ORIGINAL ARTICLE

Perspective of Office Workers on Impact of Standardized Workplace Design on Performance

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ABSTRACT

Introduction: Workplace design significantly influences employees' work performance and productivity. Standardized workplace design refers to consistent office layouts and equipment across an organization. This study examined the impact of standardized workplace design on performance among office workers compared to traditional workplace design and studied its strengths and limitations as there are currently limited studies on standardized workplace design and its impact on work performance. **Materials and methods:** An explorative qualitative study involving 12 office workers of private organizations in Malaysia's Kuala Lumpur and Selangor areas. Participants, selected through a sociodemographic and occupation characteristics survey questionnaire, joined semi-structured online interviews, where the interview questions explored the impact of workplace design on musculoskeletal discomfort, psychosocial and work performance, the strengths and limitations of workplace design, and satisfaction with current standardized workplace design. **Results:** The seven main themes identified from the semi-structured interviews were: (1) Impact on musculoskeletal discomfort, (2) Impact on mental health, (3) Impact on work performance, (4) Impact on work satisfaction and engagement, (5) Strengths of standardized workplace design, (6) Limitations of standardized workplace design and (7) Workplace satisfaction. **Conclusion:** The design of workplace environments plays a pivotal role in influencing both physical comfort and mental well-being. Addressing musculoskeletal discomfort through ergonomic solutions, while also considering psychosocial factors, is essential for fostering a healthy, productive workplace. Organizations must balance the strengths of standardized designs with the need for personalization and flexibility to create an environment that supports all employees effectively.
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INTRODUCTION

In the past decades, office workers have worked in a traditional workplace design, a commonly closed-plan design that creates a distinct separation between workers and departments with a lack of innovative and modern office furniture and may exhibit outdated decoration (1). It's a more conventional and less standardized setting that uses non-standardized or less standardized office components. Nowadays, in the competitive business world where organizations are engaging in a marathon to meet their goals and objectives, it is imperative for organizations not to disregard their workforce's potential to ensure high employee performance (2). Over time, various office designs have been used to meet diverse work styles and objectives (3) and workplace design with standardized office components has gained widespread adoption.

Workplace design with standardized office components involves consistently applying a standard to the design and layout of all office installations, including furniture and telecommunications equipment (4). This approach ensures that every employee has access to an equal and uniform workplace and support function areas, promoting equitable distribution and functionality across the organization (4). In addition, work performance is defined as the degree to which their assigned jobs and obligations have been completed. It is generally evaluated by the volume of work accomplished and the level of quality achieved (5).

Previous studies showed a strong association between workplace design and employees' job performance (2,6). Research showed that 96% of employees perceived that effective office design enhances overall work performance and competitiveness (7). Additionally,

furniture is ranked highest as the factors influencing performance (7). A study by Mendis also concluded that effective workplace design, including workplace layout, lighting, ventilation, thermal comfort and equipment, had a strong relationship with job performance (2). In addition, the study revealed that employees' productivity showed a 14% increase when working in a more comfortable work environment (8). Besides, improving working conditions is suggested to mitigate musculoskeletal problems and fatigue, ultimately contributing to improved employee productivity (9). A systematic review also revealed that workplace design demonstrated an association with the mental health of employees, which encompasses productivity, well-being, stress, mood, concentration, engagement and sleep quality (10). Mental health conditions can impact job performance negatively (11). Contrary to previous studies, a study showed that workplace design does not directly impact perceived job performance; however, an enhancement in perceived job performance was observed when coworkers were highly engaged and demonstrated better collaborative capabilities (12).

While previous studies have looked into the relationship between work performance and various components of workplace design, such as furniture and equipment established, lighting, thermal comfort, ventilation and workplace layout, there is currently no paper studied the impact of standardized workplace design (incorporating standardized office components) and traditional workplace design (using non-standardized office components) on performance. Besides, there are limited in-depth qualitative studies that delve deeper into the perceptions and experiences to study the impact of workplace design on performance among office workers. Thus, this study was conducted to fill the gap by studying the impact of standardized workplace design on work performance among office workers. Through in-depth interviews, this study aimed to examine the work performance of employees working in standardized workplace design compared to traditional workplace design. Additionally, it will study the strengths and limitations of standardized workplace design compared to traditional workplace design.

MATERIALS AND METHODS

Study Design

This study's design was explorative qualitative, using a case study approach. The data was collected through semi-structured interviews with the study participants. The institutional review board of the Universiti Kebangsaan Malaysia (UKM PPI/111/8/ JEP-2022-057) granted ethical approval to conduct this study according to the Declaration of Helsinki. All participants expressed their concerns before data collection.

Participants

The study population consisted of office workers of private organizations in the Kuala Lumpur and Selangor areas of Malaysia. The sampling method used was purposive to ensure a diverse range of perspectives. The inclusion criteria for the study were as follows: (i) Currently working in workplace design with standardized office components in Kuala Lumpur/ Selangor, (ii) Had past working experience in traditional workplace settings, (iii) Worked in workplace design with standardized office components for 5 months or more, (iv) Had musculoskeletal discomfort, (v) Able to understand and converse well in both English and Bahasa Melayu, (vi) Full-time workers, (vii) Spend most of their working time in the workplace (eight hours and above), (viii) Has internet access and device that enable participants to answer the pre-interview questionnaire and join the online meeting platform 'Google Meet'. The following were the exclusion criteria: (i) Part-time workers, (ii) Had medical conditions affecting cervical and lumbar spine (For example, ankylosing spondylitis, arthritis, disc degeneration, slip disc), (iii) Had history of lower back, neck, spine surgery previously, (iv) Had history of traumatic accidents.

Evidence-based suggestions for non-probabilistic interview sample sizes were at least 12 to reach data saturation. Saturation happened during the first twelve interviews, even though the fundamental components of the meta-themes were already present after merely six interviews (13,14) where the data showed redundancy, and additional interviews did not yield any new information. Thus, 12 participants had been recruited to participate in this study. To address potential selection biases, we established clear inclusion and exclusion criteria, aiming for a balanced representation in terms of duration of work in the current workplace, musculoskeletal discomfort, and common work tasks. This approach enhanced the transparency and credibility of our study.

Instrumentations

Initially, a sociodemographic and occupation characteristics survey questionnaire was distributed to office workers of private organizations in the Kuala Lumpur and Selangor areas in Malaysia. This questionnaire collected demographic information, which included name, age, gender, race, level of education, past medical history such as medical conditions affecting the spine (ankylosing spondylitis, slipped disc), history of spine surgery and history of traumatic accident. In addition, the questionnaire also collected information on occupation characteristics, which included current workplace design (standardized or traditional), past working experience in traditional workplace design, duration of work, working department and common work tasks. Subsequently, based on the information gathered from the survey questionnaire, 12 eligible participants were selected and approached by phone to participate in a semi-structured online interview. Once they agreed to participate in the study, a consent form

and information sheet were given to the participants. Before the interviews, participants were provided with detailed instructions on how to access and join the virtual meeting platform.

The semi-structured interviews were conducted via the online meeting platform 'Google Meet' to facilitate flexibility and accessibility for participants. In addition, the flexibility of online interviews allowed for scheduling convenience, accommodating participants' availability without the need for travel. We took steps to mitigate the impact of the interview, for example, we ensured that interview questions were clear and structured to facilitate open and meaningful responses. We also encouraged participants to share their thoughts and feelings openly, creating a supportive and empathetic interview environment. The interview questions were semi-structured, allowing for flexibility in conversation while ensuring crucial topics were covered methodically. By reviewing the existing literature (15,16) and engaging in interactive discussion within the research team, a semi-structured interview guide, which comprised 14 semi-structured questions, was developed. The semi-structured interview questions focused on three dimensions, which were: (i) Impacts of workplace design looking into the aspects of musculoskeletal discomfort, psychosocial and work performance, (ii) Strengths and limitations of standardized workplace design compared to traditional workplace design, (iii) Satisfaction with current standardized workplace design. The interview session lasted around 20-45 minutes, depending on the discussion depth and participants' engagement level. This duration was selected to balance the necessity for comprehensive data gathering with considerations for participants' comfort and attention span. During the interviews, the researcher was the moderator, leading the conversation and ensuring all questions were addressed. Probing approaches stimulated the elaboration and clarification of responses, allowing a deeper understanding of participants' perspectives. Only the researcher and interviewees were in the meeting room during the interview. With participants' consent, the sessions were screened and audio recorded to ensure accurate documentation of responses.

Data Analysis

Statistical Package for the Social Sciences (SPSS) version 26.0 was used to analyze the sociodemographic and occupation characteristics survey questionnaire data. The data was analyzed by calculating the frequencies and percentages for each variable. Additionally, the information obtained from the interviews was analyzed thematically using Braun and Clarke's thematic analysis method (17). Two researchers did this to avoid biases. Firstly, all the interview video recordings were transcribed verbatim by the researchers and transcription quality was closely monitored, with regular reviews to ensure accuracy and completeness. The researchers read and re-read the transcriptions to familiarize themselves with the data. This was followed by an initial coding process where data with interesting features, ideas or patterns was systematically identified and labelled. These initial codes were descriptive and captured specific data features related to the research questions. Once initial coding was completed, researchers started to search for broader patterns and themes within the coded data. Themes were identified and generated based on patterns of resemblance, difference or significance across the data. Then, themes were reviewed and defined, ensuring they accurately represented the content of the data. Subsequently, the themes and findings were interpreted and analyzed. Researchers analyzed patterns and variations within and across themes to discover similarities, differences and trends in the data. Lastly, the findings were reported and supported by illustrative quotes or interview extracts. In this study, transcripts were not returned to participants for review, and no software was utilized for this analysis. This analytical method allowed an in-depth and thorough exploration of participants' perceptions and experiences regarding the impact of workplace design on performance.

During the thematic analysis, the coding process involved multiple researchers to ensure a comprehensive and unbiased interpretation of the data. Disagreements between researchers regarding the coding of data were resolved through a systematic approach. Initially, each researcher independently reviewed and coded the data, identifying key themes and patterns. When discrepancies arose, they were discussed in team meetings, where researchers presented their perspectives and rationale for their coding decisions. To further enhance the reliability of the analysis, a consensus approach was employed. This involved re-examining the data and collaboratively refining the codes until all researchers reached an agreement. In cases where consensus could not be achieved, an external expert in qualitative research was consulted to provide an objective opinion and help mediate the disagreement. This rigorous process ensured that the final themes and codes were robust and accurately reflected the data, thereby enhancing the credibility and trustworthiness of the analysis.

RESULTS

Table I shows the sociodemographic information and occupation characteristics of the participants. A total of 12 office workers were involved in this study, and each participant was referred to as P1 to P12. The participants comprised ten females and two males, with all 12 participants reporting having a tertiary education level. The racial breakdown was six Chinese, five Malay and one Indian. They all have experience working in traditional workplace design for over five months. As for their duration of work in the current workplace, four participants had five months to two years of experience; two participants had two to five years of experience, and the other six had more than five years of experience. All

12 of them reported working an average of at least eight hours per working day.

Table I: Sociodemographic and occupation characteristics of participants

Partici-pants	Age	Gender	Race	Duration of work in the current workplace	Musculoskeletal discomfort	Department of work	Common work tasks
P1	59	F	Chinese	>5years	Low back	Administra-tion	Email correspondence and communication Scheduling and calendar management Data analysis and reporting
P2	36	M	Malay	>5years	Neck, Low back, Knees	Group Managing Director's Office	Typing and data entry Answering and making phone calls Email correspondence and communication Scheduling and calendar management Event planning and coordination Data analysis and reporting Office organization and maintenance
P3	28	F	Malay	2-5years	Neck, Shoulders, Upper Back, Low Back, Hips/Thighs	Strategy	Typing and data entry Answering and making phone calls Email correspondence and communication Scheduling and calendar management Data analysis and reporting Other: Presentation
P4	34	F	Malay	>5years	Neck, Upper Back, Low Back, Wrists/ Hands, Hips/Thighs	Administra-tion	Typing and data entry Email correspondence and communication Scheduling and calendar management Event planning and coordination Data analysis and reporting
P5	52	F	Malay	>5years	Neck, Shoulders, Upper Back, Wrists/ Hands	Laboratory	Typing and data entry Email correspondence and communication Event planning and coordination Data analysis and reporting Office organization and maintenance Other: research lab work
P6	28	M	Malay	2-5years	Neck, Shoulders, Upper Back, Low Back, Ankles/Feet	Information Technology (IT)	Typing and data entry Answering and making phone calls Email correspondence and communication Managing office supplies and equipment Scheduling and calendar management Customer or client support Data analysis and reporting Office organization and maintenance
P7	48	F	Chinese	>5years	Neck, Shoulders, Upper Back, Elbows	Strategy	Typing and data entry Email correspondence and communication Scheduling and calendar management Customer or client support Event planning and coordination Data analysis and reporting
P8	35	F	Indian	>5years	Low back, Shoul-ders	Education (Lecturer)	Email correspondence and communication Data analysis and reporting Other: Preparing materials
P9	38	F	Chinese	5months-2years	Shoulders	Finance	Email correspondence and communication Data analysis and reporting
P10	23	F	Chinese	5months-2years	Neck, Upper Back, Wrists/Hands, Hips/ Thighs, Knees	Information Technology (IT)	Data analysis and reporting
P11	25	F	Chinese	5months-2years	Neck, Shoulders, Low Back, Wrists/ Hands	Creative Service	Email correspondence and communication Managing office supplies and equipment Scheduling and calendar management Event planning and coordination Other: Design & research
P12	23	F	Chinese	5months-2years	Neck, Shoulders	Tax	Typing and data entry Answering and making phone calls Scheduling and calendar management

Participants came from various departments: Administration, Group Managing Director's Office, Strategy, Laboratory, Information Technology (IT), Education, Finance, Creative Service and Tax. As for the common work tasks, participants performed various tasks, as stated in Table I. The most common work tasks included email correspondence and communication (ten participants), data analysis and reporting (ten participants), scheduling and calendar management (eight participants) and typing and data entry (seven participants). Other tasks included event planning and coordination (five participants), answering and making phone calls (four participants), office organization and maintenance (three participants), managing office supplies and equipment (two participants), customer or client support (two participants), presentation (one participant), research lab work (one participant), materials preparation (one participant), as well as design and research (one participant). Additionally, all 12 participants reported experiencing musculoskeletal discomfort. The most common type of discomfort was neck pain, reported by nine participants (75%), followed by shoulder pain, experienced by eight participants (67%) and low back pain, experienced by seven participants (58%).

Seven main themes and thirty subthemes have been identified from the semi-structured interview data. Table II shows the number of responses for each subtheme of the main themes. Fig. 1 presents a summary of the impacts of standardized workplace design on performance among office workers and its strengths and limitations obtained from the semi-structured interview. From Fig. 1, we may conclude that musculoskeletal discomfort in the workplace is significantly influenced by the design and ergonomics of office components. While standardized ergonomic furniture can reduce discomfort, the lack of personalization may exacerbate these issues. Psychosocial factors also play a crucial role in mental health; a well-organized environment can alleviate stress, while physical discomfort can trigger anxiety. The impact of standardized workplace design extends to work performance, with ergonomic components enhancing productivity and satisfaction. However, rigidity in design and lack of personalization may hinder performance and engagement. Despite the strengths of standardized designs—such as consistency, fairness, and cost-effectiveness—limitations like inflexibility and non-ergonomic setups persist, impacting overall workplace well-being.

Table II: Themes and subthemes

Theme	Subtheme	Responses (N)	Participants Responds
Impact on musculoskeletal discomfort			
(1) Impact on musculoskeletal discomfort	(Positive impact of standardized workplace design)		
	(1) Ergonomic standardized office components reduce musculoskeletal discomfort	2	P6: *We received the extra monitor with adjustable height, so we will sit straight a bit and I notice that the neck pain has become reduced after I use that.* P5: *I do have muscular discomfort, it comes occasionally. I think much was contributed from my previous workplace whereby I didn't have a proper workplace to work, but at my current office, we have a proper chair so along the way that has improved my muscular discomfort.*
	(Negative impact of standardized workplace design)		
	(2) Lack of personalization of standardized furniture causes musculoskeletal discomfort	9	P2: *The company provides one-size-fits-all office furnitures, such as the tables are all with the same height, but different people have different tolerance to this table, yes, chairs can be adjusted, but at the end of the day, it's a bit tiring for me because I always slouch a bit, the same goes to mouse, everyone have the same mouse, but I buy myself an ergonomic mouse because it used to be very painful in my hand as different people has different size of hand and hand grip on mouse.* P3: *The non-ergonomic chairs and poorly positioned computer screens lead to poor posture and cause some strains on muscle and joints.* *P9: The organization has standard furniture, but it lacks ergonomic design, after prolonged sitting for the whole day will sometimes cause shoulder pain.* *P10: The desktop is a bit higher than eye level, so I'm always looking up when I'm working. I feel like that contributes to my neck and shoulder problems as well.*
	(No impact)		
	(3) No impact	1	P1: *We are provided with ergonomic chairs…usually we sit more than 8 hours on the chair without doing any exercise, and over time, I think it creates some discomfort.*

CONTINUE

Table II: Themes and subthemes (CONT.)

Theme	Subtheme	Responses (N)	Participants Responds
Impact on psychosocial aspect			
(2) Impact on mental health	(Positive impact of standardized workplace design)		
	(4) Consistency and familiarity provide assurance and prevent demotivation	2	P3: *Familiarity and consistency of the standardized design of equipment where everyone gets the same thing and experiences the same thing so no one would be feeling demotivated.* P7: *I feel having consistency will help to give me assurance and comfort.*
	(5) Well-organized and uncluttered environment reduces stress	3	P4: *Workplace design with a less crowded room will be more convenient and we will not be so stressful with the noise.* P5: *Last time in the very cramped workplace…it caused a mood swing because the environment was not welcoming enough.* P9: *Indirectly, with standardized design, you wont feel that the office is messy when you enter the office.*
	(Negative impact of standardized workplace design)		
	(6) Physical discomfort due to non-ergonomic standardized workplace causes stress	1	P8: *Sometimes it does affect my mental health like when you sit for too long at a non-ergonomically designed workplace, and you have no choice and have a lot of work to do and you need to complete it but you have back pain, so I become very stressed.*
	(No impact)		
	(7) No impact	6	P1: *Not really.* P6: *It doesn't really affect mental health, it just creates some boredness during working.*
Impact on work performance			
(3) Impact on work performance	(Positive impact of standardized workplace design)		
	(8) Ergonomic standardized office components improve work performance	2	P6: *When we receive the extra monitor with adjustable height, we will sit straight a bit and I notice that the neck pain has become reduced after I use that and it improves my work performance.* P12: *The comfortable and well-organized workspace with ergonomic components will improve productivity by reducing the physical strain.*
	(9) Well-designed workplace improves productivity	1	P5: *With the current standardized workplace which is more pleasant and well-designed, by taking into the consideration of healthcare and well-being of staff, design of equipment and office facilities and also the safety of staff itself, I think it definitely has facilitated our performance better. I tend to have less pain and less frequent sick leave compared to last time in the workplace which is very cramped.*
	(Negative impact of standardized workplace design)		
	(10) Non-ergonomic standardized office components affect work performance	4	P8: *After I sit for 2-3 hours on the improper chair, I have extreme back pain and after that I cannot concentrate on my work.* P9: *When the chairs and desks are not adhere to ergonomic principles, they may lead to musculoskeletal discomfort, thus affecting work efficiency*
	(11) Rigidness hinders performance	1	P10: *It might hinder my performance because of the rigidness of it because it's the same place and everything.*
	(12) Centralized temperature affects productivity	1	P7: *My room is very cold, it's a centralized aircon, so we are not able to really change the temperature. So most of the time, I will have to bring extra warm clothes to work to try to overcome this issue, but more often I am not able to stand the cold, this causes me to lose focus and I'm not able to work properly which probably affected my productivity.*
	(No impact)		
	(13) No impact on work performance	3	P2: *No, no impact.*

CONTINUE

Table II: Themes and subthemes (CONT.)

Theme	Subtheme	Responses (N)	Participants Responds
Impact on work performance			
(4) Impact on work satisfaction and engagement	(Positive impact of standardized workplace design)		
	(14) Consideration of health issues improves work satisfaction	1	P5: *Uniformity ensures that all the office components are taken into consideration of health issues and workflow of the staff, so definitely that has given more work satisfaction not only to me and also to every staff as well.*
	(15) Sense of security enhances engagement	1	P7: *Having uniformity does give me security and I know that there's no changes and gives me the assurance to just carry on with doing my work and without having to fear changes.*
	(Negative impact of standardized workplace design)		
	(16) Boredom/lack inspiration affects work satisfaction	3	P6: *Uniformity for me is a bit boring, so I will prefer a customizable design and personalized design and have better satisfaction with this.* P10: *I would say a standardized workplace negatively impacts my work satisfaction and also engagement, the reasoning is the office design is not really inspiring in a sense where there's lack of modern design.*
	(17) Lack of personalization affects work satisfaction	1	P12: *Providing a consistent environment which can be reassuring but it may not fit individual preference which can affect the satisfaction.*
	(No impact)		
	(18) No impact	6	P1: *I think regardless of standardized and traditional, both don't affect work satisfaction and engagement.* P2: *Both make no difference.* P3: *Personally, no. I think there are various other factors that will influence my work satisfaction and engagement rather than the workstation features.*
Strengths and limitations			
(5) Strengths of standardized workplace design	(19) Standardized ergonomic furniture and equipment	7	P2: *We have ergonomic chair with adjustable armrest, seat and lumbar support.* P10: *We have comfortable chairs and sufficient desk space.* P6: *My company provides us with an external keyboard, mouse, extra screen and an ergonomic chair with back and hand supports.* P11: *There is a high table that allows working in standing to prevent prolonged sitting.*
	(20) Familiarity and predictable environment	1	P3: *The most noticeable strength would be the familiarity and predictable environment with standardized office furniture, for example there are several designs of office chairs with the same color which we can choose from.*
	(21) Fairness and equality	1	P3: *I think it's fair for all of us as employees because everyone has the same chairs and cubicles design, so it provides the sense that the company treats all the employees fairly.*
	(22) Health and well-being consideration	1	P5: *The current workplace design takes into consideration the healthcare and well-being of staff. In that way, currently the workplace is very much favorable to our health issues and we don't have many health issues. We also provide them with crocs so that they are more comfortable because we need to stand for a long time.*
	(23) Cost reduction	1	P9: *Standardizing the purchase of office furniture can help reduce costs.*
	(24) No identified strength	3	P4: *No.*

CONTINUE

Table II: Themes and subthemes (CONT.)

Theme	Subtheme	Responses (N)	Participants Responds
Strengths and limitations			
(6) Limitations of standardized workplace design	(25) Lack of personalization	4	P6: *I prefer customized office components. I think standardized office components make me feel less sense of belonging as the office components are not customized and personalized.* P9: *The current design makes everyone's workspace uniform, regardless of their level, but limits the ability to customize one's workspace to individual needs and preferences. This lack of personalization can affect comfort and satisfaction at work.* P12: *It's also very important to balance the standardization with the opportunity for personal preferences because the personal workspace can foster a sense of belonging and the standard design maybe sometimes make the place feel less personalized.*
	(26) Fit and adjustability issues	2	P2: *I'm slightly taller than other people. Sometimes I find that my knees are hitting the table.* P11: *I feel that the furniture is not user friendly, the desk and chair are standard, the chair is adjustable, but when adjusted to its max lowest height, it's still too high for me, and the armrests height is not perfectly fit. The height of the table and chair is not fit also.*
	(27) Non-ergonomic workplace design	2	P4: *We are not using the adjustable chair, and when we sit too long, it will affect our lower and upper back. One more thing, everyone here is using a laptop, instead of a desktop, laptop is lower than the desktop, and we have to look down to see the screen.* P8: *I think it's not very ergonomic, the desk, the desktop and my chair are not at appropriate height because when I work for too long then I'll have back pain.*
	(28) Inflexibility for different work preferences and tasks	1	P3: *Sometimes lack of flexibility in our individual workstation as in like maybe the particular workstation may not accommodate different work preferences and tasks.*
	(29) No identified limitation	3	P1: *No, it's quite good.*
Workplace satisfaction			
(7) Workplace satisfaction	(30) Satisfaction with current standardized workplace design		**Satisfied** P7: *Overall, I'm quite satisfied.*
	☐ Satisfied	4	
	☐ Moderately satisfied	2	**Moderately satisfied**
	☐ Not satisfied	5	P3: *I will say yes, but on a very minimum level because I don't have high expectations and it already provides me with a comfortable and at least functional environment which will support my productivity and well-being in doing my work.* P12: *I'm moderately satisfied with the workplace design because it meets the basic needs and supports my daily task effectively but there's also some room for improvement.*
	☐ Mixed satisfaction	1	**Not satisfied** P2: *I would say no.* P8: *Not really.*
			Mixed satisfaction P9: *Satisfied as in open layout, it promotes instant communication and collaboration among employees, reducing information delays, but not satisfied in terms of the open environment can lead to increased noise and distractions, affecting employees' concentration and work efficiency.*

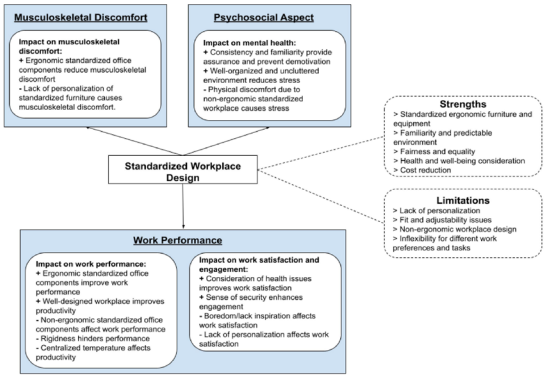

Fig 1: Summary of impacts of standardized workplace design (solid line rectangle) and its strengths and limitations (dashed rounded rectangle). The "+" symbol indicates a positive impact, while the "–" symbol indicates a negative impact.

DISCUSSION

In this study, we explored the impact of standardized workplace design on musculoskeletal discomfort, mental health, work performance, work satisfaction and engagement among office workers, and its strengths and limitations compared to traditional workplace design through one-to-one in-depth interviews. The insights gained from the interview provided a deep and rich understanding of the personal experiences of employees working in standardized workplace design. Our findings reveal a comprehensive understanding of how standardized environments influence employee's work experience.

In this study, the findings showed that standardized workplace design has a mixed impact on musculoskeletal discomfort. While some participants reported that ergonomic standardized office components such as adjustable chairs and monitors helped alleviate musculoskeletal discomfort, most experienced musculoskeletal discomfort due to the lack of personalization and ergonomic fit in standardized office components. Some participants pointed out that the one-size-fits-all office components caused poor posture and muscle strain, which aligns with previous studies indicating that non-ergonomic workstations lead to an increase in musculoskeletal discomfort (18,19). According to a study, the primary causes of musculoskeletal disorders are high physical demands, including awkward working postures, such as twisting, bending, kneeling and working with arms above shoulder height (20). Ergonomic interventions in the workstation reduce musculoskeletal pain in office workers, especially in the neck, upper back, shoulders and wrist/hand (21). These findings highlight the importance of incorporating ergonomic principles and allowing for personalization in workplace design to reduce musculoskeletal discomfort, as work-related musculoskeletal discomfort can impact fatigue and the productivity of workers (9).

The impact of standardized workplace design on mental health was predominantly positive or neutral among participants. While the majority reported no impact on mental health, several participants noted that the consistency and familiarity provided by standardized workplace design were noted to provide a sense of assurance and comfort. Besides, some participants pointed out that the well-organized, spacious and uncluttered standardized workplace gives a pleasant feeling and reduces stress. Studies have shown that the mental well-being of employees is adversely affected by crowded office environments resulting from psychosocial work stressors and environmental dissatisfaction (22). However, one participant reported experiencing stress due to physical discomfort from non-ergonomic standardized workplace design. This highlights the need for ergonomic considerations to minimize detrimental effects on mental health, as a non-ergonomic workplace can cause stress and affect cognitive functions and capabilities (23). The findings indicate that while standardized workplace design can improve mental health through organization and consistency, it can also leave negative impacts if ergonomic needs are not addressed. Given that psychological well-being significantly impacts employee performance and productivity (24), both psychological and ergonomic factors in standardized workplace design should be considered for improving work performance.

In addition, the workplace design's organizational and ergonomic features influence work performance. Most participants reported that the non-ergonomic furniture and rigid designs of standardized workplaces negatively affected their work performance. This is supported by a past study which reported that a workplace environment with inappropriate furniture and poorly designed workstations can harm productivity and work performance (25). Moreover, the centralized temperature control in the workplace also leads to losing focus and negatively affects productivity. Productivity and work performance of office workers are influenced by indoor temperature, with 21°C being the optimal indoor temperature (26). Low thermal environments impair physiological responses and cognitive performance during office tasks, with temperatures below °C intolerable for routine mental tasks (27). Conversely, some participants reported a positive impact on work performance, highlighting that ergonomic elements of standardized workplaces enhance their work performance by reducing physical strain. Past studies support this finding, claiming that ergonomic design elements, such as desk height, seating, lighting, and workflow, can significantly improve productivity and work performance by providing a safe and comfortable work environment (28-30). Additionally, a well-designed and organized workplace with considerations for staff healthcare and well-being was identified to improve work performance by reducing physical strain and frequency of sick leave. A well-designed workstation that prioritizes the health and well-being of employees can

triple productivity (31). While standardized workplace design can enhance work performance by integrating ergonomic components and health considerations, non-ergonomic furniture, rigid layout and inadequate temperature control can impair productivity and work performance.

Looking into the impact on work satisfaction and engagement, a significant number of participants (50%) reported there was no difference in work satisfaction and engagement between the standardized and traditional workplace design, suggesting a general neutrality towards the impact of standardized workplace design. However, some participants reported that standardized workplace design causes boredom and lack of personalization, negatively affecting work satisfaction. Past studies showed that boredom is negatively associated with work satisfaction (32) and job engagement (33), which aligns with negative experiences reported by some participants in this study. Additionally, workplace personalization provides several advantages for office workers, such as reducing stress levels, increased productivity and improved job satisfaction (34). In contrast, a few participants noted positive impacts, where they appreciated the sense of security and health considerations provided by the uniformity of a standardized workplace, which contributes to work satisfaction.

One of the primary strengths identified in this study is the presence of ergonomic furniture and equipment with adjustable features. A recent study demonstrated the effectiveness of ergonomic chairs, even the basic ones, in reducing upper quadrant musculoskeletal pain and improving productivity in computer workers (35). Investing in ergonomic furniture for workers enhances job satisfaction, which benefits the organization (36). Besides ergonomic furniture and equipment, a few more advantages were addressed, which include promoting familiarity, ensuring fairness, considering health aspects and reducing costs. The past study reported that a well-designed workstation that supports the health and well-being of employees could increase productivity, reduce the risk of injuries by 50% and increase employee engagement by 5 times, ultimately contributing to overall organizational success (31). Besides, employees' psychological and social well-being in an organization is greatly enhanced when they perceive fairness within the organization (37).

Despite the strengths, a few limitations were pointed out, notably the lack of personalization. Participants expressed dissatisfaction with not being able to customize their workplace to meet their unique needs and preferences, which resulted in discomfort, diminished sense of belonging and reduced satisfaction. A lack of personalized workstations caused the feeling of uneasiness, being interchangeable and not being incorporated into the organization (38). The inability to adjust workstations to meet one's needs and comfort standards negatively affects perceived productivity and health in the workplace (39). Fit and adjustability issues were another significant limitation reported by participants. The one-size-fits-all design of standardized workplace design frequently failed to accommodate the varying body sizes and ergonomic needs. The mismatch between the body dimensions and office furniture leads to poor sitting posture, discomfort and reduced productivity (40). Participants also noted that non-ergonomic elements in standardized workplace design, such as chairs and desks that were not adjustable to meet ergonomic standards, led to musculoskeletal discomfort. This aligned with past studies, which showed that non-ergonomic workstations can negatively impact both general health and performance, and adjusting workstations to improve comfort and prevent musculoskeletal discomfort is essential (41). Moreover, the lack of flexibility in standardized workplaces was noted as a limitation, which can hinder the ability to create a dynamic and flexible workplace that supports different work types and individual needs. These limitations emphasize the importance of balancing standardization with the flexibility to accommodate individual preferences and physical needs.

In addition, participants' satisfaction with current standardized workplace design was varied. 33% of participants were satisfied, 17% were moderately satisfied, 42% were not satisfied, and 8% had mixed satisfaction. This emphasizes the importance of improving workplace design to better meet employees' diverse needs, as workplace satisfaction is an important indicator in determining employee productivity (42).

One of the limitations of this study is the relatively small sample size of 12 office workers from private organizations in Kuala Lumpur and Selangor, Malaysia. While these regions were selected to represent central Malaysia, the limited sample size may not fully represent office workers' diverse experiences and viewpoints from different industries and geographical locations. Moreover, the participants came from various departments and had diverse roles and specific job tasks within their respective organizations, introducing potential variability in how they perceive and experience standardized workplace design. The diversity highlights the need for caution when extending these findings to a larger population of office workers. The study's findings provide preliminary insights into the impact of standardized workplace design on performance among office workers. Future studies could benefit from broader and more diverse samples representing various regions and industries to enhance understanding of how standardized workplace design affects work performance and employee satisfaction.

CONCLUSION

The findings from this study indicate a mixed response to the impacts of standardized workplace design. Many participants reported negative impacts on musculoskeletal discomfort and work performance. In contrast, impacts on mental health were generally reported as positive or showing no impact, while work satisfaction and engagement showed predominantly no impact. These findings imply that while standardized workplace design may offer some advantages, they pose considerable challenges, particularly concerning physical health. In future, studies should look for methods to achieve a balance between standardization and personalization in workplace design, ensuring that the workplace design meets the diverse needs of employees. Besides, future studies should include a broader and more diverse sample of participants from various industries and roles to represent the breadth of experiences and opinions better. This will aid in identifying the particular elements and factors contributing to these diverse outcomes to optimize workplace design for better work performance and employee well-being.

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REFERENCES

1. Spaceist. Differences Between Traditional & Modern Offices. Spaceist; 2021[cited 2024 March 18]. Available from: https://www.spaceist.co.uk/blog/differences-between-traditional-modern-offices/
2. Mendis MVS. Workplace design and job performance: A study of operational level employees in the apparel industry of Sri Lanka. IJSRP. 2016;6(12):148-53.
3. Pitchforth J, Nelson-White E, Helder M, Oosting W. The work environment pilot: An experiment to determine the optimal office design for a technology company. PLoS One. 2020;15(5):1-33. doi.org/10.1371/journal.pone.0235428
4. Slighte P, Tanner M. Office space standards and guidelines. Government of the Northwest Territories, Public Works and Services; 2012.
5. Henarath HDNPO. Organizational behavior: The human side of work. Sri Lanka: Department of Human Resource Management, University of Sri Jayewardenapura; 2015.
6. Saha S. A study on impact of workplace design on employee's productivity in selected IT companies in Pune region. IJBGM. 2016;5(1):25-38.
7. Mahmoud Ali El-Zeiny R. Interior design of workplace and performance relationship: Private sector corporations in Egypt. ajE-Bs. 2018;3(7):109-18. doi.org/10.21834/aje-bs.v3i7.263
8. Soewardi H, Dila A, Rizkiningtias P. Development of working environment comfort to improve productivity. In: Proceedings of the 2016 IEEE International Conference on Knowledge Engineering and Applications (ICKEA); 2016.
9. Daneshmandi H, Choobineh AR, Ghaem H, Alhamd M, Fakherpour A. The effect of musculoskeletal problems on fatigue and productivity of office personnel: a cross-sectional study. JPMH. 2017;58(3):252–8.
10. Kropman D, Appel-Meulenbroek R, Bergefurt L, LeBlanc P. The business case for a healthy office; a holistic overview of relations between office workspace design and mental health. Ergonomics. 2022;66(5):1–25. doi.org/10.1080/00140139.2022.2108905
11. Hennekam S, Richard S, Grima F. Coping with mental health conditions at work and its impact on self-perceived job performance. Employee Relations. 2020;42(3):626–45. doi.org/10.1108/er-05-2019-0211
12. Paje RC, Boco LB, Gloria JCA, Go HAR. The effect of workplace design on employee engagement, collaborative capability, and on perceived work performance in coworking spaces. Journal of Physics: Conference Series; 2020. doi.org/10.1088/1742-6596/1529/3/032063
13. Braun V, Clarke V. Successful qualitative research: A practical guide for beginners. Sage; 2013. doi.org/10.1177/0959353515614115
14. Andrew JB, Henry WW. Supporting Thinking on Sample Sizes for Thematic analyses: a quantitative tool. Int J Soc Res Methodol. 2015;18(6):669–84. doi.org/10.1080/13645579.2015.1005453
15. Babapour M. From fading novelty effects to emergent appreciation of Activity-based Flexible Offices: Comparing the individual, organisational and spatial adaptations in two case organisations. Applied Ergonomics. 2019;81. doi.org/10.1016/j.apergo.2019.102877
16. Rolfu L, Eklund J, Jahncke H. Perceptions of performance and satisfaction after relocation to an activity-based office. Ergonomics. 2017;61(5):644–57. doi.org/10.1080/00140139.2017.1398844
17. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative Research in Psychology. 2006;3(2):77–101. doi.org/10.1191/1478088706qp063oa
18. Bentley H, Wu T, Russell M, Fitzgerald S, Chapman N, Kolof H, et al. Assessment of musculoskeletal discomfort and evaluation of radiology workstation ergonomics in a national radiology workforce. Academic Radiology. 2022;30(10):2101-7. doi.org/10.1016/j.acra.2022.12.007
19. Khandan M, Arab Z, Koohpaei A. High ergonomic risk of computer work postures among Iranian Hospital staff: Evidence from a cross-sectional study. Int J Hosp Res. 2016;5(1):29–34. doi.org/10.15171/ijhr.2016.06

20. Mishra S, Narendra P. An Overview of Ergonomics. J Ergon Res. 2020;3(1).
21. Lee S, DE Barros FC, DE Castro CSM, Sato TDO. Effect of an ergonomic intervention involving workstation adjustments on musculoskeletal pain in office workers—a randomized controlled clinical trial. Ind Health. 2021;59(2):78-85. doi.org/10.2486/indhealth.2020-0188
22. Herbig B, Schneider A, Nowak D. Does office space occupation matter? The role of the number of persons per enclosed office space, psychosocial work characteristics, and environmental satisfaction in the physical and mental health of employees. Indoor Air. 2015;26(5):755–67. doi.org/10.1111/ina.12263
23. Alyan E, Saad NM, Kamel N, Rahman MA. Workplace design-related stress effects on prefrontal cortex connectivity and neurovascular coupling. Applied Ergonomics. 2021;96. doi.org/10.1016/j.apergo.2021.103497
24. Nika FA, Bashir I. Impact of psychological well-being on employee performance and productivity. Productivity. 2023;63(4):417–27. doi.org/10.32381/prod.2023.63.04.5
25. Edem MJ, Akpan EU, Pepple NM. Impact of workplace environment on health workers. Occup Med & Health Aff. 2017;5(2). doi.org/10.4172/2329-6879.1000301
26. Vimalanathan K. Babu TR. The effect of indoor office environment on the work performance, health and well-being of office workers. J of Environ Health Sci and Eng. 2014;12. doi.org/10.1186/s40201-014-0113-7
27. Sepehri S, Aliabadi M, Golmohammadi R, Babamiri M. Human cognitive functions and psycho-physiological responses under low thermal conditions in a simulated office environment. Work. 2021;69(1):197–207. doi.org/10.3233/wor-213469
28. Afolayan MA, Fadeyi O, Nwachukwu C. Relationship between workplace design, ergonomics and organizational performance: A case study of West African Examination Council (WAEC). Management Strategies Journal. 2020;48(2):4-13.
29. Kumar GR, Bezawada ST. The impact of ergonomics on employees' productivity in the architectural workplaces. IJEAT. 2019;8(5C):1122–32.
30. Salawati L, Abbas I. The application of ergonomics to improve work productivity. JKS. 2023;23(2):336–44. doi.org/10.24815/jks.v23i2.33566
31. Kapri V, Gulati R, Omar A. Healthy workplaces: Offices that support employee health and well-being. IJRASET. 2023;11(4):4194–206. doi.org/10.22214/ijraset.2023.51242
32. Reijseger G, Schaufeli WB, Peeters MCW, Taris TW, Beek I, Ouweneel E. Watching the paint dry at work: psychometric examination of the Dutch Boredom Scale. Anxiety, Stress & Coping. 2013;26(5):508–25. doi.org/10.1080/10615806.2012.720676
33. Forastero A, Sjabadhyni B, Mustika MD. What millennials want: How to optimize their work. Psikohumaniora J Penelit Psikol. 2018;3(1):1-16. doi.org/10.21580/pjpp.v3i1.2489
34. Sari SM. Implementation Of Personalization In The Interior Of Cubicle Workspace. In: Proceedings of the First International Seminar on Languare, Literature, Culture and Education, ISLLCE; 2020.
35. Hoeben C, Louw Q. Ergonomic chair intervention: Effect on chronic upper quadrant dysfunction, disability and productivity in female computer workers. S Afr J Physiother. 2014;70(2):11-8. doi.org/10.4102/sajp.v70i2.32
36. Evans B, Duffy VG. Ergonomic analysis through targeted industrial case review and company investment benefit. In: Proceedings of the HCI International 2022 – Late Breaking Papers: Ergonomics and Product Design; 2022.
37. Emmanuel S. Distributive Justice and Employee Satisfaction in Rivers State. AJSSHR. 2020;3(3):18–27.
38. Fincke I, Hieb A, Harth V, Mache S. Activity-based working: Qualitative analysis of working conditions and health-related outcomes. Work. 2020;67(3):625–39. doi.org/10.3233/wor-203313
39. Kim J, Candido C, Thomas L, Dear R. Desk ownership in the workplace: The effect of non-territorial working on employee workplace satisfaction, perceived productivity and health. Building and Environment. 2016;103:203–14. doi.org/10.1016/j.buildenv.2016.04.015
40. Adu G, Adu S, Effah B, Frimpong-Mensah K, Albert Darkwa N. Office Furniture Design – Correlation of Worker and Chair Dimensions. IJSR. 2014;3(3):709–15.
41. Kumar SM, Kumar CN. Design of workstations for computer users: A review. IRE Journals. 2017;1(4):24-34.
42. Fassoulis K, Alexopoulos N. The workplace as a factor of job satisfaction and productivity. JFM. 2015;13(4):332–49. doi.org/10.1108/jfm-06-2014-0018