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A STUDY ON EMPLOYEE EXPERIENCE WITH SHIFT WORK

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ABSTRACT. Shift work has become necessary for many industries operating 24 hours a day, 7 days a week, affecting individual workers and their overall well-being. Based on a survey of 1049 shift workers of various industries, ages, and genders from all fourteen regions of the Czech Republic, the paper analyzes their experience with different shift work rosters to determine individually perceived advantages and disadvantages of shift work and discuss perspective ways of improving shift workers' well-being. The findings confirm the importance of effective and efficient shift work planning and organizing to achieve demanded work productivity, desired work-life balance and overall well-being of shift workers. The analysis confirmed a hypothesis that the preference for work shifts depends on the age of shift workers. Individually perceived negative impacts of shift work included physical fatigue, sleep disorders, or depression. These could be limited by more flexible shift work scheduling to harmonize work shifts with personal matters whenever possible and thus support shift workers' work-life balance and well-being.

JEL Classification: M12, M50

Keywords: working time, shift workers, work-life balance, well-being, shift roster, Czech Republic

Introduction

The organization of working time represents one of the most important factors in working conditions, which significantly affects the satisfaction and productivity of individual workers and, accordingly, the entire organization's performance (Mélan & Cascino, 2022). The issue of the working time organization involves establishing the shift within weekly working hours and its scheduling into daily work shifts (Antunes, 2021). The organization of working time is ordinally shaped by the international and national legal framework on working time arrangements determined by effective labor law, which particularly limits the length of weekly working time and daily work shifts, scheduling of working time, overtime, night work,

or weekend work (Garde *et al.*, 2020). All these issues related to the organization of working time are also commonly regulated by collective agreements. Within this legal framework, every organization must schedule weekly working hours into daily work shifts to meet its business needs (Lee *et al.*, 2021).

Many business models in different industries, such as manufacturing, power engineering, logistics, retail, hospitality, health, social care, or public services, are currently based on continuous operation 24 hours a day, 7 days a week. Such a continuous operation usually requires shift work, where workers regularly alternate in two, three, or more work shifts to keep business processes operating and achieve optimal work productivity (Kletzander & Musliu, 2020). The effective implementation of shift work in the organization and its business processes requires an effective choice of an optimal form of shift work to maximize labor productivity and minimize harmful effects on shift workers (Sonati *et al.*, 2015). Especially night shifts may have a very detrimental impact on shift workers, whose health may suffer due to the lack of sleep and improper nutrition (Kosem *et al.*, 2021).

Unsuitable scheduling of shift work may disturb the work-life balance of shift workers and their overall well-being. This may reduce job satisfaction and work productivity of shift workers and result in their turnover (Karhula *et al.*, 2020). Therefore, it is important for the organization to be interested in the experience of shift workers with their shift work schedules to analyze individually perceived advantages and disadvantages of shift work and find an optimal form of shift work to meet the need of both the organization and shift workers (Härmä *et al.*, 2018).

Based on a survey of 1049 shift workers of various industries, ages, and genders from all fourteen regions of the Czech Republic, the paper analyzes employee experience with different shift work schedules to determine individually perceived advantages and disadvantages of shift work and discuss perspective ways of improving shift workers' well-being.

The paper includes a literature review, methodology, empirical results and discussion, and conclusion. The literature review defines the concept of shift work, its advantages, and disadvantages for both the organization and shift workers, and ways of limiting the potential negative impacts of shift work on shift workers. The methodology describes the way of conducting the authors' survey on employee experience with shift work and analyzing its findings. Empirical results and discussion describe and discuss findings of the authors' survey of 1049 shift workers of various industries, ages, and genders and their experience with different shift work schedules, including perceived advantages and disadvantages of shift work and perspective ways of improving it. The conclusion summarizes essential findings and offers opportunities for further research.

1. Literature review

Shift work represents a specific model of the organization of working time in which workers alternate regularly in certain work shifts, which allows the organization more or less continuous operation by extending the organization's operating hours beyond the working time of individual workers (Li *et al*., 2021). The system of shift work may include fixed shift designs, in which a group of workers always work the same shift, or rotating shift designs, in which workers work shifts varying regularly over time according to the shift work schedule (Togo *et al.*, 2022). By its nature, shift work requires late or night work and weekend work for some workers, particularly if the organization is operating non-stop 24 hours a day, 7 days a week (James *et al.*, 2017). Shift work is traditionally designed in three eight-hour shifts (early/late/night) or two twelve-hour shifts (day/night). In three eight-hour shifts, the first group

of shift workers may work during the morning and early afternoon (e.g., 06:00-14:00), the second group of shift workers may work during the late afternoon and evening (e.g., 14:00-22:00), and the third group of shift workers may work during the night (e.g., 22:00-06:00). Similarly, in two twelve-hour shifts, the first group of shift workers may work from morning to evening (e.g., 06:00-18:00) and the second group of shift workers may work from evening to morning (e.g., 18:00-06:00). The shift work design varies with the legal framework of a country and the operational requirements of individual organizations (Adams *et al.*, 2019).

Shift work has advantages and disadvantages for both the organization and shift workers. The organization may achieve continuous operation and more intensive use of production factors, which may lead to greater productivity and profitability. Shift work allows the organization to achieve optimal use of available resources and meet the higher demand for produced goods or provided services. On the other hand, shift work is more organizationally and financially demanding, brings additional administrative and labor costs by having more shifts and workers in operation, and includes potentially negative impacts on shift workers' performance and well-being (Kim *et al.*, 2021), which concerns in particular rotating shift designs with twelve-hour or longer shifts (Dall'Ora *et al.*, 2016). Another source of reduced shift workers' performance and well-being is instability in shift work schedules, which causes general job dissatisfaction (Schneider & Harknett, 2019). Additionally, any unpredictable shift work schedules may be associated with the poor physical and mental health of shift workers (Cho, 2018). Through shiftwork, shift workers may achieve greater time flexibility, more free time, or higher total earnings due to extra payments for certain shifts. On the other hand, shift work may lead to different health issues that may take months and years to become apparent, including physical fatigue, mental overload, sleep disorders, headache, cardio-vascular troubles, or digestive disorders (Åkerstedt *et al.*, 2002). Especially night workers working outside of the framework of the standard working time arrangements and in opposition to their biological clocks may be at a greater health risk than other shift workers (Torquati et al., 2019). Many night workers suffer from insufficient sleep, which may have other serious health consequences in the long term (Kecklund & Axelsson, 2016). Shift work may also disturb the work-life or work-family balance and overall well-being of shift workers by consuming time they have for their private and family activities. Additionally, non-standard working time arrangements associated with shift work may negatively affect not only the shift workers themselves but also their family members (partners and children), who may suffer from poor social interactions (Arlinghaus *et al.*, 2019). Achieving the work-life and work-family balance of shift workers should be supported by stable and predictable shift work schedules (Carrillo *et al.*, 2017).

Organizations commonly require their workers to work in different work shifts to satisfy different needs of their clients from various industries, who often require non-stop services. Shift work must take into account the labor legislation, the collective agreement, and also the expectations of shift workers, who increasingly take into account the work-life balance (Komarudin *et al.*, 2020). The present requires following the path of sustainable workforce planning and flexible shift work, for example in manufacturing, transportation, health care, or call centers (Kletzander & Musliu, 2020).

Karhula *et al.* (2020) found that tight deadlines, performance pressures, weekend work, and a lack of autonomy regarding shift work scheduling correlate with disturbing the work-life balance and well-being of shift workers. To limit the potential negative impacts of shift work on shift workers, the organization should organize working time and schedule work shifts more concerning individual needs, providing shift workers with greater time flexibility and autonomy (Bürger & Nachreiner, 2018). A possible solution may be "self-rostering" or self-scheduling, i.e., the possibility for shift workers to choose their upcoming work shifts for a given roster

period, which has its benefits for both shift workers and the organization, particularly in the sense of increased staff morale and subsequently improved staff retention (Hainey, 2021). Shift workers generally feel more engaged experiencing more control over shift work scheduling (Shiri *et al.*, 2021). The option to change one's shift work schedule increases the probability of job satisfaction and decreases the probability of job stress (Ray & Pana-Cryan, 2021). The effective implementation of self-rostering increases job satisfaction and encourages interest in shift work (Hart *et al.*, 2020). The flexibility of shift work leads to a better work-life balance for shift workers but has certain organizational implications associated with the disruption of work-related social ties, including the disruption of mutual trust and support (Bürger & Nachreiner, 2018). Self-rostering may harm work relationships between shift workers and their superiors as a result of changed responsibilities. The increase in decision-making autonomy of shift workers and the modified leadership authority of superiors may harm cooperation and communication at the workplace (Wynendaele *et al.*, 2021). Job requirements are more realistic and the social climate at the workplace is improving, especially if the implementation of self-rostering does not mean any radical changes in the organization of shift workers' work-life balance (Hansen *et al.*, 2015).

According to the number of articles in the Web of Science database between 2000 and 2021 (see *Table 1*), workforce planning was a frequently addressed issue in England (263), Australia (218), the USA (171), Canada (81), and the Netherlands (42). In the Czech Republic, however, only three articles on this issue were published. Thematically, the articles were related to health care (235), business economics (146), nursing (118), general medicine (116), occupational health and safety (102), and engineering (62). Articles on shift work were published mainly in the USA (1511), Australia (377), England (360), Germany (292), Canada (261), Italy (206), and the Czech Republic (22). Thematically, the articles were related to public environmental occupation health (1307), neurosciences and neurology (637), physiology (399), nursing (331), and psychology (199). Articles on rostering were published mainly in Australia (50), England (49), China (42), Belgium (36), Germany (29), and Canada (24). In the Czech Republic, seven articles on this issue were published. Thematically, the articles were related to operational research (140), computer science (130), engineering (106), business economics (48), and health care (27). And articles on self-rostering were published mainly in Denmark (4), England (2), and Finland (2). In the Czech Republic, only one article on this issue was published. Thematically, the articles were related to nursing (3), occupational health and safety (3), ergonomics (2), engineering (2), and psychology.

Table 1. Bibliographic records on a query in the Web of Science and Scopus 2000-2021

Query	Web of Science	Scopus
"Workforce planning"	965	1,709
"Shift work"	5,031	6,405
"Rostering"	408	816
"Self-rostering"	12	22
Total	**6,416**	**8,952**

Source: *own calculation, assess 2022/01/07*

2. Methodological approach

The paper analyzes employee experience with different shift work schedules to determine individually perceived advantages and disadvantages of shift work and discuss perspective ways of improving shift workers' well-being. The analysis is based on a survey of 1049 shift workers of various industries, ages, and genders from all fourteen regions of the Czech Republic.

The survey was carried out by authors from November 2020 to April 2021 and surveyed shift workers were asked (1) about the length of their shift work experience, (2) about their usual shift work schedule, (3) about their preferred shift work schedule, (4) about their preferred work shifts, (5) about their opinion on advantages and disadvantages of shift work, (6) about their opinion on problems of shift work, (7) about the willingness of their organization to schedule work shifts according to their wishes, and (8) about their wish to plan work shifts autonomously according to their needs.

According to the industry, there were 31% of shift workers from production, 18% of shift workers from retail, 10% of shift workers from health care, 9% of shift workers from transportation, 8% of shift workers from public administration, 5% of shift workers from logistics, 2% of shift workers from the accommodation, and 18% of shift workers from other industries. According to the education, there were 9% of shift workers with elementary education, 38% of shift workers with an apprenticeship certificate, 42% of shift workers with a secondary certificate, and 11% of shift workers with higher education. According to the age, there were 15% of shift workers aged 18-26 years, 23% of shift workers aged 27-35 years, 21% of shift workers aged 36-44 years, 23% of shift workers aged 45-53 years, and 18% of shift workers aged 54-65 years. According to gender, there were 63% of male shift workers and 37% of female shift workers.

The average age of shift workers was 41 years (the median was 41 years). For male shift workers, the average age was 41 years (the median was 41 years). For female shift workers, the average age was 40 years (the median was 40 years). More than half of shift workers (53%) were the age 40 or older. These findings were important for the analysis of the data concerning shift workers' experiences with different shift work schedules and their impacts on shift workers' well-being. Data analysis was based on the assumption that different shift work schedules are more challenging for older shift workers.

During the process of data analysis, descriptive statistics, pivot tables, Pearson's correlation analysis, analysis of variance (ANOVA), independent t-tests, and chi-square tests were applied to evaluate the relative frequencies of responses and the dependence of responses on the respondents' age, gender, education, and industry by using Microsoft Excel and Gretl software. The significance level was set at 0.05. Two hypotheses were verified in this process:

H1: The preference for work shifts depends on the age of shift workers.
H2: The wish to plan work shifts autonomously depends on the age of shift workers.

The process of the verification of defined hypotheses using a chi-square test procedure started with the determination of the null (H_0) and alternative (H_A) hypotheses and the significance level (α=0.05). After that, the chi-square statistic (χ^2) was calculated and compared to the determined critical chi-square value $\chi^2_\alpha(f)$. If the chi-square statistic was higher than the critical chi-square value, the null hypothesis was rejected in favor of the alternative hypothesis.

3. Conducting research and results

A survey of 1049 shift workers of various industries, ages, and genders from all fourteen regions of the Czech Republic is presented to analyze their individual experiences with different shift work schedules, to determine individually perceived advantages and disadvantages of shift work, and to discuss perspective ways of improving shift workers' well-being.

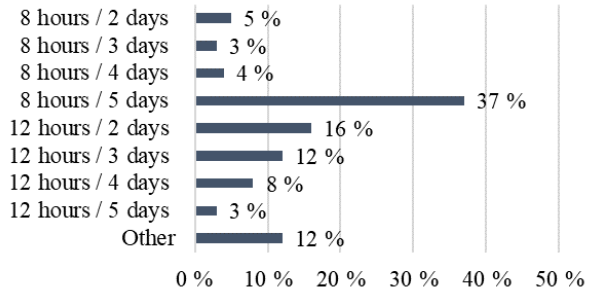
3.1. Individual experience with different shift work schedules

Shift work is one of the most demanding working time arrangements, both physically and mentally, and therefore is often associated with significant shift worker turnover (Ericsson *et al.*, 2021). That is way surveyed shift workers were asked about the length of their shift work experience to which 36% of shift workers stated 5 years or less, 22% of shift workers stated 6-10 years, 24% of shift workers stated 11-19 years, and 18% of shift workers stated 20 years or more. These findings showed that 42% of surveyed shift workers had more than a decade of shift work experience. This group of shift workers included 71% of male shift workers with an average age of 46 years (the median was 46 years) and 29% of female shift workers with an average age of 48 years (the median was 49 years). These male shift workers most often worked in production (28%), transportation (15%), public administration (14%), or retail (11%) having mostly a secondary certificate (51%), an apprenticeship certificate (34%), higher education (12%), or elementary education (3%). The female shift workers most often worked in health care (30%), production (24%), or retail (22%) having mostly an apprenticeship certificate (54%), a secondary certificate (33%), elementary education (9%), or higher education (4%). These findings confirm that shift workers work in different industries, however, female shift workers work mostly in services with a generally lower level of education, while male shift workers work mostly in production with a generally higher level of education.

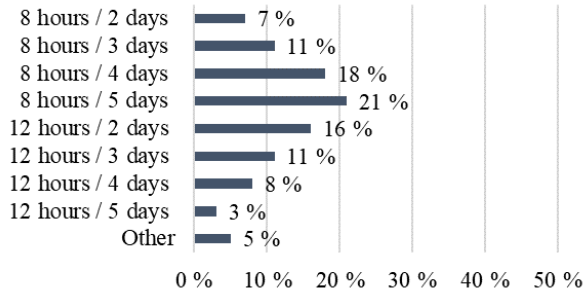
An interesting finding was that among the 29% of female shift workers having more than a decade of shift work experience, 71% of shift workers were over the age of 45. Similarly, among the 71% of male shift workers having more than a decade of shift work experience, there were 57% of shift workers over the age of 45. Shift work in older age can lead to many negative impacts on the shift workers' health, especially long-term sleep disorders, which can lead to other chronic physical and mental issues (Karhula *et al.*, 2020). Among the most serious health issues of shift work is the risk of cardiovascular disease (Torquati *et al.*, 2018), the risk of type 2 diabetes (Gao *et al.*, 2020), or the risk of depressive and anxiety symptoms (Lee & Park, 2022), which increase with the length of regular shift work experience and may be exacerbated by poor lifestyle habits such as cigarette smoking or alcohol consumption (Wong *et al.*, 2019). Therefore, shift workers should be protected by introducing policies preventing shift workers' health risks and supporting their healthy lifestyle, taking into account shift workers' demographic characteristics, such as age and gender (Bae *et al.*, 2017).

Following that, surveyed shift workers were asked about their usual shift work schedule (see *Graph 1*). Most shift workers stated eight-hour work shifts in a series of five days (37%), including 35% of shift-workers over the age of 45, or twelve-hour work shifts in a series of two days (16%) or three days (12%), including 47% of shift-workers over the age of 45. The shift work schedule is set by the organization, usually without the direct participation of shift workers, so it is interesting to find out which shift work schedule shift workers would prefer. Following this idea, surveyed shift workers were asked about their preferred shift work schedule (see *Graph 2*). Most shift workers stated eight-hour work shifts in a series of five days (21%) or four days (18%), including 37% of shift-workers over the age of 45, or twelve-hour work

shifts in a series of two days (16%) or three days (11%), including 52% of shift-workers over the age of 45. These findings correspond to a regular working week and show that shift workers' preferences regarding the shift work schedule correspond to a usual shift work schedule set by the organization, more or less regardless of the age of the shift workers. This may indicate that most shift workers are used to the usual shift work schedule and do not desire changes that could disturb their work-life balance. However, a Pearson's correlation analysis revealed a weak positive correlation between the age and preferred length of work shifts ($r = 0.199$; $p = 0.05$). With increasing age, shift workers do not seem to mind longer work shifts. Generally, the worst seems to be shift work schedules involving any extremes such as "unpredictable working hours, short daily rest between shifts and split duty shifts" (Akerstedt & Kecklund, 2017).



Graph 1. Usual shift work schedules
Source: *own data*



Graph 2. Preferred shift work schedules
Source: *own data*

Shift workers' preferences may concern both the entire shift work schedule and particular work shifts. A usual shift work schedule is organized into two or three shifts, including early, late, or night shifts (Wild *et al.*, 2021). Following this system, surveyed shift workers were asked about their preferred work shifts to which 57% of shift workers stated early shifts, 16% of shift workers stated late shifts, and 27% of shift workers stated night shifts. These findings suggest that most shift workers prefer early shifts from morning to early afternoon. The 57% of shift-workers stated an early shift included 61% of female shift workers aged 18-26 years (22%), 27-35 years (25%), 36-44 years (11%), 45-53 years (24%), and 54-65 years (18%), and 54% of male shift workers aged 18-26 years (14%), 27-35 years (25%), 36-44 years (23%), 45-53 years (22%), and 54-65 years (16%).

Table 2. The preference for work shifts and the age of shift workers

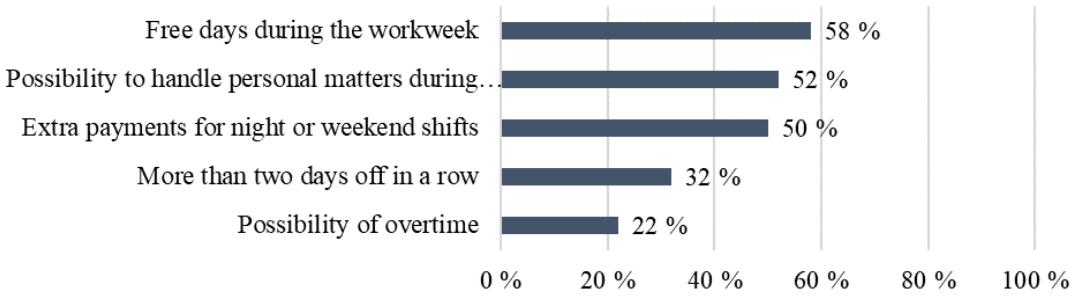
	The preference for work shifts			
Age	**Early**	**Late**	**Night**	**∑**
35 years or less	252	76	71	**399**
36-44 years	108	38	72	**218**
45 years or more	235	57	140	**432**
∑	**595**	**171**	**283**	**1049**
H_{01}: The preference for work shifts does not depend on the age of shift workers. H_{A1}: The preference for work shifts depends on the age of shift workers.				
Chi square statistic $\chi^2 = 37.488$ Critical chi-square value $\chi^2_{0,05}(4) = 9.488$				
The hypothesis H_1 was confirmed. The preference for work shifts depends on the age of shift workers.				

Source: *own data*

These findings indicate that early shifts are preferred by most shift workers regardless of gender or age. On the other hand, the 27% of shift workers stated a night shift included 24% of female shift workers aged 18-26 years (12%), 27-35 years (22%), 36-44 years (19%), 45-53 years (24%), and 54-65 years (23%), and 28% of male shift workers aged 18-26 years (3%), 27-35 years (17%), 36-44 years (30%), 45-53 years (27%), and 54-65 years (23%). Similarly, these findings indicate that night shifts are preferred by some shift workers regardless of gender or age. Most shift workers prefer night shifts worked in production (36%), retail (14%), and health care (12%). On the other hand, most shift workers prefer early shifts worked in production (29%), retail (22%), health care (9%), public administration (8%), transportation (7%), and logistics (5%). These are industries more suitable for work during the day, but the findings suggest that early and night shifts are applied in many different industries. Following these findings, hypothesis H_1 was verified that the preference for work shifts depends on the age of shift workers using a chi-square test (see *Table 2*). The null hypothesis was tested that the preference for work shifts does not depend on the age of shift workers. Since the chi-square statistic [χ^2] was higher than the critical chi-square value [$\chi^2_{0.05}(4)$], the null hypothesis was rejected. The hypothesis H_1 was confirmed.

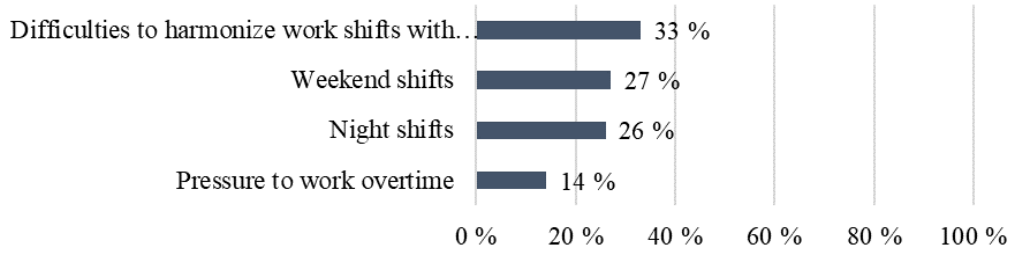
3.2. Individually perceived advantages and disadvantages of shift work

Each shift work schedule has its advantages and disadvantages, depending on the needs of both the organization and shift workers (Guerriero & Guido, 2021), so surveyed shift workers were asked about their opinion on the advantages and disadvantages of shift work (see *Graph 3*). The advantages of shift work stated included free days during the workweek (58%), the possibility to handle personal matters during the day (52%), or extra payments for night or weekend shifts (50%). These advantages indicate that most shift workers like more free time providing them with greater work-life balance or extra payments providing them with higher total earnings.



Graph 3. Advantages of shift work
Source: *own data*

On the other hand, the disadvantages of shift work stated (see *Graph 4*) included difficulties to harmonize work shifts with personal matters (33%), weekend shifts (27%), night shifts (26%), or pressure to work overtime (14%). These findings confirm that work-life balance affecting overall well-being is important to most shift workers (Karhula *et al.*, 2020).

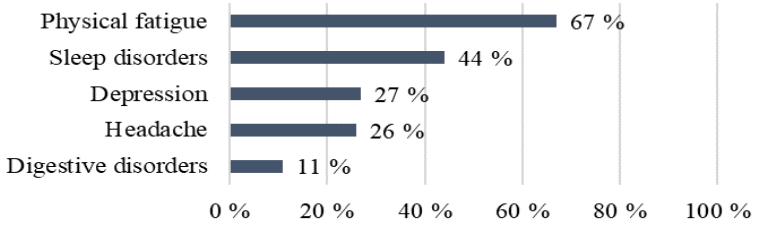


Graph 4. Disadvantages of shift work
Source: *own data*

As already mentioned, night and weekend shifts represent a specific issue of shift work due to the significant risk of depression or anxiety leading to other mental issues (Lee *et al.*, 2017). The more demanding shift work schedules, the greater the risk of mental issues for shift workers, while female shift workers seem to be at greater risk than male shift workers (Milner *et al.*, 2015). The 26% of shift-workers disliked night shifts included 37% of female shift workers aged 18-26 years (16%), 27-35 years (19%), 36-44 years (9%), 45-53 years (28%), and 54-65 years (28%), and 63% of male shift workers aged 18-26 years (11%), 27-35 years (28%), 36-44 years (24%), 45-53 years (18%), and 54-65 years (19%). Similarly, the 27% of shift workers disliked weekend shifts included 40% of female shift workers aged 18-26 years (26%), 27-35 years (27%), 36-44 years (14%), 45-53 years (21%), and 54-65 years (12%), and 60% of male shift workers aged 18-26 years (13%), 27-35 years (25%), 36-44 years (23%), 45-53 years (25%), and 54-65 years (14%).

These findings indicate that night and weekend shifts are more disliked by male than female shift workers. However, in terms of age, among the 37% of female shift workers disliking night shifts, 56% of shift workers were over the age of 45, and among the 63% of male shift workers disliking night shifts, there was 37% of shift workers over the age of 45. Similarly, among the 40% of female shift workers disliking weekend shifts, 33% of shift workers were over the age of 45, and among the 60% of male shift workers disliking weekend shifts, there was 39% of shift workers over the age of 45. These findings indicate that night shifts are more disliked by older female shift workers than male shift workers, which confirms other scientific findings that shift work schedules including night shifts are more demanding for female shift workers than male shift workers (Milner *et al.*, 2015) and older than younger shift workers (Lee *et al.*, 2017).

Fallowing stated disadvantages of shift work surveyed shift workers were asked about perceived negative impacts of shift work (see *Graph 5*). The negative impacts stated included physical fatigue (67%), sleep disorders (44%), depression (27%), headache (26%), and digestive disorders (11%). These are typical negative impacts of shift work that can have a very detrimental impact on the health of shift workers and their overall well-being (Blasche *et al.*, 2022).



Graph 5. Negative impacts of shift work
Source: *own data*

Among the 67% of shift workers experiencing physical fatigue, there were many shift workers experiencing sleep disorders (45%), depression (30%), or headache (27%). Among them, there were 12% of shift workers experiencing sleep disorders, depression, and headache, including 41% of female shift workers (of which 35% were over the age of 45 and 26% had more than a decade of shift work experience) and 59% of male shift workers (of which 40% were over the age of 45 and 49% had more than a decade of shift work experience). A Pearson's correlation analysis revealed a weak positive correlation between depression and digestive disorders ($r = 0{,}298$; $p = 0.05$) or headache ($r = 0{,}240$; $p = 0.05$). These findings confirm that long-term shift work causes general physical fatigue, which often leads to other negative impacts, such as lack of quality sleep (Park & Suh, 2019), depression and anxiety (Park *et al.*, 2019), or being overweight (Kosem *et al.*, 2021). The risk of negative impacts of shift work on health and well-being mainly affects older male and female shift workers (Schneider & Harknett, 2019). However, a Pearson's correlation analysis revealed a weak negative correlation between the age and digestive disorders ($r = -0.123$; $p = 0.05$) and the age and depression ($r = -0.113$; $p = 0.05$). This could mean that as the age of shift workers increases, their complaints about negative impacts of shift work decrease, in other words, older shift workers are less sensitive to perceived negative impacts of shift work. If so, this would support the importance of monitoring the impact of shift work on older shift workers. An analysis of variance (ANOVA) revealed that there was no statistically significant difference between female and male shift workers in terms of perceived negative impacts of shift work ($F(1, 959) = [0.534]$, $p = 0.47$). Similarly, an analysis of variance (ANOVA) revealed that there was no statistically significant difference among industries in terms of perceived negative impacts of shift work ($F(6, 954) = [0.625]$, $p = 0.71$).

3.3. Perspective ways of improving shift workers' well-being

The negative impact of shift work on the physical and mental state of shift workers could be limited by a more suitable shift work schedule corresponding to the needs of shift workers, especially the need for more flexible shift work scheduling to harmonize work shifts with personal matters (Waren, 2021). If possible, shift workers should be provided with a choice among work shifts based on their individual preferences. Following this idea, surveyed shift workers were asked about the willingness of their organization to schedule work shifts according to their wishes to which 30% of shift workers stated "yes, whenever needed", 42% of shift workers stated "yes, sometimes, if possible", 21% of shift workers stated "only exceptionally", and 7% of shift workers stated "never". These findings show that in 71% of cases, organizations are willing to schedule work shifts in some way according to the wishes of shift workers, which is important for achieving greater work-life balance and overall well-being. The 7% of shift workers stated their organization is "never" willing to schedule work shifts according to their wishes worked mostly in production (43%), which makes sense because a fixed shift work schedule usually needs to be followed in production. On the other hand, the 30% of shift workers stated their organization is willing to schedule work shifts according to their wishes "whenever needed" worked in production (29%), retail (19%), transportation (9%), public administration (8%) health care (8%), or logistics (5%). These findings confirm that scheduling work shifts according to the wishes of shift workers is possible in many different industries, depending on the specific needs of organizations and workers (Hainey, 2021). Interestingly, a Pearson's correlation analysis revealed a weak negative correlation between the willingness of the organization to schedule work shifts according to the wishes of shift workers and generally perceived negative impacts of shift work ($r = -0.282$; $p = 0.05$). The organization's more supportive approach to shift work scheduling seems to have a positive

effect and reduces the number of perceived negative impacts of shift work, including digestive disorders (r = -0,214; p = 0.05), depression (r = -0.192; p = 0.05), headache (r = -0.157; p = 0.05), or sleep disorders (r = -0.164; p = 0.05). These findings were confirmed by an analysis of variance (ANOVA) revealing that there was a statistically significant difference between the willingness of the organization to schedule work shifts according to the wishes of shift workers and the generally perceived negative impacts of shift work (F (3, 957) = [28.489], p = 0.00).

The work-life balance and well-being of shift workers could be supported by an opportunity for shift workers to plan their work shifts autonomously according to their needs, using "self-rostering" (Barrett & Holme, 2018). Following this idea, surveyed shift workers were asked about their wish to plan work shifts autonomously according to their needs to which 94% of shift workers stated yes and only 6% of shift workers stated no. These shift workers worked mostly in production (31%) or health care (19%), which are industries where stable shift work schedules are preferred, but where self-rostering could be used to enhance the level of individual flexibility. An analysis of variance (ANOVA) revealed that there was a statistically significant difference among industries in terms of the wish of shift workers to plan work shifts autonomously (F (6, 954) = [2.499], p = 0.02). There was a statistically significant difference between transportation and industry or transportation and health care. On the other hand, there was not a statistically significant difference between transportation and retail or transportation and other industries.

Following these findings, hypothesis H_2 was verified that the wish to plan work shifts autonomously depends on the age of shift workers using a chi-square test (see *Table 3*). The null hypothesis was tested that the length of shift work experience does not depend on the gender of shift workers. Since the chi-square statistic [χ^2] was lower than the critical chi-square value [$\chi^2_{0.05}(2)$], the null hypothesis was not rejected. The hypothesis H_2 was not confirmed.

Table 3. The wish to plan work shifts autonomously and the gender of shift workers

	The wish to plan work shifts autonomously		
Gender	**Yes**	**No**	∑
35 years or less	378	21	**399**
36-44 years	204	14	**218**
45 years or more	400	32	**432**
∑	**982**	**67**	**1049**
H_{02}: The wish to plan work shifts autonomously does not depend on the age of shift workers. H_{A2}: The wish to plan work shifts autonomously depends on the age of shift workers.			
Chi square statistic $\chi^2 = 1.596$ Critical chi-square value $\chi^2_{0,05}(2) = 5.991$			
The hypothesis H_2 was not confirmed. The wish to plan work shifts autonomously does not depend on the age of shift workers.			

Source: *own data*

The findings show that almost all the surveyed shift workers would wish to plan work shifts autonomously according to their needs, regardless of age. This again confirms the importance that shift workers attach to the organization of their working time, which determines their work-life balance and overall well-being (Stieler *et al.*, 2021). Self-rostering could provide shift workers with satisfactory control over their work-life balance and overall well-being if its implementation would be based on clear self-rostering guidelines (Brook & Kemp, 2021). The increase in decision-making autonomy of shift workers due to the implementation of self-rostering must not lead to excessive stress for shift workers caused by

unsuitable self-rostering policies and practices set by the organization (Nätti *et al.*, 2015). Shift work itself is a significant risk factor for mental issues such as depression and anxiety. To avoid these issues, it is important to provide shift workers with favorable working conditions, including satisfactory working hours and sufficient rewards for the work done (Yoon et al., 2018). On the other hand, the improvement of well-being must be in the interest of the shift workers themselves, who need to take care of improving their lifestyle habits (Li *et al.*, 2019).

The findings presented are intended to show a possible way for the organizations and their managers that use shift work, which seek to retain existing workers or recruit new ones. In this context, the behavior of managers can be likened to the behavior of politicians in the concept of the political business cycle, in which politicians use different economic instruments to attract the most potential voters (Matějová *et al.*, 2015). In cases where wages cannot be increased, it is possible to offer other benefits, such as greater flexibility and an individual approach to workers. In the case of shift workers, it may be the self-scheduling of work shifts. Generally, it is about creating more attractive job opportunities and working conditions, which retain existing shift workers and attract new ones.

Conclusion

Shift work belongs to the most demanding working time arrangements. The shift work schedule set by the organization significantly affects the job satisfaction and work productivity of shift workers. The findings of the authors' survey of 1049 shift workers of various industries, ages, and genders from all fourteen regions of the Czech Republic confirm the importance of the effective organization of working time and its efficient scheduling into work shifts to achieve demanded organizational performance as well as desired work-life balance and overall well-being of shift workers. The analysis confirmed a hypothesis that the preference for work shifts depends on the age of shift workers. Individually perceived advantages and disadvantages of shift work included free days during the workweek or extra payments for certain shifts on the one hand, and the impossibility to harmonize work shifts with personal matters or pressure to work overtime on the other hand. The negative impacts of shift work stated included physical fatigue, sleep disorders, depression, headache, and digestive disorders. These could be limited by more flexible shift work scheduling using "self-rostering" to harmonize work shifts with personal matters whenever possible and thus support shift workers' work-life balance and well-being. The findings of the authors' survey could be beneficial for further research activities on shift work scheduling and achieving greater flexibility and autonomy for shift workers.

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