perceived fatigue.

We have some evidence that among students the case of gender might be also important; for example- the study of Yi-Chun Lee et.al. (2007) describes prevalence rates of fatigue higher for female compared to male students and concludes that the risk factor for fatigue not only relates to the current chronic disease or insomnia. This, in turn, point us towards the connection between specific personality traits and fatigue. The coincidence between neuroticism (especially combined with perfectionism) and fatigue is well documented. Both might cause maladaptive coping strategies, even further aggravating the problem of exhaustion (Magnusson et al., 1996). The role of personality traits in the development of chronic fatigue symptom is also a popular line of research. Apart from neuroticism and perfectionism, popular variables are extraversion and the other five factor Model personality dimensions, self-esteem and emotional control (White & Schweitzer, 2000; Nater et al., 2010). We did not find any kind of conclusive research establishing the possible pattern of personality traits explaining fatigue in the context of gender among students.

In our research we seek to answer the question "who is a tired student?", taking into broader context covering all the aforementioned areas. The main goal of this exploratory study was to define the characteristics of a fatigued student and to point out from the whole set of variables the most important factors determining fatigue among medical students.

Methods

Participants

The studied group consisted of second-year medical students (N=193) from a Polish medical university. Participation in the study was completely voluntary and anonymous. The questionnaire sheets were distributed directly to students (not online) after the academic course was completed before the outbreak of the Covid-19 pandemic. The only exclusion criteria were: lack of informed consent and suffering from life-threatening diseases. The protocol of the study was approved by the local university ethics committee.

Table 1
Socio-demographic description of the studied group

	Students (n=193)
Age (in years) M±SD	20.96±1.7
Gender (N; %)	
Female	131 (68%)
Male	62 (32%)
Place of residence	
Family house	49 (26%)
Private flat	30 (16%)
Rented flat (single person)	16 (8%)
Rented flat (more than one)	83 (43%)
Dormitory	13 (7%)
Relationship status	
Single	122 (64%)
Stable relationship	69 (36%)
Combining studies with work	
Only studying	115 (61%)
Additional work during studies	75 (39%)

Procedure

We used six questionnaires adapted to Polish conditions, involving rating scales and one semi-open question:

1. Chalder Fatigue Inventory. This is an 11-item instrument to measure fatigue defined as mental and physical endurance (Cella & Chalder, 2010). The questionnaire was adapted to Polish conditions, and the adaptation was made with the participation of a group of students (Zdun-Ryżewska et al., 2020).
2. TIPI. This a 10-item measure of the Big-Five dimensions to describe personality traits such as: extraversion (outgoing or reserved), agreeableness (friendly or challenging), conscientiousness (organized or easy-going), openness to experience (curious or cautious) and emotional stability (confident or sensitive) (Gosling et al., 2003). The Polish adaptation was made by Sorokowska et. al. (2014). TIPI has previously been used in research with Polish students as participants (Łaguna et al., 2014).
3. The General Self-Efficacy Scale (GSE) consists of 10 items measuring the strength of an individual's general belief in the effectiveness of dealing with difficult situations (Weinman et.al., 1995).
4. The Satisfaction with Life Scale (SWLS) was developed by Diener et al., in 1985 and reviewed in 1993 (Pavot & Diener, 1993). The scale assesses satisfaction with the

respondent's life as a whole; it does not assess specific domains such as health or finances but requires the respondent to make a general evaluation.

5. The Perceived Stress Scale (PSS-10) is a widely used psychological scale for measuring the perception of ongoing stress (last month), giving the degree to which situations in life are appraised as stressful (Pavot & Diener, 1993).
6. GSE, SWLS, and PSS-10 were adapted to Polish conditions by the same team of psychologists (Juczyński, 2001).
7. The Hospital Anxiety and Depression Scale (HADS) is a reliable instrument for detecting states of depression and anxiety, designed by Zigmond and Snaith for use in hospital settings (Zigmond & Snaith, 1983) but it has also been widely used as a screening tool among other groups of people, including students (Andrews et al., 2006). The scale was adapted to Polish conditions (Gałuszko de Walden & Majkowicz, 2008).
8. We also used numerical rating scales ranging from 0 to 10 to assess variables such as sleepiness (with the question: How sleepy have you been lately? 0 = not sleepy at all, 10 = very sleepy), health condition (How do you assess your current state of health? 0 = very bad, 10 = perfect), pain intensity (How much pain do you currently experience? 0 = no pain at all, 10 = the worst pain I have ever experienced), and satisfaction with results achieved during studies (How satisfied are you with the academic results achieved in the last semester? 0 = very unsatisfied, 10 = very pleased with the obtained results). There was also one semi-open question about the most important cause of fatigue.

Parametric tests were used. Student's t-test was used to compare two groups, and one-way ANOVA was used to compare groups of more than two. The Pearson correlation coefficient was used to estimate the relationship between quantitative variables. To establish the predictors of fatigue we performed multiple regression analyses.

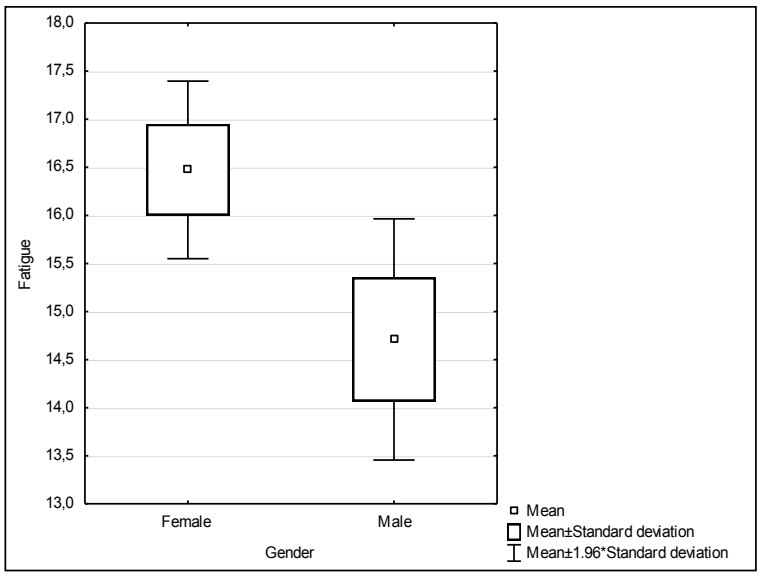
Results

There were no statistically significant differences comparing the intensity of reported fatigue in students living in different places: family house, rented flat, or dormitory (ANOVA $F(4,186)= 0.19$, $p=0.94$). Surprisingly, there was no difference between people only studying ($M=16.23$, $SD=5.67$) and those who combined their studies with additional work in different ways ($M=15.43$, $SD=4.62$), $t(188)=1.03$, $p=0.3$). Also relationship status (single $M=15.90$, $SD=5.44$, or in a stable relationship $M=15.97$, $SD=5.19$) was not relevant for fatigue ($t(190)=-0.09$, $p=0.93$).

A statistically significant difference in fatigue was found between male and female students ($t(191)=2.17$, $p=0.03$). Although the difference is statistically significant, it is small (Cohen's $d = (14.71-16.47) / 5.22 = 0.34$, Cohen's $d = 0,3$). Female students reported higher levels of fatigue ($M=16.47$ $SD=5.39$) than male students ($M=14.71$, $SD=5.04$); the results are presented in Figure 1.

Figure 1

Fatigue (Chalder Fatigue Scale-PL) comparing male and female students



Students responded to the semi-open question about one of the most important causes of their fatigue mentioned mostly similar reasons, which are presented in Table 2.

Table 2

The most important cause of student's fatigue

Cause of fatigue	Deprivation of sleep	Lack of time for resting	Too many obligations	Stress	Bad time organization	Other reasons
Percentage of indications	N=54 28%	N=20 10.4%	N=32 16.6%	N=26 13.5%	N=29 15%	N=32 17%

Analyzing the intensity of fatigue in people based on cause, we found no statistically significant differences (F(5.126)=1.26, p=0.28) for any of the reasons cited: deprivation of sleep (M=14.13, SD=4.82), lack of time (M=17.6, 4.97), many obligations (M=18.19, SD=4.92), stress (M=16.6, MD=4.89), lack of time organization ability (M=15.86, 5.71), and other reasons (M=15.22, SD=5.88).

Table 3

Correlations between general fatigue and sleepiness, health condition, and pain intensity

	Sleepiness	Health condition	Pain intensity
Fatigue	0.55*	-0.34*	0.26*

*p<0.05

Using the Pearson correlation coefficient, we obtained two positive correlations between intensity of fatigue measured by CHFQ-PL and sleepiness (moderate correlation), pain intensity (weak correlation) and one weak and negative with health condition (the better the health status, the less tired students were). More than half of the group (N=105, 57%) complained of various types of chronic pain. Only 79 students reported that they felt no pain. The most common complaints were backaches (N=42, 40%), headaches (N=34, 32%), stomachaches (N=18, 17%), and knee pain (N=11, 10.5%). The more pain students reported, the more fatigued they were.

In the area of psychological variables potentially connected with increased fatigue (Pearson coefficient), the most important were low general satisfaction with life (weak correlation), emotional stability and low conscientiousness (weak and very weak), high level of situational stress (moderate), anxiety and depression (both moderate correlations), and low self-efficacy (very weak correlation).

Table 4

Correlations between general fatigue and psychological variables

	Fatigue (CHFQ-PL)
Life satisfaction (SWLS)	-0.25*
Extraversion (TIPI-PL)	-0.02
Emotional stability (TIPI-PL)	-0.31*
Agreeableness (TIPI-PL)	-0.01
Conscientiousness (TIPI-PL)	-0.17*
Openness (TIPI-PL)	-0.04
Stress (PSS-10)	0.41*
Anxiety (HADS)	0.48*
Depression (HADS)	0.55*
Self-efficacy (GSE)	-0.16*

*$p<0.05$

To establish which variables determine fatigue, multiple regression analysis was performed for male and female students separately. The regression model for women's fatigue is presented in Table 5. Sleepiness ($\beta=0.34$, $p<0.001$), health condition ($\beta=-0.21$, $p<0.01$), depression ($\beta=0.28$, $p<0.05$), and conscientiousness ($\beta=-0.12$, $p<0.05$) proved to be significant predictors of female student fatigue.

The whole model allows us to explain 46% of the variance of fatigue (adjusted R^2= 0.465), and is statistically significant (F(14,110)=8.708, p<0.001).

Table 5

Regression model of fatigue with predictors for female students

Coefficient	Estimate β	P
Sleepiness	0.34	***
Health condition	-0.21	**
Pain intensity	0.03	
Stress	0.17	
Emotional stability	-0.07	
Extraversion	0.14	
Agreeableness	-0.003	
Conscientiousness	-0.12	*
Openness	0.1	
Life satisfaction	0.18	
Anxiety	0.04	
Depression	0.28	*
Exasperation	0.006	
Self-efficacy	0.14	

*p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001

Predictors that turned out to be relevant for men's fatigue were: sleepiness (β=0.55, p<0.001), health condition (β=0.42, p<0.05), anxiety (β=0.4, p<0.05), and agreeableness (β=0.26, p<0.05).The whole model allows us to explain 55% of the variance of fatigue among male students (adjusted R^2= 0.553) and is statistically significant (F(14,43)=6.045, p<0.001).

Table 6

Regression model of fatigue with predictors for male students

Coefficient	Estimate β	P
Sleepiness	0.55	***
Health condition	0.42	*
Pain intensity	0.09	
Stress	0.16	
Emotional stability	0.08	
Extraversion	0.09	
Agreeableness	0.26	*
Conscientiousness	-0.11	
Openness	0.18	
Life satisfaction	-0.13	
Anxiety	0.4	*
Depression	0.06	
Exasperation	0.14	
Self-efficacy	0.08	

*p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001

Discussion

The results of our study offer a new perspective on fatigue among medical students. Some of our results might be perceived as new contributions to increasing our knowledge about fatigue, especially taking the perspective of gender into consideration. According to our research, there is a correlation between health status (the worse the health status, the greater the fatigue), pain intensity (the more the pain, the greater the fatigue) and sleepiness. The connection between fatigue and health is very well documented even in research conducted in general populations (Loge et al., 1998). Subjects reporting health problems are more fatigued than subjects in good health (Finsterer & Mahjoub, 2014; Akerstedt et al., 2014). Fatigue and (especially chronic) pain often occur together and might be the symptom picture of various processes. There are attempts to identify the basic and single mechanism that underlies both of these phenomena (Gold et al., 2009). The high percentage (57%) of our respondents suffering from pain in the basically healthy group was surprising. Students

suffered from backaches, headaches, stomach aches, and knee pain, which might have a psychosomatic origin and association with stress and/or a connection to a sedentary lifestyle. It seems necessary to undertake further research in this area, especially in times of Covid-19.

Although the connection between health status, pain and fatigue is quite consistent, the results concerning the relationship between fatigue and sleepiness vary. Some authors point to significant connections between them (Åkerstedt et al., 2014; Darwent et al., 2015; Shahid et al., 2010) while others emphasise the differences by describing the different mechanisms underlying fatigue and problems with sleepiness (Hossain et al., 2005). Our results seem to reconcile these contradictory results. On the one hand, we noticed that, as sleepiness increased, there was also an increase in the level of fatigue, which was observed for both male and female students. On the other hand, when we took into consideration the causes of fatigue most often indicated by students, there was no difference in the level of fatigue in people indicating deprivation of sleep (28% of indications) as the main reason for fatigue or other reasons such as stress or excessive obligations. Although there is a connection between sleepiness and fatigue, and we can predict fatigue when we consider sleepiness, the shortage of sleep hours alone does not bring us any closer to a complete understanding of the phenomenon of fatigue.

The results of our research are completely consistent with the results obtained by many other authors who have combined the phenomenon of fatigue with the three variables that, in our opinion, constitute the Pro-Fatigue Triad (three variables strongly and positively associated with fatigue), which are depression, anxiety, and neuroticism (Deary & Chalder, 2010; Nater et al., 2010; Jiang et al., 2003; Hyland, 2011). Stressors experienced in everyday life (especially in terms of psychological distress) and difficulties coping with stress can lead to fatigue; this was confirmed again by our results, which indicated a positive correlation between stress and fatigue. This is in line with Tanaka et al. (2009), who used the Japanese version of the Chalder Fatigue Scale and studied medical students, finding a positive association between stress and fatigue. The authors also pointed out the relationship between avoidance-oriented stress coping activity and fatigue. These findings were completely independent of age and gender. This might be combined with the negative correlation we obtained between fatigue and self-efficacy. Self-efficacy with resilience is a predictor of a task-oriented style of coping with stress among university students (Konaszewski et al., 2019), and low self-efficacy might be a possible explanation for avoidant behaviours (Bandura, 1997).

In summing up the obtained results, it should be pointed out that the same health (sleepiness, health condition as predictors) and other factors of psychological functioning turned out to be significant for women and men in the studied group of students. At the same time, we found a statistically significant difference in subjective fatigue; there was more fatigue in women than men. In many scientific reports (also on general populations and in large representative samples), gender is associated with fatigue, and women are more likely to suffer from it (Loge et al., 1998; Hinz at al., 2018; Åkerstedt at el., 2002). Moreover, in our research, we could predict fatigue in male and female students using different variables. In the female student group, conscientiousness and depression determined fatigue, and in the male student group, agreeableness and anxiety did. To explain these differences, we can refer to research in the area of cognitive social psychology, which reveals the presence of two dimensions in the assessment of self and others: communion (associated with closeness to others and femininity) and agency (associated with the implementation of own goals and masculinity) (Fiske et al., 1999; Wojciszke, 2010). In the group of men, having more "feminine" characteristics (incompatible with the functioning cultural stereotype of masculinity) might promote fatigue. Among women, however, the factors showed a possible relationship with a maladaptive perfectionism resulting from high social expectations (Higgins, 1987), which makes women conscientious and simultaneously generates a high level of depression resulting from the feeling of not fully meeting those expectations. Although there have been previous attempts to determine a

different mechanism or risk pattern for fatigue related to gender differences (Thorsteinsson & Brown, 2009; Peretti-Watel et al., 2009) our research seems to be the first attempt to explain the differences in perceived fatigue in terms of personality traits explained through the prism of defined stereotypical social roles. Most studies refer to the idea of multiple role responsibilities combined with greater social family responsibilities for women (Jason et al., 1999; Åkerstedt et al., 2004) but this seems an insufficient explanation of the gender differences connected with level of fatigue. This issue certainly requires further exploration, especially because, in our research and in the studies of other authors, fatigue—especially chronic fatigue—strongly reduces quality of life regardless of gender (Torbjörn Åkerstedt et al., 2014).

There are several potential limitations to our study. In the future, we plan to undertake research on a broader sample covering all years of medical study and at various universities across Poland. It seems worth continuing because current and further results can be used to identify students who form a risk group for burnout. Including them in early prevention could be helpful, not only for themselves but also for their patients. The Covid-19 pandemic may also have an impact on the fatigue of students coexisting with high levels of anxiety and stress, especially in the medical realm. On the one hand, there has been a change in the teaching methods (Reilly, 2020), and on the other hand, students of these faculties have often been involved in fighting the pandemic. It seems worth repeating the studies undertaken during a pandemic to make comparisons with results previously gained.

Conclusions

Through our exploratory research, we identified variables related to fatigue, including sleepiness, pain intensity, stress, anxiety, depression, health condition, life satisfaction, emotional stability, conscientiousness, self-efficacy and gender. Although sleep deprivation was one of the most common causes of fatigue, we did not observe differences in fatigue between sleepless, overloaded, or stressed people. When designing programmes to support the well-being of students and counteract fatigue, it is definitely worth going beyond the popular and recommended measures in the literature interventions to restore good sleep and habits that serve this purpose. Equally important in terms of impact are learning time management, proper planning, counteracting procrastination (all these will allow an individual to cope with an overload of duties over time) and effective stress management.

In our research women were more tired, and different factors allowed prediction of fatigue in women sleepiness, health condition, depression, and conscientiousness; and in men sleepiness, health condition, anxiety and agreeableness. We tried to explain the results obtained for the differences in perceived fatigue in terms of personality traits explained through the prism of defined stereotypical social roles. It is important to consider gender when designing research about fatigue or burnout and before planning practical interventions for reducing exhaustion. Our research underlines the importance of taking the social context into consideration, as the same intervention applied to all groups might bring about different results.

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