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The Relationship between Ergonomics and Health Problems: A Study on Hotel Room Attendants in three-star Hotels

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Abstract

A room attendant position is considered one of the most physically demanding hotel jobs that include many repetitive and tiring tasks such as mopping, dusting, buffing, vacuuming, making beds, emptying garbage, tidying, and sweeping floors. This work profile leads not only to exhaustion but also to a high incidence of occupational hazards, pain and injuries. Managerial Sciences have recently established new methods, tools, and approaches for workplaces organizations to minimize the consumption of energy, avoid fatigue, eliminate occupational hazard among the employees in addition to increase their efficiency and productivity. One of these recent approaches is ergonomics that is focused on the adaptation of work environment to suit the employees' capabilities, talents, and limits. The major objectives of this study were to assess the room attendants' awareness about ergonomics in the investigated hotels, and to study the relationship between the three types of ergonomics (physical /cognitive/ organizational) and health problems among them. A face-to face interview was conducted to collect data from 30 room attendants working in three-star hotels in greater Cairo. Based on the analysis conducted using SPSS version (24), the results supported the first research hypothesis and found a significant relationship between physical ergonomics and health problems among room attendants as workload & work conditions (1.652*) and equipment & supplies (0.478*). The results also showed a significant relationship between cognitive ergonomics and the health problems (0.893*). The third hypothesis related to the relationship between organizational ergonomics and health problems of the room attendants was rejected. The study recommends that on-the-job training should be provided to room attendants in three-star hotels to make them aware about ergonomics practices.

Keywords: Ergonomics, Room attendants, Health problems, Physical ergonomics, Cognitive ergonomics, Organizational ergonomics, Three-star hotels

Introduction

Housekeeping is considered one of the main revenue-generating departments of the hotel. The major function of this department is to sustain high level of cleanliness and the aesthetic charm of the hotel. In order to remain competitive, hotel housekeeping managers often requires room attendants to do the

routine in-room tasks such as changing bed sheets and bathroom linen, making beds, replacing amenities, cleaning bathrooms, lifting heavy mattress etc., in addition to loading and pushing heavy carts. These activities include effort and time in cleaning by using different and repetitive movements such as bending, leaning, slouching, squatting, kneeling, stretching and crouching. According to time and motion studies (CCOHS, 2016), a room attendant change her/his body position every 3 seconds while cleaning a guest room. Supposing it takes 25 minutes as an average time to clean each room, it may be estimated that a room attendant could have 8000 distinctive body postures in every 8-hour shift. These postures, over time contribute to new musculoskeletal injuries (MSIs) and musculoskeletal disorders as studied by Raghubalan & Raghubalan (2016)

As the human resources is considered the most valuable asset in the hospitality industry. Recently, most hotels have adopted new trends, technologies, and approaches to avoid the occupational hazards and keep the staff injury-free and healthy. As a result, some studies have been carried out to investigate the intervention of ergonomics "appropriate workplace design and proper use of assistant equipment" in hotels and to assess its impact on the housekeepers' productivity (Moh Nasrull et al., 2018; Anilambica & SrinivasaPrasad, 2020). Other studies have been conducted to assess the ergonomics and prevalence of pain or occupational hazards among the housekeepers (Amaechi &Elsie, 2019; Ayshath Munazila et al. 2020). However, most of the previous studies according to review of literature focused only on the physical ergonomics and ignored the other related factors. Therefore, this study aims to fill this gab and assess the relationship between the three types of ergonomics (physical /cognitive/organizational) and the health problems among hotel room attendants.

Literature Review

What is Ergonomics?

The term Ergonomics is derived from the Greek word 'ergon' meaning 'work', and 'nomoi', meaning 'natural laws' (Irimie, 2008). Ergonomics that is also known as human factor, biotechnology, or human engineering is defined in Merriam Webster dictionary as the applied science of arranging and designing things in an order that people can interact with them safely and more efficiently. Ergonomists study the human limitations and capabilities in association with work demand. They seek to adopt the working conditions to fit the individual worker as any mismatch between the physical procedures of the work and the physical capacity of the worker can cause fatigue and likelihood of injuries. Ergonomics is characterized of being holistic approach, as it takes into consideration environmental, physical, social organizational, cognitive, tools, equipment and any other related factors as shown in figure (1).

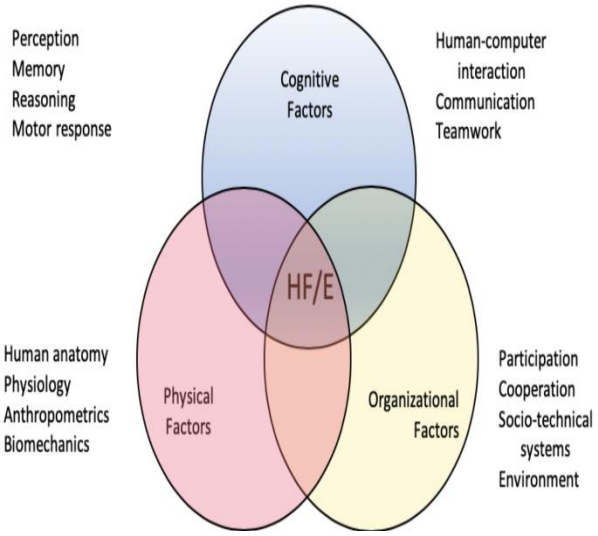

Figure (1) The Three Factors of Ergonomics (Bridger, 2018)

Physical Ergonomics

Physical ergonomics considers the most important domain of ergonomics, as most employers spotlight physical comfort when trying to accommodate their staff. It is concerned with how human bodies interact with the physiological and physical workloads. Physical ergonomics focuses mainly on workplace conditions and how to match the job demands with the capabilities of the employees which in returns creates many values for both the organization and staff. These values include higher productivity, lower costs, improved staff engagement, better product quality and safety culture (Matt, 2020)

The physical workload of room attendants includes many tasks that are essential for the guest safety, comfort and safety (Oxenbridge &Moensted, 2011). A guest room attendant, on an average cleans 15 or more rooms per day with various statuses, and does so under the extreme time pressure. Mest (2013) indicated that if the workload exceeds the limit of 15 rooms cleaned each day, it is supposed that it will lead to a number of injuries to room attendants. A Study by Burgelet al., (2010) suggested that there is a significant relationship between shoulder pain and psychosocial job factors that relate to time pressure, payment structure, and work overload. Using appropriate tools, equipment, and supplies can prevent occupational injuries and provide a safe workplace. Ergonomics practices could eliminate most of the occupational risk factors, particularly the physical ones like awkward posture, joint posture, static posture, excessive repetition, high force etc.(Alison &Steele 2012).

Cognitive Ergonomics

Cognitive ergonomics is concerned with the human aptitudes and mental processes while at work. Work stress, human reliability, mental workload, skilled performance, human error, and training are all fall in to this category. A study conducted by Wadsworth et al., (2003) showed a positive relationship between occupational safety and cognitive failure and correlated the workplace accidents with the mental errors, inattention and distraction. Cognitive ergonomics aims to suit work environment with cognitive functioning, which in returns reduce injuries and accidents and employees' performance and productivity. (Kim, 2016).

Organizational Ergonomics

While physical ergonomics tends to concentrate on individual comfort, organizational ergonomics studies show to enhance the entire workplace. Organizational ergonomics focuses on the optimization of sociotechnical system including work communications, supervision, working times, quality management, teamwork, motivation, job satisfaction, ethics, workplace policies and procedures. Abarghouei and Nasab (2012) proposed a model for ergonomics practices that focuses on management support, knowledge support, HR participation, as well as assessment, awards and recognition (Figure 2). These four elements are associated with training and work within a communication network. Feedback is another key element that goes back and forth amongst the elements of the model.

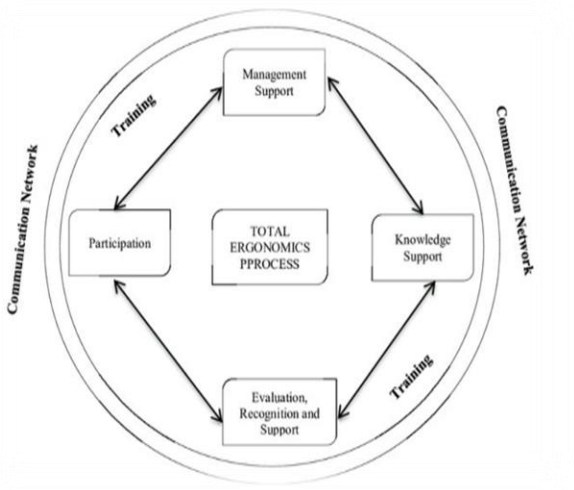

Figure 2. Total ergonomics evaluation and intervention process model (Abarghouei&Nasab, 2012)

Significance of Ergonomics in Housekeeping

Housekeeping is a very challenging task. It can be categorized as moderately to heavy work as the energy required is about 4 kilocalories per minute. The daily tasks of hotel housekeepers make them very exposed to high risk of occupational injuries, physical pains and health problem. The attention should not be on measuring the number of injuries but on measuring the behaviors and possible causes that may lead to injuries. Therefore, the application of ergonomics practices contribute importantly toward eliminating work-related physical stress, which in turn interprets into improved efficiency and productivity among housekeeping staff. In order to reduce the workload and avoid injuries hotels should apply ergonomics practices that include controlling the work environment, modifying of loads lifted/way of lifting, modifying the workplace layout/ equipment, modifying of the

personal habits, as well as redesigning work practices as recommended by by Raghubalan & Raghubalan (2016)

Room Attendants Health Problems

Hotel employees have higher rates of occupational injuries and sustain more severe injuries than most other service employees (Buchanan et al., 2010; Amaechi &Elsie 2019). Many studies indicated that the most common injuries among the hotel room attendants are the musculoskeletal ones due to the physical requirements of the job. These injuries in return are correlated with the employee turnover. Musculoskeletal Disorders (MSDs) are injuries that affect the movement of human body or musculoskeletal system that includes tendons, ligaments, muscles, nerves, blood vessels and discs (Table 1). The injuries or disorders occur when a part of the body works harder, stretches further, lifts more or does any other function at a greater level than it is ready for (Montross, 2011; Middlesworth, 2015).

Table (1) Housekeeping tasks that can lead to injuries

Task	Movement of the body
Making beds	Pulling and Pushing
Moving Cleaning Trolleys	Repeated trunk flexion/extension and rotation with poor body mechanics
Lifting Loads	Repeated trunk flexion/extension and rotation with poor body mechanics
Cleaning Bathrooms (i.e floor, tubs, and toilets)	Repeated forward trunk flexion/extension and rotation with poor body mechanics
Dusting, Vacuuming, and Cleaning	Poor body mechanics, lifting, forward trunk flexion and rotation
Repositioning Furniture /Trash removal and Lifting	Repeated lifting with trunk flexion, extension and rotation

Source: (Landers and Maguire, 2004)

Skin irritations and respiratory illnesses are very common among hotel room attendants due to the exposure to chemicals used for cleaning guest bathrooms (Hsieh et al., 2013). Broken glasses and medical wastes left in the guest room are other examples of biological hazards that could cause infectious diseases to the housekeepers as indicated by Makulowich (1996). Hotel room attendants also are in a high-risk for hypertension due to the high-pressure work conditions (Sanon, 2013). Occupational health and safety (OHS) is deeply related to ergonomics and it needs to be implemented to each member of the organization. Trainings allow transition of organizational knowledge and help trainees to understand how to apply a specific ergonomics practices in different situations (Abarghouei &Nasab, 2012).

Research questions

The following research questions shall guie the study:

1. Do the room attendants in three-star hotels aware of the ergonomic concept?
2. To what extent do the three-star hotels apply the ergonomic practices in the housekeeping department?
3. What is the impact of ergonomic on the room attendants' health?

Hypothesis

In order to achieve the research objectives, three hypotheses were developed as follows:

H1: There is a significant relationship between the physical ergonomics and health problem among room attendants.
H2: There is a significant relationship between the cognitive ergonomics and health problem among room attendants.
H3: There is a significant relationship between the organizational ergonomics and health problem among room attendants.

Methodology

The primary data for this research was collected through a face-to-face interview with room attendants. Due to Covid-19 prevention procedures and closure of most hotels, the researchers could only make appointments to interview 30 room attendants working in three-star hotels in greater Cairo from October 2020 through January 2021. Each interview lasted

between 40-60 minutes maximum. This procedure was required to be done away from the hotels to assure room attendants had time to answer questions and felt comfortable discussing their health, safety risk, work condition and workload at their workplace. The research interview survey was adapted and modified from a previous survey instruments, used in studies on hotel housekeepers, developed by Hsieh et al., (2013) and Mammen (2017).

Survey questions were classified as either closed or open-ended. Open-ended. Room attendants were given the flexibility to react in their own way without being limited by choices when they were asked open-ended questions. The survey items were mostly short and straightforward. The questions were specific and to the point, making them easy to grasp for room attendants. Moreover, the survey included an informed consent to participate to notify the room attendants about the voluntary nature of participation and that withdrawal from the study could be done at any time. The survey comprised of five sections as follows:

The first section included general questions about the room attendant such as *gender, age, years of working as a room attendant, this section concluded with the questions of health insurance availability and whether or not the room attendant is aware of the ergonomic term*.

The second section involved the assessment of physical ergonomics. Questions on workloads and work conditions started by asking the room attendants *how many rooms are assigned to him/her during a typical workday and the time taken to clean them*. The room attendant also was asked *how often in the last 4 weeks before the interview he/she had to skip/shorten lunch or break to finish the assigned work, work longer hours, flipped mattress or moved heavy furniture without help, had to clean after sick people, and avoided going to the bathroom to finish the work*. The response scale used was *never, 1-5 times, 6-9 times, 10-20 times and more than 20 times*. The following questions were asked about the room attendant's equipment and supplies: *vacuum cleaner is broken or too heavy, cleaning supplies irritate the eyes or do not clean effectively, linen cart is too heavy, and cleaning tools are insufficient*. The response scale was strongly agree, agree, disagree, and strongly disagree

The third section consisted of questions to assess the cognitive ergonomics such as, *working under lot of time pressure to finish my rooms each day, not getting enough time off work to get the rest I need, not taking time off work for fear of losing my job, if I had a choice I would not do this job, I am treated unfairly at work, the salary I make is enough for me to make a decent living and I am with respect by my supervisor*. Responses to these questions included strongly agree, agree, disagree, and strongly disagree which enhance the statistical analysis of these statements.

In the fourth section of the survey the organizational ergonomics were assessed through questions like *I am encouraged to report workplace injuries, If I disclose a work-related injury, I receive coaching, Management is only concerned about health and safety after there has been an accident, Management sometimes neglects safety and health procedures, Management expects me to break safety and health guidelines to get work done, I may be fired if I report multiple work-related injuries, Management does not respond to my suggestions to enhance health & safety. Possible choices* included strongly agree, agree, disagree, and strongly disagree

Finally, the fifth section of the survey included closed-ended questions to ask the room attendant if he/she had any health problem or pain in various parts of the body during the past 4 weeks. The answers of this section ranging from *none, mild, moderate, severe, and very severe.*

Table (2) Cronbach's Alpha and Self-validity of the Dimensions

Dimension	No. of Items	Cronbach's Alpha
Physical ergonomics	5	0.529
Cognitive Ergonomics	5	0.817
Organizational ergonomics	7	0.655
Health problem of the room attendants	16	0.522

Cronbach's Alpha statistics were used to measure validity and reliability of the research dimensions. All the coefficients were more than 0.5, which assured that these dimensions were reliable. It is also found that all values of correlation coefficients are significant and higher than 0.4, which means that these dimensions were valid to measure the hypotheses of the study as shown in table (2).

Results

In order to answer the research questions, Statistical Package for Social Sciences (SPSS), Version 24 was used to analyze the data collected from the interview survey held with 30 room attendants working in the three-star hotels in greater Cairo. T-test, Anova and regression model were used to analyze the data.

Personal profile

The descriptive analysis of the demographic questions included in the first section of the interview survey is shown below in table (3)

Table (3) Demographic Variables

		Frequency	%
Gender	Male	6	20.0
	Female	24	80.0
Age	Less than 20 year	1	3.3
	From 20 to 29 year	21	70.0
	From 30 to 39 year	5	16.7
	More than 40 year	3	10.0
Working years as a room attendant	Less than 1 year	7	23.3
	From 1- 5 years	16	53.3
	From 6- 10 years	6	20.0
	More than 11 years	1	3.3

The findings of the personal data demonstrated that most of the participants were female 80%, which is typical of the situation for most hotels in the sector. Most of the respondents' ages ranged from 20 to 29 years old. With regard to experience, 53.3% of the respondents reported working between 1-5 years as a room attendant. The room attendants were also asked in section (1) about the health insurance availability, and the majority of them (86.7%) stated that they have health insurance. Only 16.6% of the room attendants stated that they are aware of the ergonomic concept.

Physical ergonomics

The second section of the interview survey was the assessment of the physical ergonomics .The descriptive statistics of workload and work conditions is illustrated below in table (4&5)

Table (4)

Questions	Mean	Std. Deviation
During a typical workday, how many rooms are you assigned?	11.87	2.460
On average. How long does it take to clean them	34.83	22.837

Table (5)

Questions	Mean	Std. Deviation
I had to skip/shorten lunch or break to finish my assigned work for the day	1.60	0.498
I had to work longer hours to finish my assigned work for the day	1.93	0.254
I was required to rotate/flip mattresses/move heavy furniture without help	1.93	0.450
I had to clean after sick people who stayed in the room	1.60	0.498
I avoided/delayed going to the bathroom to finish my rooms	1.87	0.434

Cognitive ergonomicsx

This factor was used in the third section of the survey to explore to what extent the respondents realize cognitive ergonomics in their work, the findings are illustrated in table (6)

Table (6) the Descriptive Statistics of Cognitive Ergonomics

Questions	Mean	Std. Deviation
I work under a lot of time pressure to finish my rooms each day	4.50	0.630
I don't get enough time off from work to get the rest I need	3.63	1.129
I don't take time off from work for fear of losing my job	1.87	0.507
The salary I make is enough for me to have a decent living	3.07	0.944
If I had a choice, I would not do this job	4.57	0.679
I am treated unfairly at work	2.93	1.311
I am treated with respect by my supervisor	3.23	0.971

Organizational ergonomics

This factor was included in the fourth section of the survey. The findings are presented in table (7).

Table (7) the Descriptive Statistics of Organizational Ergonomics

Questions	Mean	Std. Deviation
Management sometimes ignores health and safety procedures	2.20	0.714
Management is only concerned about health and safety after there has been an accident	3.73	0.828
Management expects me to break health and safety regulations to get the work done	2.67	1.093
I am encouraged to report work-related injuries	3.00	0.525
If I disclose a work-related injury, I receive coaching	3.23	0.504
If I report multiple work-related injuries, I may get fired	3.13	0.507
Management does not respond to my suggestions to enhance health/safety	3.67	0.758

Health problems

The findings of the fifth section of the survey is illustrated in table (8)

Table (8) Health Problems among room attendants

Dimensions	Mean	Std. Deviation
Pain in my legs/hips and /or knees	2.40	0.724
Pain in my ankles and/or feet	2.17	0.834
Pain in my hands, wrists, fingers	2.47	0.776
Pain in my elbows and lower or upper arms	1.67	0.479
Head (headaches)	1.70	0.535
Pain in my chest or abdomen	3.33	0.711
Pain in my neck/shoulder	3.57	0.774
Pain in my upper or lower back	2.90	1.062
Pain or burning in my eyes	2.03	0.850
Burning or itching on my skin	2.07	0.944
Pain from cuts/open wounds	2.80	1.126
Burns from chemicals	2.03	0.809
Sprains/strains	1.67	0.606
Fractured/broken bones	2.50	1.280
Dislocation of joints	2.40	0.855
Injury from slips/trips/falls	2.77	0.774

Correlation between physical ergonomics and health problems of room attendants

Table (9) Regression analysis of workload and work conditions

Health problem of the room attendants						
Variables	R	R Square	F-test	Sig.	B	sig
Workload and work conditions	.448[a]	0.201	7.048	.013[b]	1.652	0.013

The model is significant where the value of Sig=.013 is less than 0.05 = α.

From the previous table we can note that the value of the correlation coefficient is .448a, which indicates a moderate positive correlation between workload and work conditions to health problem of the room attendants. The value of the coefficient of determination is 0.201, which means workload and work conditions were able to explain 20% of the variations in health problem of the room attendants. There is a statistically significant effect of (workload and work conditions) on health problem of the room attendants where the value of Sig is less than 0.05 = α , the value of b = 1.652,when workload and work

conditions increase by unit 1 health problem of the room attendants increase by 1.652.

Table (10) Regression analysis of equipment/ supplies

Health problem of the room attendants						
Variable	R	R Square	F-test	Sig.	B	sig
Equipment and supplies	.376[a]	0.141	4.608	.041[b]	0.478	0.041

From the previous table we can note that, the value of the correlation coefficient is .376, which indicates a moderate positive correlation between equipment and supplies to health problem of the room attendants. The value of the coefficient of determination is 0.141, which Equipment and supplies were able to explain 14% of the variations in health problem of the room attendants. There is a statistically significant effect of (equipment and supplies) on health problem of the room attendants where the value of Sig=0.041 is less than 0.05 = α, the value of b = 0.478, when equipment and supplies increase by unit 1 health problem of the room attendants increase by 0.478.

Correlation between cognitive ergonomics and health problems of room attendants

Table (11) Regression analysis of cognitive ergonomics

Health problems of the room attendants						
Variable	R	R Square	F-test	Sig.	B	sig
Cognitive Ergonomics	.695[a]	0.482	26.094	.000[b]	0.893	0.000

From the previous table we can note that, the value of the correlation coefficient is .695, which indicates a moderate positive correlation between cognitive ergonomics to health problem of the room attendants. The value of the coefficient of determination is 0.482, which means cognitive ergonomics were able to explain 48% of the variations in health problem of the room attendants. There is a statistically significant effect of (cognitive ergonomics) on health problem of the room attendants where the value of Sig=0.041 is less than 0.05 = α , the value of b = 0.893,when cognitive ergonomics increase by unit 1 health problem of the room attendants increase by 0.893.

Correlation between organizational ergonomics and health problems of room attendants

Table (12) Regression analysis of organizational ergonomics

Health problem of the room attendants						
Variables	R	R Square	F-test	Sig.	B	sig
Organizational Ergonomics	.238[a]	0.057	1.681	.205[b]	0.833	0.205

From the previous table we can note that, the value of the correlation coefficient is .238, which indicates a moderate positive correlation between organizational ergonomics to health problem of the room attendants. The value of the coefficient of determination is 0.057, which organizational ergonomics were able to explain .57% of the variations in health problem of the room attendants. The model is not significant where the value of Sig=. 205 is more than 0.05 = α.

Table (13) Summary of Results

id	Hypothesis	Supported / not
1	There is a significant relationship between physical ergonomics and health problems among the room attendants	Supported
2	There is a significant relationship between cognitive ergonomics and health problems among the room attendants	Supported
3	There is a significant relationship between the organizational ergonomics and health problems among the room attendants	Not supported

Discussion and implication

The study was conducted on 3-star hotels in greater Cairo to investigate the effect of ergonomics practices on room attendant's health and to examine which types of ergonomics (physical /cognitive /organizational) can cause health problems to them. The results of the study assured that the majority of the room attendants (83.4%) are not aware of the ergonomic concept. The results also showed that the room attendants

are mainly exposed to Musculoskeletal Disorders (MSDs) due to repetitive functions, chemical hazards due to use of cleaning supplies and chemicals, which irritate their skin and eyes and, in some cases, can cause respiratory diseases. In addition to the biological hazards such as exposure to broken glassware and medical waste left by guests in their rooms while cleaning. These findings are consistent with a previous studies by Mammen (2017) and Amaechi &Elsie (2019), which proved that there is a correlation between the physical ergonomics (workload /work conditions) and (supplies/ equipment) and prevalence of pain among hotel housekeepers. Therefore, this study suggests that housekeeping management to provide the room attendants with on-the-job training to be aware of the ergonomic practices, offer them with the prevention items such as eye goggle, knee pads, rubber gloves, masks, and to consider ergonomics, as well as health/safety hazards before buying any supplies or equipment (e.g. mattress lifter, lighter linen cart, color-coded cleaning supplies).

Previous study proved that, psychological factors, which work-related stress caused by the time constraints and workloads, in addition to the relationship between the room attendants and their supervisor and to what extent they feel respected and appreciated from their supervisor (Mest, 2013). Another study affirmed that there is a positive relationship between occupational safety and cognitive failure and correlated the workplace accidents with the mental errors, inattention and distraction (Kim, 2016). The results from this study are consistent with the previous studies as confirmed a significant relationship between cognitive ergonomics and health problems among room attendants. In this respect the study recommends the housekeeping managers in three-star hotels to have effective communication with the room attendants, encourage them to report health / safety issues, involve them in the purchasing process of supplies and equipment, empower them to share in identifying problems and finding solutions. Management also should coincide with the latest technologies & trends that could eliminate the workload stress on the room attendants and reduce their turnover/ absenteeism. The housekeeping management could also improve the work environment for the room attendants and encourage them to relax, do stretching exercising and breathing training during their break time to eliminate stress, improve performance and increase productivity.

Limitation and future research

The major limitation of this study was the sample size as the researchers could only interviewed 30 room attendants in greater Cairo due to the covid-19 prevention procedures and the closure of most hotels. Future research should attempt to collect larger sample of hotel room attendants. Another limitation of the study is that the sample was comprised only of room attendants working for three-star hotels in greater Cairo. Therefore, the results cannot be generalized. Future research should broaden the geographical area of the sample population locally or internationally. Future studies could include staff in different hotel department such as front office or food and beverage. Moderator variables should be simultaneously added to the_theoretical framework of the future research to increase the validity of the study.

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