The Analysis of Stress and Negative Effects Connected with Scientific Work among Polish Researchers

Radosław Wolniak and Adam R. Szromek

Department of Organization and Management, Institute of Economy and Informatics, Silesian University of Technology, Akademicka 2A, 44-100 Gliwice, Poland; innowator@o2.pl
*Correspondence: radek_wol@o2.pl; Tel.: +48-237-77-73

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Abstract: In researchers’ work nowadays there is a big and increasing amount of stress. In this paper, we have conducted an analysis of this problem because we think it is necessary to cope with it to increase the academic workers’ quality of working life. The aim of this paper is to assess the level of stress load of Polish researchers concerning subsequent academic degrees and titles. Based on research, we can say that the level of stress load of Polish researchers concerning subsequent academic degrees and titles is differentiated—the least stressful is professorship, then doctoral thesis, and the most stressful is the habilitation. When analyzing the most frequently observed afflictions that the respondents associate with scientific procedures, it can be stated that these are irritation, nervousness, and aggression, as well as mild stress in the form of headache or stress, which was observed for at least half of the researchers. Almost every three respondents suffered from some kind of psychological problems (depression, depressed mood for a longer period, addictions, the necessity to undergo therapy), and 28.9% suffered from psychosomatic disorders (for example, pain of unknown source of limbs and of internal organs).

Keywords: stress; researchers; scientific work; job satisfaction; quality of life

1. Introduction

Scientific activity is an investment into the future of the whole society and brings a big contribution to it in the aspect of the quality of life, knowledge, innovations, and personal skills of people. The work of the scholars nowadays is also not an easy one. It is very long, the pay is not always satisfactory, and the assessment of the achievements is not easy and transparent. It brings many problems to the work of scholars, which negatively affect the quality of their working life [1–10].

Conducted research was based on the literature gap concerning the knowledge of the discussed issue [11–15]. There were some research studies about stress in an academic job, but authors did not concentrate on the analysis connected with academic degree. It is interesting to know if the academic degree and the level of career influence the problem of stress among researchers. This problem is a research gap. Conducted research was based on the broad context of the literature analysis described in the literature review section.

The aim of this paper is to assess the level of stress load of Polish researchers concerning subsequent academic degrees and titles.

2. Literature Review

Scientific work has a big influence on the functioning of the whole society. It has many both educational and research values that bring a big contribution to current society. But this process is
not easy, and the result of the carried research starts to appear after many years, long after it has started. The literature analysis indicates problems that stress scholars, which are increasing in many countries [16–21]. We think the problem is big and worth investigating in many countries and from many different points of view. In this paper, we concentrate on the problem of stress in the work of the researchers, especially on the example of empirical research conducted in Poland.

The factor that is important for the feeling of stress in the profession and has a big impact on the satisfaction that comes with it are the deadlines imposed by the work or the need to meet the requirements of renewing the employment contract and the next promotion. In Table 1, there are selected definitions of stress. Research conducted in Great Britain in 2012 [22] showed that the main cause of stress in scientific work was time pressure related to the performance of tasks.

| Author                  | Definition                                                                                                                                 |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Latack (1986) [23]      | Defines stress by explaining the components of dealing with stress: • the person perceives a threat, • they then make a cognitive appraisal to try to understand what is causing the stress, but at this stage, they are still uncertain as to how to respond, • degree, or level, of stress that is experienced, • the implementation of how to cope with the stressful event/threat. |
| Lazarus (2000) [24]     | Defines the term stress as being a complex and multidimensional negative emotion. Coping with stress can lead to the reduction of demands (internal and external). States that external demands (stressors) and those experienced by the body (stress) can be placed into two categories: |
| Krohne (2002) [25]      | • systematic stress that is associated with physiological or psychobiological factors; • psychological stress that is associated with cognitive psychology. |
| Thoits (2010) [26]      | Stressors can have a substantial damaging effect on mental and physical health. |
| Walsh (2011) [27]       | Describes a stressor as “any biological process, emotion or thought”. It is the outcomes of demands on the body during experiences of fight or flight. |
| Robbins and Judge (2013) [28] | Stress is an unpleasant psychological process that may happen as a response to environmental pressures. |
| Luke Seaward (2016) [29] | Stress is any change experienced by the individual. |

Source: Own work.

However, research from 2006, conducted on over two thousand English institutions dealing with higher education, indicated the existence of a different dependence. A negative correlation in this research was found between the number of hours worked by scholars and job satisfaction. It did not result from a simple translation into work at all, but it was dependent on what work the scientist was doing. In P.A. Stevensa [30], interesting information can be found that the time spent on research had a positive effect on overall job satisfaction, but that was not the case when performing administrative work. Thus, the excessive burden related to filling the documentation affected the opposite of the sense of satisfaction in comparison with the feeling of satisfaction, which was much greater when it concerned research.

This is also confirmed by other analyses [31]. S. Liu and A.J. Onwuegbuzie show that all employees who were excessively burdened with didactics had an increased level of stress and a reduced level of job satisfaction. This study emphasized that excessive workload can cause excessive stress at work. In turn, international research by F.J. Lancy and B.A. Sheehan [32] showed a difference between academic staff from different countries, which shows that the relationship between job satisfaction and subjects taught was different for different nationalities.

Many examples of reports about stress in scholars’ work come from international studies. A 2008 report which came from the University and College Union (UCU) says that most universities were failing to meet expectations and standards for psychosocial working conditions which were set out by the Health and Safety Executive [11,33]. According to this research, lack of time to engage in research process was most the important factor. In this case, the highest number of respondents pinpointed a very high contribution to their unacceptable levels of stress or level of frustration.
Moreover, very important problems were connected with excessive workloads and lack of access to sufficient resources to undertake their research. Respondents also pinpointed as very important problems connected with obtaining sufficient funding levels. According to others research, we can divide stress factors into the following seven categories [34]:

- Problems with working hours, workload, and pace of work;
- Control methods used to measures levels of autonomy, pacing, and timing of scholars working methods;
- Peer support and the degree of help and respect from other university staff including colleagues;
- Managerial support and their supportive behaviors. Help from line managers and also the organization itself. The examples of this help are encouragement and availability of feedback;
- Relationships between university staff and levels of conflict in the workplace. In this case, the very important problems are bullying behavior and harassment;
- The extent to which researchers believe that their work is important and fits into the aims of the particular organization; and
- Change which reflects how well changes in the university environment are managed and communicated.

The authors of the mentioned report identified important factors to tackle problems with stress in higher education (Table 2).

| Factor | Actions |
|--------|---------|
| General | • increase of appreciation of researchers’ work,  
• help for scholars to cope with increased student numbers,  
• quieter working spaces in the university,  
• use of more methods of mentoring and support,  
• increase of collegial work and good organizational culture,  
• giving more research opportunities for scholar-related academics and university teachers,  
• decrees of bureaucracy,  
• implementation of methods of change management,  
• improved planning methods, |
| Management | • more inclusion of scholars in decision-making processes,  
• more communication between researchers and management staff,  
• more training methods for managers,  
• implementation of effective institutional action in the case of bullying and harassment,  
• more flexible patterns of work,  
• measure of workload control,  
• increase of job security, |
| Employment | • an end of implementation in university fixed-term contracts,  
• proper reward for job and removal of problems connected with the gender pay gap,  
• greater equality in employment,  
• UCU to take more action on stress and workload,  
• more opportunity for career progression, |
| Career | • more worthwhile opportunities for professional development,  
• smaller classes, |
| Teaching | • greater recognition for teaching. |

Source: [33].

Other studies drew similar conclusions [35–40]. The authors in their research highlight primarily the main cause of stress and job insecurity. In addition, they think that very important problems are
connected with stress relating to work relationships, resources, control, and communication. They also highlighted significantly lower levels of stress-connected problems relating to work–life balance, lower levels of physical health, and job overload.

Comparative data about stress work among English University Teachers in the years 1998–2012 were presented by the English Association of University research report [35]. The data in this report are based on surveys of the higher education sector. The research was conducted in 1998, 2004, 2008, and 2012. Analyzing data, we can say that year-by-year, the situation is worsening. The proportion of respondents who strongly agree that their job is stressful is increasing. For example, in 1998, 21.6% of respondents said that their job is very stressful, in 2004 it was 26.3%, in 2008—24.5%, and in 2012—32.6% [39].

The phenomenon is not restricted to one country but is widespread in the modern academic world. For example, interesting research is presented in the newsletter of CUPE Local 3902. The research was done on a representative of 7000 workers at two universities: University of Toronto and Victoria University. Authors in this paper highlight also the increasing stress level among researchers especially in the 30–39 age group of staff [40].

In addition, the phenomenon of academic stress is not restricted to a particular profession. The problem of stress among researchers is described especially well and in detail in medical faculties [41,42]. However, other faculties are not stress-free [43,44].

Another very important problem is connected that was reported by some researchers, for example, in the survey done by Psychosocial Working Conditions in Britain, the lower well-being of university staff. The level of their well-being is lower than the average level for the target group (this target group came from the education sector) [45].

The previous conclusions are contradicted by the studies of E. Bexley, J. Richard, and S. Arkoudis [46], because they show that, despite the fact that many scholars point to too much workload, it has a positive impact on job satisfaction. This research has shown that in many cases, didactic work compensates for problems related to working conditions. There are also numerous studies [47–52] in the literature on the subject pointing to the pressure associated with conducting scientific research and publishing the results. It turns out, therefore, that this aspect of scientific work may also be a reason for reducing the satisfaction of scientific work.

Due to the increasingly rapid development of higher education, the competition of scientific units is becoming more and more intense. The research of X. Guan and others [53], conducted among Chinese academic teachers, shows that with the development of higher education, the workload and feeling of pressure related to raising the teaching level, conducting research, and publishing results is increasing. These studies have also shown that researchers in China are exposed in their job to high levels of occupational stress. Many of them suffer also from some symptoms of depression. Chinese academic teachers were susceptible to deterioration of physical and mental health, which can effect the deterioration of job satisfaction.

The rapid and increasing pressure and competition among researchers lead to long working hours and have a negative impact on family life. Zabrodska points out the negative role of academic pressure on work–life balance and conflicts in the families [54]. The negative impact of workaholism on family life in academia was also found by Torp [55].

Research carried out in 2012 in Great Britain by G. Marek and A.P. Smith [13] revealed that the reasons for university anxiety and depression were demands related to the job position, inability to cope with obligations, and excessive effort. The problem was also connected to the employee reward systems and support as a way to reduce the negative impact of work on well-being. Guarino and Borden [56] observe that the situation depends on gender, and generally women’s situation in the academy is worst. This was also pointed out by Tunguz [57].

In the next years, the situation tends to be worse. G. Kinman and S. Wray in his research in 2013 [35] found that 75% of academics agreed or strongly agreed that their job is stressful. ComRes carried out research for the National Association of Schoolmasters Union of Women Teachers (NASUWT). In this
research, they found that 61% of researchers were often or always stressed. Moreover, 47% of them were considering leaving the research and teaching profession [58]. A survey carried out by YouGov, which was done in 2015 for the National Union of Teachers (NUT), also had a similar conclusion. Authors found that 53% of researchers were considering leaving the profession in the next two year period [39]. Mwangi in her research in 2014 points out that she observed an increasing competition in the university and more challenges with recruiting and also retaining qualified academic staff. She adds also that we can observe increased demands on grants and funding [60]. The problem with research funding of the research especially on PhD level was also observed by Horta [61]. Nowadays we can observe increasing pressure on the effectiveness of the research [62–70].

Stress in the academic environment does not appear to have declined. Nowadays it is an important factor for university organizations and also individuals because the level of stress makes it difficult to develop constructive ways for researchers to cope effectively with problems. Because of this, it is also not easy to protect the feelings of their well-being [71,72].

One study about stress in the academic environment found that researchers who were more active physically and meet the guidelines of 150 minutes of vigorous or moderate-intensity activity every week reported lower levels of stress and a higher level of well-being [73].

Academic stress leads to many health and psychical problems of scholars. For example, it can lead to burnout. Bad emotional experience has been related with the phenomenon of burnout. This is a particularly important problem for staff in human service sectors. The study revealed that when teachers are exposed to high numbers of students, they are more prone to burnout. The problem is especially important in the case of postgraduates [39].

Bleiklie [74] observed a negative effect of bad management on the level of academic stress and researchers’ burnout. This was also pointed out by Connell [75] and Lee [76]. We can especially observe the effect of globalization that brings instability of academic contracts even to developed countries’ academy environments. This is because universities must compete on the global market and try to find possibilities to cut costs [77].

The term “burnout” comes from the aerospace language and dates back to the 1950s. Then it was only used to describe fuel in rockets or fuel consumption in nuclear reactors. Since then, definitions of burnout varied. They were applied to human behavior. Now there are many definitions of burnout in the literature [78,79]:

- Burnout is when a particular person has pushed creative energy beyond the borders.
- Burnout is when a person is subjected to continuous job-related stress, especially in situations where one has the loss of emotional, physical, and mental energy.
- Burnout is the lack of motivation and desire to achieve a sufficient level of balance among professorial responsibilities in the job, especially in areas of teaching, service, scholarship, peer relationships, and student care-giving.
- Burnout is when one experiences problems connected with detachment (especially detachment from staff, students, peers, and clients) and a decrease of satisfaction or sense of well-being.
- Burnout is frustration, fatigue, or apathy resulting from long periods of stress, intense activity, or overwork.
- Burnout is neither a neurosis nor physical ailment. It is an inability to mobilize one’s capabilities and interest or loss of will.

Quantity and severity of stressors researchers experience nowadays over a period of time can easily lead faculty into the “burnout cycle”. Researchers caught up in this cycle will eventually have dysfunctional professional behaviors, which can lead to a decrease of performance in one or sometimes more of the job areas of research, teaching, service, and student-care and sometimes to problems with interpersonal relationships with family and their colleagues.

Other studies [80–83] show that job satisfaction—based on the use of human resources—contributes to the reduction of occupational burnout, general sense of stress, and depressive symptoms.
An interesting observation is that the difference in remuneration in similar positions may be a reason for dissatisfaction with the work performed. This phenomenon may give rise to distrust as to the proper appreciation of scientific and didactic work and reduce the employee’s self-esteem.

Firstly, the burnout victim should recognize that they may be in a state of denial. Using introspection, managers can determine their state. They can recognize if they have a sufficient number of symptoms connected with burnout needed to be addressed by staff members. Once denial can be recognized, the scholar is placed in a state of possibility to escape the following stages of the burnout cycle [38]:

- Recognize symptoms of burnout regarding their performance, body language, communication style, and attitudes.
- Willingness to make changes.
- Talk to someone, for example, counselor, friend, family physician, or doctors specializing in stress.
- Balance their lifestyle and analyze what is important in their life.
- Develop a plan to overcome the stressors. Set targets and goals for change.
- Join in some stress management programs.
- Read books and papers about burnout, stress, and suggested coping mechanisms.
- Negotiate with the department authorities to temporarily change their professional responsibilities.
- Take a sabbatical or personal leave.
- Reverse negative vocabulary and also negative thinking.
- Explore some relaxation exercises.
- Find a hobby.
- Explore about assistance in these problems with the university’s human resources department.

Navarro and Mas on the basis on macro analysis of many studies about burnout in academia found that the burnout syndrome [84] in the case of researchers has prevalence rate of 16.4%; [85] 18.4% [86], and 22.9% [87] of teachers with maximum level burnout. On the basis of collected data, they concluded that provided data seems to indicate that nowadays we are in the face of a frequent problem with academics’ burnout, the consequences of which make it costly and serious. There are some studies that found out that the experience of burnout and stress may affect commitment to the job, job satisfaction, and the whole organization [88–94].

Permanent stress leads not only to burnout but also to many various mental illnesses. A recent survey found that 43% of researchers exhibited symptoms of mental-disorder-connected problems [78]. The problem is nearly twice as common compared with mental disorders widespread in the general population. This is due to are the increased demands to publish, increased workloads of scholars, and problems to obtain external revenue [95].

High levels of problems connected with poor mental health of scholars have a profound impact on their professional competence and also productivity. It is affecting teaching and administrative, and research quality. It also decreases work relationships among staff and communication [39].

Some recent high-profile cases, like the suicide of a professor based in London in 2014 and the suicide of a professor in the US have started discussions about how to support the mental health of researchers. Because of this, concerns about mental health grow. We can see many challenges faced by researchers. Now, several organizations involved in academic research try to find the problem and better understand these challenges. They want to know how scholars could be better supported by academic authorities. RAND Europe recently analyzed the evidence connected with this problem for the Royal Society [96] and also the Wellcome Trust. They found that there is a lack of sufficient data about the problem, but nevertheless we can observe strong grounds for concern. The now-available evidence suggests that we are observing a decreasing level of well-being of researchers. This problem is worse than in other types of employment [97].

We can distinguish many mental health problems among academics; for example, Shaw found the following problems [98]:
• depression (75%),
• panic attacks (42%),
• eating disorder (15%),
• self-harm (11%),
• obsessive-compulsive disorder (11%),
• alcoholism (11%),
• post-traumatic stress disorder (9%),
• other mental health disorder (7%),
• bipolar disorder (4%),
• drug addiction (2%).

Some important factors found by RAND Europe connected with academics’ mental health were as follows [96]:

• In many surveys, UK higher education teachers have reported that their well-being is worse compared with staff well-being in other types of organizations (including health, education, and social work). They compared areas of work demands, support provided by managers, change management, and clarity about one’s role.
• The proportions of both scholars and postgraduate students which have a risk of having or developing a problem with mental health. This proportion is based on, for example, self-reported data. It is generally higher than we can observe among other working populations.
• The main factors that are associated with the development of depression and other typical mental health problems among PhD students are work–life conflict, high levels of work demands, poor support from the supervisor, low job control, and exclusion from the decision making processes.
• Studies pinpoint that academic staff involved in research on sensitive topics as abuse or trauma can be emotionally affected by the problems they encounter in their research. They should receive better support for university authorities to mitigate the possible negative impacts of this work. The problem of abuse in the university environment was also pointed out by Oleksinienko [99].
• We can observe that job stress levels and poor workplace conditions can contribute to reduced productivity of academic staff. It can be both through absence and also through presentism. Because of that researchers can attend work and are less productive.

To support the mental health of academics we can use, for example, the following methods:

• Implementation of detailed personal development plans, 360-degree feedback, group sessions, and mentoring. Workshops with staff can be useful to increase the level of understanding and engagement of researchers into the strategic plan, online resources, and communication, vice-chancellor-led open meetings, etc.
• Briefings, stress risk assessment, free gym membership, training, and solution groups.
• Academic and non-academic middle managers can participate in a program connected with individual executive coaching [100].
• Establishment of workplace policies useful for stress reduction [101].
• Yoga sessions for academic staff [102,103].
• Suicide-prevention training program [104].
• Mindfulness six-week program to decrease stress levels [105].

An interesting study about problems with work in University in Poland was conducted by A. Baruk in 2016 [106,107]. She found that burning out professional and life energy quickly was one of the most important factors of unwillingness to start work in an academic environment. Moreover, low salaries, less free time compared to other employers, job insecurity, lack of prospects for professional development, and the lack of professional stabilization were important elements in the analysis.
3. Materials and Methods

In the prepared research, such factors as the demographic data of the studied researchers (age, level of education, years worked in academic field, etc.) and conditions of work (position, job, remuneration), as well as professional psychosocial factors (including stress) that may be associated with satisfaction of work, were taken into account. The development of research results focuses on the influence analysis of the mentioned aspects on the level of perceived stress when pursuing academic degrees. Additionally, the presence of other health incidents (diseases or chronic illnesses), the source of which may be the stress endured during the scientific procedure, was also taken into account. Therefore, two working hypotheses were proposed:

**Hypothesis 1 (H1).** The level of stress load of Polish researchers concerning subsequent academic degrees and titles is differentiated and decreases with each subsequent academic degree and title.

**Hypothesis 2 (H2).** The achieving of subsequent academic degrees in many cases has a negative effect on the health of the researchers.

In the first stage, the research was focused on the analysis of the level of perceived stress and its influence on the health of the researchers. This stage covers, therefore, the development and verification of a research (diagnostic) tool the objective of which was to verify the working theories and provide a general image of the problems of Polish researchers as compared with literature. In the analysis of the discussed issue, our own research tool was used, which was developed on the basis of previously used diagnostic tools used in some studies [108]. These tools, however, were used as an inspiration to develop our own questionnaire that was the basis to collect data during the second stage.

The research focuses on the issues of subjective perception of stress characteristic of subsequent degrees, as well as on the health and social effects of stressful work. It must be noted, however, that no discussion of the real source of the defined illnesses or events took place. There is only analysis of the studied subjects' feedback that assesses by themselves the influence of stressful situations characteristic of scientific work on their health and status of social relations.

The research questionnaire was handed to 10,000 randomly chosen academics from Poland. They held at least a PhD degree. From them, 763 researchers took part in the research process, which significantly exceeded the minimal size of a random sample, which was defined in this research at the level of 589 questionnaires. It was estimated for the assumed level of maximum sample statistical error on the level amounting to ±4% and confidence interval $p = 0.95$. Not all questionnaires which we obtained were analyzed due to the presence of non-systematic errors (for example, lack of data, some errors in the logic within provided answers); therefore, in the end, 712 from completed questionnaires were analyzed. The whole research was carried out in Poland in 2017 (November and December).

The research questionnaire contained 19 groups of questions, mostly very complex, as they referred to thematically grouped opinions that could be assessed on a scale of 1 to 10 or on the Likert scale. The analysis of reliability in the following thematic groups indicated a sufficiently high reliability of the tool. The survey questionnaire was sent by e-mail directly to randomly selected respondents.

In the conducted research, many of the statistical analysis methods that present the correlations resulting from the conducted research were used. The conducted analysis of the collected data consisted of the establishment of a database of collected data, initial organizing data, and then proper statistical analysis. The stage of data ordering in the analysis consisted of random and systemic errors elimination. In some cases in the research, persons who incorrectly understood the question or those which did not read in whole the request in the questionnaire were studied.

To analyze collected data, we used statistical analysis methods, both one-dimensional (in the form of traditional or item descriptive analysis) as well as two-dimensional (in the form of analysis of dependencies of pairs of studied characteristics) and even an multidimensional one with the use of correspondence analysis for taxonomic distances (in case of features of quality).
In the case of variables with normal distribution, to compare two average values in the studied independent groups, the \( t \)-Student test was used, first determining the uniformity of variations (with the use of Fisher–Snedecor test). To compare two groups with variations of distribution other than normal (and they were in the majority), the \( U \) test was used (Mann–Whitney). In the case of non-uniform variations of features characterized by normal distribution, the \( C \) test was used (Cochran–Cox). The comparative analysis of three and more independent groups of distribution other than normal was made with the use of ANOVA test of Kruskal–Wallis, while in the case of non-uniformity of variable variations of normal distribution, the tests were carried out with independent variations estimation. The significance of differences between structure indicators was verified with \( \chi^2 \)-squared test. The presence of normality of distribution of studied variables was verified with Shapiro–Wilk test.

When verifying statistical hypotheses, the statistical tests were used, taking into account significance at the level of \( \alpha \leq 0.05 \). At the same time, it was indicated that \( p \) probability of making an error of type I is not greater than 0.05 and even sometimes 0.001.

4. Results of Our Own Research

In the conducted research, we collected data concerning 712 respondents. The respondents were doctors, habilitated doctors, and professors who at the time of the conducted research (academic year 2018/2018) worked at Polish universities. The whole population consists of 416 doctors, 193 habilitated doctors, and 103 professors. Based on the research, we can say that the age structure of the respondents has a visible domination of people aged 40–45. The remaining age categories were represented by smaller groups. Based on research, none of the respondents was above 75 years old. Additionally, the smallest age group was researchers aged 25–30 (0.6%).

4.1. Stress Level in Scientific Procedures

Attaining subsequent academic degrees and titles (in this work, the term “academic degrees” will be an umbrella term referring to the PhD, habilitated PhD, and professor titles) are quite often linked with stress. The respondents were asked for a subjective assessment of the level of stress when attaining subsequent degrees in the past on a scale from 1 to 10. It must be noted, however, that the assessment of the level of perceived stress during subsequent scientific procedures can be given only by respondents who had higher academic degree or equivalent academic degree as the assessed one, which means that professors rated the stress level for all academic degrees, habilitated doctors assessed the level of doctoral thesis and habilitated doctoral thesis, while doctors only assessed the habilitated doctoral thesis. Thus, in assessments of some of the academic degrees, the number of assessments is greater than the number of respondents participating in the research.

Not referring to correlation coefficients and significance analysis of differences between average rates, on the basis of differences between the varied academic degrees it can be stated that the level of stress can depend on the level of the academic degree being attained. The descriptive analysis indicated that subjective level of stress (on a scale from 1 to 10) for a doctoral thesis amounted to 6.39 ±2.30. Habilitation is characterized by a slightly higher level of perceived stress as compared with the doctoral thesis as in the studied sample it amounted to 6.48 ± 2.57. It must be clearly stated, however, that this difference is statistically significant \((p = 0.0396)\). The least stressful is the attaining of professor title, which was assessed at the level of 4.44 ± 2.95, a result significantly lower than the level characteristic for a doctoral thesis \((p < 0.001)\) and habilitation \((p < 0.001)\).

The obtained rates are presented in more detail in Table 3. It can be noted that in the case of doctoral thesis and habilitation, the level of stress is similar, taking into account item measurements (for example median). The level of stress for the professor’s title is different, which confirms the results of traditional analysis. What is worth attention is the fact that among the respondents were those who chose extreme answers for all the degrees and titles; therefore, taking the median value into account is justified.
Table 3. Results of descriptive analysis on the level of stress.

| The Level of Stress for a Scientific Procedure (on a Scale from 1 to 10) | In General | PhD | Hab. PhD | Prof. |
|---------------------------------------------------------------|------------|-----|----------|-------|
| Sample size (N)                                               | 1019       | 626 | 298      | 95    |
| Arithmetic mean ($x_{ar}$)                                     | 6.28       | 6.39| 6.63     | 4.44  |
| Standard deviation (SD)                                       | 2.53       | 2.30| 2.62     | 2.95  |
| Lower quartile $Q_1$                                          | 5.00       | 5.00| 5.00     | 2.00  |
| Median $Q_2$                                                  | 7.00       | 7.00| 7.00     | 4.00  |
| Upper quartile $Q_3$                                          | 8.00       | 8.00| 9.00     | 6.00  |
| Dominant Do                                                   | 8.00       | 7.00| 8.00     | 1.00  |
| Minimum (MIN)                                                 | 1.00       | 1.00| 1.00     | 1.00  |
| Maximum (MAX)                                                 | 10.00      | 10.00| 10.00| 10.00 |
| Coefficient of variation ($V_x$)                              | 40.32      | 35.97| 39.52| 66.30 |

Source: Own study.

It is worth noting that despite the effort and good will of the respondents, such an approach towards stress may be very subjective. A doctor when assessing their doctoral thesis cannot compare it with subsequent academic degrees. Therefore, it is justified to look at stress from the perspective of those who have all academic degrees, meaning professors, who can compare various stages of their academic career. Such an approach has also a weak side, as in the case of professors the time that has passed since, for example, their doctoral thesis is in general the longest from among other respondents.

In the assessment given by 103 professors, the most difficult in terms of stress was the habilitation (6.1), then the doctoral thesis (5.8), and then professorship (4.4), which is similar to the results obtained in general from all the respondents. What is different is only the level of perceived stress, which seems to be lower than before, probably due to the longer time perspective towards stress and comparison with other degrees.

4.2. Ailments and Dysfunctions Related to Participation in the Scientific Procedure

The respondents were asked to answer the following question: during the scientific procedure and two years after attaining the last academic degree/title, did the respondents feel the listed ailments and dysfunctions? They also had the possibility to define the ailments not listed in the questionnaire. It was not assessed to what extent the observed disorder or ailment or dysfunction was associated with the scientific procedure. What was taken into account was the assessment of this phenomenon as given by the respondent towards oneself.

When analyzing the responses of all researchers in total (Figure 1), it was noted that the most commonly listed ailments are irritation, nervousness, and aggression, as well as mild stress in the form of headache or tension, which was observed for 52% of the researchers. Almost every third respondent (31.6%) suffered from some kind of psychological problems (depression, depressed mood for a longer period, addictions, the necessity to undergo therapy). Moreover, 28.9% suffered from psychosomatic disorders (for example, pain of unknown source of limbs and of internal organs). The same number of respondents (30.6%) indicated damage to the relationship understood as weakening or break up of family relations, relationships, or friendships. Every fourth respondent (24.6%) was disappointed with the lack of due benefits in the relation towards co-workers on equivalent position, which was more frequently than every tenth respondent (11.5%) feeling superiority over other co-workers or feeling more important.

Cardiac incidents of varied severity, understood as heart diseases and vascular diseases (hypertension, arrhythmia, heart attack, stroke, etc.), were present among 17.9% of respondents, while only one in every three (6.2%) resulted in serious consequences to health.

Every tenth respondent defined their ailments as “other”, although when writing details about the observed dysfunctions it often turned out that these are psychosomatic or neurological, gastric disorders (chronic fatigue, back pain, degeneracy, exhaustion, hormonal disorders, sleeplessness,
chronic infections, loss of sight, irritable bowel syndrome, etc.). A full summary of the given responses is presented in attachment no. 1.

At the same time, significant differences were observed in the frequency of occurrence of particular ailments in subsequent groups divided according to academic degree. Mild stress in the form of headache or tension was felt by every third doctor (33.7%), while habilitators suffered two times less frequently (12.9%) and professors suffered four times less frequently (6.3%). A similar situation concerned irritation, nervousness, and aggression, as well as psychological disorders (depression, depressed mood for a longer period, addictions, the necessity to undergo therapy), perceived damages to the relations (weakening or break up of family relations, relationships or friendships), and psychosomatic disorders (pain of unknown source of limbs, of internal organs, etc.). However, in the case of attaining a title of professor, the discussed reactions occurred eight times less frequently as compared with doctors. Comparable disproportions of the frequency of occurrence were observed in relation to cardiac and vascular disorders (hypertension, arrhythmia, heart attack, stroke, etc.). A full comparison is presented in Table 4.

Figure 1. Ailments suffered during the scientific procedure and 2 years after the procedure has ended. Source: Own study.

Table 4. Frequency of occurrence of a given ailment during scientific procedures.

| Ailments Felt        | PhD  | hab. PhD | Prof. |
|----------------------|------|----------|-------|
| Mild stress          | 33.7%| 12.9%    | 6.3%  |
| Nervousness          | 33.0%| 15.0%    | 5.2%  |
| Psychological ailments| 19.9%| 8.7%     | 2.9%  |
| Damage to the relations| 19.5%| 8.1%    | 2.9%  |
| Psychosomatic disorders| 17.8%| 8.8%    | 2.2%  |
| Disappointment        | 16.3%| 6.2%     | 2.1%  |
| Cardiac incidents     | 8.8% | 5.1%     | 3.9%  |
| Felling of superiority| 6.7% | 3.5%    | 1.3%  |
| Cancer                | 0.0% | 0.0%     | 0.0%  |
| External dysfunctions| 0.0% | 0.0%     | 0.0%  |
| Other                | 6.3% | 2.5%     | 0.8%  |

Source: Own study.

The effects of stress endured during subsequent scientific procedures to attain the next academic degree were analyzed. The respondents were asked what changes they observed in their lives after they were awarded their last academic degree or title. These were related to health and economics, as well as social life. Respondents could agree or disagree with the provided statements or select a neutral response and agree only partially (Figure 2).
It was stated that more than 83% of respondents noticed an improvement in finances after obtaining the next academic degree. However, it was not a permanent change, as 37.7% of respondents (almost half of the percentage that stated improvement) admitted that they are only sometimes financially better as compared with the period before they were awarded their degree. The percentage of respondents that claimed that in general their lives are better is even higher (45.3%).

A slightly smaller number of researchers who were awarded another degree noticed greater respect from the environment (students, co-workers)—37.1%—but taking into account those who notice this respect only from time to time in total makes it 84.2% of respondents.

An even greater number of people noticed the increase of importance of their professional position that is expressed by the feeling that the voice of a promoted university employee matters more. Such a change is noticed by 85.3% of respondents, while 48.6% were only partially convinced.

Every third respondent (31.5%) did not feel appreciated by the employer for the awarded academic degree, which means that 68.5% of people felt appreciated by the employer or felt partially appreciated.

Unfortunately, more than every second person noticed a deterioration of health which was associated with negative factors of participation in scientific procedures that will give the researcher the next academic degree. This is the standing of more than every fourth respondent (27.8%), and nearly the same number (28.3%) only partially explains the deterioration of health by citing the difficulties of attaining the next academic degree. In addition, 43.9% of respondents did not feel an influence on their health as caused by the scientific process of attaining the next academic degree. The people associating the negative health effects with the load associated with the scientific process were mostly doctors (60%) and habilitated doctors (27%). The least numerous group that noticed negative effects after a scientific process are professors (13% of professors noticed a deterioration in health).

Unfortunately, every fifth respondent (18.3%) noticed negative changes in family life and relations with friends after being awarded the next academic degree. Every fourth respondent felt such changes in relations with family and friends only partially (26.9%). More than half (54.8%) did not have these problems or did not associate them with an academic degree.
Deteriorating relations with co-workers after obtaining the next academic degree is confirmed by only 4.0% of respondents, and every fourth respondent (23.6%) noticed this problem in a limited scope. The majority of respondents, or three out of four of them (72.4%), did not notice such a phenomenon in their environment.

Qualitative changes describing particular features of the respondents made it also possible to make a multidimensional qualitative analysis. It was made with the use of correspondence analysis, meaning the method of comparing similar answers given by respondents’ groups. The analysis of the distance between the itemized points of responses’ variants allows the identification of the interrelations between various categories of variables. As a result of this process, two artificial dimensions are created which enable a graphic representation of a multidimensional phenomenon. The resulting dimensions are therefore artificially created correspondence variables.

The correspondence analysis concerning the research factors made it possible to confirm several of the statements made above. Figure 3 makes it possible to observe age intervals found the closest to the subsequent degrees and title: the academic degree of a doctor is awarded to persons belonging to a wide age range of 25–50 which is convergent with the estimated average age range when such a degree is awarded, which is 31–36.

![Figure 3. Correspondence analysis: comparison of age and academic degrees. Source: Own study.](image_url)

The age when the habilitated PhD is awarded is also characterized by a wide range as its location is close both to the category of people in the age range of 45–50, as well as aged 55–60, yet it was the closest to the age range of 50–55. As presented in Figure 4, this academic degree is the most varied one in case of age when it is awarded. The age range estimated before was 42–47 years.

The title of a professor is granted to those aged 60–75, which is a significantly higher category than the one estimated before at the average level of 50–55 years and dominating one of 60–65 years (in this age category were 35.1% of professors).

The second comparison presents the location of observed adverse effects to health after being awarded subsequent academic degrees (Figure 4). Professors participating in the research in general did not comment on any afflictions or diseases that they would associate with the completed professorship. In some cases, there was an indication of cancer at a critical stage. The situation is different in the case of those holding a habilitated PhD or PhD (both items are close to one another). Such afflictions as mild stress, psychological afflictions, disappointment, and damages to relationships are more often
noticed in case of doctors than in the case of habilitated doctors, who also point out to these situations, but not as often.

Slightly different is the comparison presented in Figure 5, as this time academic degrees and observed afflictions were compared with the duration of the last employment agreement. It is evident that a crucial factor that influences the frequency of anxiety, irritation, stress, and external dysfunctions in researchers can be the stability of employment. At the same time, it is a feature that often was indicated as a factor that influences the satisfaction of scientific work.

Figure 4. Correspondence analysis: comparison of academic degrees and title and the observed afflictions or diseases. Source: Own study.

Figure 5. Correspondence analysis: comparison of the duration of the employment agreement and selected afflictions. Source: Own study.
5. Discussion and Conclusions

When summing up the key issues associated with the stress connected with scientific work, we can sum up some conclusions that helped to cope with this issue. First, several selected literature references should be quoted that summarize the discussed problem [1,3,13,14,18,19,24,32,34,38,39,68].

In Poland, the academic system is based on academic degrees; in many countries, especially in the Anglo-Saxon system, it is rather based on academic position and tenure track, but the concept is similar: the researcher should teach, publish, and obtain grants. It is connected with big and increasing levels of stress. In international research, occupational stress in academic work is similar to that in Poland. For example, Singh et al. [14] describe occupational stress in the nursing profession. Other international papers also pointed out the important role of stress in today’s academy [109–112].

In conducted research, a problem with security of the contract can be observed, which leads to disappointment even if someone has obtained the next academy degree. We can observe a similar situation in the UK. The decreasing number of safe tenure track positions leads to increased levels of stress among academics [113]. Parlangeli also observed a similar situation in Italy [114].

A very interesting phenomenon observed in Polish research is the feeling of superiority. This effect is observed very rarely in other countries. In conducted research, we observed not only negative effects but also positive, for example, respect from environment and financial improvement. Those effects are rarely analyzed in international researches. They concentrate rather on the negative outcomes of academic carriers. An exception is research conducted by Bray and Williams [115].

Contrary to international research [115–118] in Poland, we rather rarely observe burnout among researchers. They have many ailments observed during scientific procedures, but they rather tolerate them and do not suffer total burnout. In addition, in the research, such effects as, for example, energy drinks addiction, did not occur as was observed by Newlon [119].

The statistical analysis of the performed research allowed to state that the level of stress load of Polish researchers concerning subsequent academic degrees and titles is differentiated: the least stressful is professorship (4.44), then doctoral thesis (6.39), and the most stressful is the habilitation (6.48) (which only partially positively verifies the hypothesis Hypothesis 1).

When analyzing the most frequently observed afflictions that the respondents associate with scientific procedures, it can be stated that these are irritation, nervousness, and aggression as well as mild stress in the form of headache or stress, which was observed for at least half of the researchers. Almost every third respondent (31.6%) suffered from some kind of psychological problems (depression, depressed mood for a longer period, addictions, the necessity to undergo therapy). In addition, 28.9% suffered from psychosomatic disorders (for example, pain of unknown source of limbs, of internal organs, etc.) (which positively verifies Hypothesis 2). The same number of respondents (30.6%) indicated damage to the relationship understood as weakening or break up of family relations, relationships, or friendships, while every fourth respondent (24.6%) was disappointed with the lack of due benefits in the relation towards co-workers in equivalent positions. More than every tenth respondent (11.5%) felt superiority over other co-workers or felt being more important. In addition, 17.9% also experienced cardiac events of various severity (hypertension, arrhythmia, heart attack, stroke, etc.). Every third suffered serious health effects due to them.

On the basis of our research, we could propose some methods to cope with problems among academics. To improve the work in the academy, managers should especially concentrate on:

- good, objective, and relevant assessment system,
- support from staff,
- relevant remuneration, liquidation of short-term contracts,
- improvement of work-life balance,
- psychological help from doctors.

The main limitation of this paper is that the research was conducted in one country and it is not easy to compare them with researches from other countries. Every research study described in the
literature has his own methodology, and results are not always comparable. Every country also has its own academic system—in particular, Eastern European countries have an academic system which is degree-based, and because of that it is not easy to compare them to Western European, American, or Asian academic systems. The research also gives only a static description of the situation. To know better the dynamic of the observed phenomenon it would be good to do the research for some years to know if the situation is really worsening as we can observe in many Eastern European countries.

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