HOW DOES THE INDOOR ENVIRONMENT AFFECT MENTAL HEALTH WHEN WORKING REMOTELY?

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Abstract

The Movement Control Order (MCO) has forced significant segments of Malaysia's economy to shut down or scale back operations in a nationwide effort to curb the spread of COVID-19. However, one segment of the population that is perhaps more susceptible to the adverse economic effects of the pandemic is the mental well-being of those who need to work remotely at home. This study expands on previous research by examining workers' perceptions of remote working practices at home and their impact on a person's mental condition. The reviewed literature presents four (4) main indoor environmental quality factors: spatial and thermal comfort; noise distraction and privacy; visual comfort; and overall satisfaction with their home and its relation to the work stress level, in addition to the emergence of the new norm of working during the pandemic. This study has shown that the quality of the indoor environment plays an important role in ensuring comfort when working from home, as the practice could have a negative or positive impact depending on the IEQ. From the results, most of the IEQ score values were more than 1, and the mean was the highest, which demonstrates a positive scale. The input from respondents on IEQ also indicates their mental well-being due to the fact that IEQ strongly affects workers' stress and productivity levels when working from home. This paper recommends extending the study on gender and productivity level, as well as mental well-being (Factor 3), when working from home, and how this relationship may affect an organisation when such a policy is implemented.

Keywords: Indoor Environment, Mental Health, Remote Working, Pandemic

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INTRODUCTION

No one expected or wanted remote work to scale because of the Covid-19 pandemic. The battle for remote work has been ongoing. Surprisingly, remote work eliminates the wasted time of commuting, the petty tyranny of office politics, and the death of the workday by a ton of meetings. It's hard to argue any other outcome. Once companies and organizations have the processes and tools in place, and the results of weeks or even months, of remote working, it will be difficult to put the genie back in the bottle. The rapid, rushed transition to working at home for the entire workforce in the face of a global pandemic is not the best ideal way to scale remote work for everyone, and home isn't the location of choice for many. Many employees across the country are well beyond the first week of working from home started when Movement Control Order (MCO) was imposed in the country to control the spread of Covid-19, and that is when the problems start to surface. The second week of the MCO is when a lot of the problems start setting in, ranging from aches and pains and putting on weight. In week three and the following weeks, workers start to create new structures to help build physical immunity and mental resilience. It is more important than normal time to sleep, avoid sugar, move and avoid negative thoughts. Stress, depression, or social exhaustion is unavoidable in the best of times especially so now – the alarming science of stress. Luana Marques (2020), a Harvard psychologist said that from a scientific perspective when there is a real threat and the Covid-19 qualifies, the body goes into flight mode. There is a fear response that happens naturally – quite quickly, immediately, the limbic system goes on, and the emotional part of the brain, and it gets people ready for a fight, flight, or freeze (Marques et al., 2020). The poor consequences are that thinking in the brain decreases. They started to lose focus as they are trying to be productive and really, they don't have as much brain capacity as they had before. In the current situation, the stress becomes chronic. Depression can lead someone to go through changes in their appetites and sleeping habits, feeling fatigued usual shifts in mood and energy, and slow in thinking or movement (Compton and Shim, 2015; Marques et al., 2020). According to World Health Organization (WHO) in the World Health Report 2020, 41% of employees whom WFH vs on-site considered themselves highly stressed, compared to 25% of those who worked only on-site. Employees whom WFH experienced more of a blur when it comes to work and personal life boundaries, especially with the use of apps and smart devices. For some, the transition has been smoother than others, especially if employees are well-versed in work-from-home basis and the technology needed for it was made available before the MCO (Irawanto et al., 2021).

The understanding of health effects related to the indoor environment has evolved over the past decade (Srinivasan et al., 2003; Arif et al., 2016; Patino and Siegel, 2018; Abdulaali, 2020). Much of the previous research has focused on indoor air constituents, primarily pertaining to particles, bioaerosols, and

chemicals (Mujan et al., 2019; Abdulaali et al., 2020), and comfort factors such as temperature, air ventilation, and humidity (Arif et al., 2016). More recently, many researchers have begun to discuss the association between the built environment and humans as a complex interplay between building occupants or residents and an array of physical, chemical, biological, and design factors. Design characteristics of the indoor environment such as lighting, heating, ergonomics, and noise may create additional exposures that might contribute to health, comfort, and productivity. As people spend more time indoors, especially when they work remotely, the likelihood of significant detrimental health effects increases, such as declining mental health (e.g., depression, anxiety, schizophrenia, bipolar mood disorder, eating disorder, etc.). Mental illness is an emerging issue in Malaysia and is among the 10 global causes of morbidity and mortality. In 2020, mental illness was expected to be the second biggest health problem affecting Malaysians after heart disease (Ministry of Health Malaysia, 2017). According to the Institute for Public Health, under the Ministry of Health Malaysia (2017), one in every three Malaysian adults aged 16 and up has a mental health problem. The survey critically analysed what is known about the indoor environment and mental health conditions (e.g., stress levels, depression, and anxiety). The prevalence of depression was the highest in Selangor at 22.6% among urban school students (10.3%). The results also reported that males had a higher prevalence of depression, while females had a higher prevalence of both anxiety and stress. The main factors that contribute to mental health issues include loneliness, diets, occupational workloads, relationships (family, friends, partner, or spouse), tobacco use, alcohol consumption, drug abuse, sexual activity, and being bullied. Further studies have examined that major depressive disorder or depression is closely related to a feeling of sadness, worthlessness, or guilt, which can affect someone to lose interest in their routine activities (Srinivasan et al., 2003). Population density, the increasing cost of living in an urban area, and the built environment also contribute to the risk factor for mental health disorders (Marzukhi et al., 2020; Zainal and Hosni, 2022).

Recent studies consistently show an association between the indoor living environment and the well-being of adults (Arif et al., 2016; Patino and Siegel, 2018; Marzukhi et al., 2020; Zainal and Hosni, 2022). People often spend more than 80% of their lives indoors, yet they know much more about ambient environmental conditions and health than they do about the built environment and mental health well-being (Zainal and Hosni, 2022). Definitely, the built environment affects mental health, including stress levels, depression, and anxiety in two (2) major ways: (i) quality characteristics of the indoor environment; and (ii) environmental characteristics such as housing, crowding, noise, indoor air quality, and light. Most research on housing and health has focused on physical health rather than mental health and well-being (Marzukhi et al., 2020). Nonetheless, this study aims to focus on indoor environmental quality

and its association with work-from-home practice. Many countries around the world have adopted the work-from-home concept due to COVID-19. Indoor environmental quality, which emphasises house type and density (e.g., high-rise unit or landed house), floor level, spatial plan, and housing quality, has been linked to mental health despite insufficient research having been done on the subject. Indoor environmental quality is also associated with how workers are forced to work from home and how this has affected their mental well-being.

Although much research focuses on academia (e.g., teachers), self-efficacy, burnout, or emotional exhaustion, this study found no systematic review evidence of research on the characteristics of the indoor environment affecting psychological and emotional well-being when working remotely. To address this gap, the present study explores the literature and expands on professional workers' opinions on remote working practices at home and how they impact a person's mental health conditions. The reviewed literature presents mental health in the context of indoor environmental quality and identifies those factors in the design and planning guidelines for improving mental health, especially among urban inhabitants. The research question also demonstrates any challenges regarding the mental health well-being of workers who work from home or remotely during the COVID-19 lockdown.

LITERATURE REVIEW
Conceptualization of well-being at work from home in the current review
Over the past decade, the understanding and attention to health effects related to the indoor environment have evolved. Indoor Environmental Quality (IEQ) is one of the categories to recognize the standards of building design and environmental assessment. The factors being evaluated by IEQ are categorized as spatial comfort, indoor air quality, and thermal comfort, noise, and privacy, visual comfort. Some scholars have focused on indoor air constituents (particles, bio aerosols, and chemicals), and comfort factors (temperature, airflow, and humidity). Rapoport (1990) emphasizes the need to look at the relationship between the built environment and humans as a complex interplay between building occupants (who they are and what they do) and an array of physical, chemical, biological, and design factors.

In this section, the paper attempts to review the association between indoor environment and work related-well-being, which has gained increased attention. People spend up to 80% of their time indoors whether it be a residential, office, or commercial buildings, 11% in their vehicles, and another 9% in open spaces (including the park, and streets) (Srinivasan et al., 2003; Zainal and Hosni, 2022). A spatial organization such as lighting, heating, ergonomics, and noise may create exposures that contribute to comfort and health, or to chronic health effects (Compton and Shim, 2015). For example, there is evidence indicating that suppression of melatonin by nocturnal artificial lighting may play a role in breast

and colon cancer (Srinivasan et al., 2003). Researchers in environmental psychology have developed much literature on ways of measuring how the physical environment meets people's needs. One of the items in environmental psychology is lighting which can be categorized as artificial, interior lighting, and natural light or daylighting from windows (Marmot and Ucci, 2015). Daylighting research has linked increased comfort and productivity (Arif et al., 2016; Mujan et al., 2019). In addition, aspects of psychological comfort such as territoriality and privacy are strongly affected by spatial layout: office/room size and location; partitioning influences acoustic as well as visual privacy (Rapoport, 1969).

People not only live inside the house but due to several crises, workers are encouraged to remote work at home. Remote work or work from home is a working pattern that encourages professionals to work beyond the conventional office setting (Anka et al., 2020). In another way, by commuting to the workplace every day and working from a fixed desk, the remote workforce can carry out their activities and tasks, and achieve their goals anywhere they opt. The benefit of remote work is that an employee can choose to work in a way that makes work-life balance perfect (Irawanto et al., 2021). A remote worker is someone who is hired by a company but operates beyond the conventional office environment-working from a nearby co-working room or from home (Anka et al., 2020; Galanti et al., 2021). Some research showed when workers were able to work remotely, they are more satisfied with their jobs, more committed to their organization, and experience less stress linked to the day-to-day demands of the office and commute (Galanti et al., 2021). However, a worker's job always requires some level of interaction with their colleagues which may be challenged by physical, communication, and temporal separation. Individuals claimed that they missed office/workplace interactions, and felt isolated as they could not share concerns they had with colleagues. This may lead to limited access to the social and emotional support that is crucial in increasing employee engagement, and well-being. In order to maintain contact and meet their job expectations, workers heavily rely on ICTs which allow them to stay connected when working from different locations. As a result, they reported working long hours, and become harder to switch off from work. This is a phenomenon that intensifies in an "always-on culture", when individuals are expected by their supervisors to be constantly available, feeling obliged to follow strong norms set by their colleagues who are also connected. These behaviors can impair individuals' ability to switch off from work, translating into poor well-being and health problems (Vischer, 2007).

Work stress is a condition that affects emotions, thought processes, and the thinking process (Irawanto et al., 2021). Work stress is a recently recognized problem since the new norm of work-from-home practice due to several factors such as pandemics, office rents, infrastructure and maintenance costs, logistics and transportation costs, and flexibility. According to Vischer (2007), work stress

poses a significant effect on the health of an employee's performance adversely at the individual level. It will lead to absenteeism, less motivation, less job satisfaction, a low instinct to perform, low productivity, fatigue, no inquisitiveness to learn new things and develop new ideas, and less interest in work, thus, affecting workers' performance. Potential stressors (such as elements that interfere with task performance, motivation, and social relationships) include spatial organization, ambient conditions, and view or visual access from the workspace. Environmental stressors can influence the physiological process, produce negative affect, limit motivation and performance, and impede social interaction. Spatial organization issues include the openness of the layout. The proportion of open workstations to private, enclosed offices, and the distance between open workstations and access to needed resources such as technology and equipment, and washrooms. Closely related to spatial organization are ambient conditions such as sound, visual openness and light, ventilation, and thermal comfort (Vischer, 2007). Colors, artwork, signage, and design details convey meaning and can have symbolism that affects people emotionally (Kwallek et al., 2005). As an example, some work environments encourage personalization and individual decoration; some have key landmark elements that facilitate territorial definition for individuals or groups, such as windows (positive vibe) or washrooms (negative vibe). Environmental psychology research into the work environment also focused on measuring user satisfaction – both job satisfaction and environmental satisfaction. Based on stimulus-response logic, this approach posits worker satisfaction as a measurable behavioral response to features of the physical environment and the everyday surrounding.

In many respects, the main factors that may contribute to work stress are the condition of the living environment (Patino and Siegel, 2018). What is the role of indoor environment quality and environmental psychology, in encouraging or discouraging mental health conditions? Mental health can be defined as the state of well-being of an individual realizing their potential, being able to cope with the normal stresses of life, can work productively, and can contribute to the community (World Health Organization, 2022). World Health Organization (2022) suggest the definition of mental health as a dynamic state of internal equilibrium which enables individuals to use their abilities in harmony with the good moral values of society. To emphasize, Srinivasan et al., (2003) mentioned that mental health is a standard level of cognitive-emotional functioning and adaption and a sense of coherence experience in managing stressors. According to Patino and Siegel (2018), the direct source of stressors is through the built environment and indirectly through good quality of living and working environment. Marzukhi et al., (2020) define the sphere of direct planning influence towards human settlements by the built environment including the physical space such as the buildings, streets, houses, schools, and networks.

Furthermore, Compton and Shim (2015) highlighted five major factors that affect poor mental health which are noise, perceptions of crime or feeling of safe, house overcrowding, cleanliness, access to green spaces, and community facilities. However, several studies also relate the mental health condition of the employee affected by the working conditions. The work conditions can be categorized into job demands and job resources, which affect employees' well-being and performance (Galanti et al., 2021). Job demands refer to the physical, psychological, and socio-organizational aspects of the work whose energy-depleting process induces people to experience energy loss and fatigue, leading to stress and burnout. While job resources refer to the physical, psychological, social, or organizational aspects of the job that reduce job demands and stimulate work motivation, personal growth, and development which are linked to resilience and an individual's ability to control and impact their environment successfully this lessening stress.

While a considerable body of research has been consolidated focusing on the macro context of the built environment, little research on detailed studies of the spatial organization using the indoor environmental quality (IEQ) and environmental psychology and the impacts on health and well-being performance and productivity. Besides, little in the approach of environmental psychology controls the personal and experiential influences and prejudices that affect workers' assessment of the quality of the workspace. To achieve the research aim, this research developed a conceptual model to demonstrate the factors that contribute to the mental well-being of the employee when working remotely to bridge the gap in the literature as well.
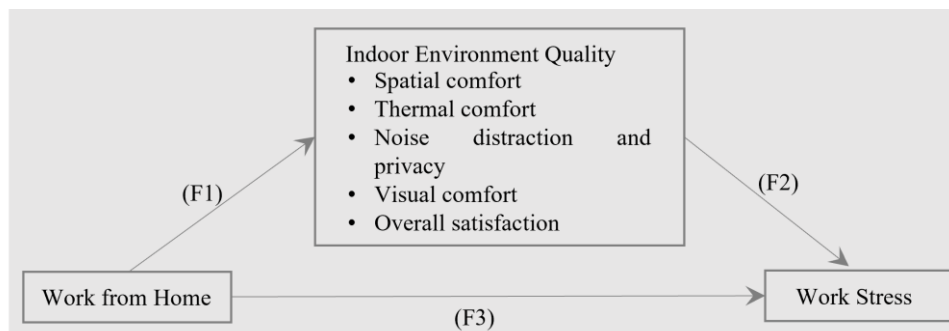

Figure 2. The conceptual model of relationship factors in this research

Factor 1 (F1) – Work from home is positively related to indoor environment quality
Factor 2 (F2) – Indoor environment quality is positively related to work stress
Factor 3 (F3) – Work from home is positively related to work stress due to the other factors

From the literature reviewed above, and the conceptual model in Figure 1, the environmental aspects have a massive impact on the workers' health well-being and psychological especially during the pandemic when they have to work remotely from any location for the first time without any preparation. This scenario contributes to the relationship of F1 as shown in Figure 1; between the work-from-home and IEQ. More recent research on environmental comfort elaborates on the notion of the suit between worker and workspace mainly in a multifunctional space, providing a sounder theoretical basis for workspace stress research. On the other note, the need to examine how work-from-home as a new way of working, has affected the mental well-being and productivity of employees with no prior remote work experience and to identify specific home-office spaces affecting remote work. In that so, the relationship of F2 was established to test whether the IEQ factors may affect the work stress level when remotely working as mental health has a relevant burden on the health of populations. While the association of work-from-home and work stress (F3) attempts to test the hypothesis that work-from-home alone affects work stress. The job demands and resources that are expected can be a major contributor to work stress.

METHODS

To test the relationship between indoor environmental quality and work stress when the working from home period due to the Covid-19 lockdown. The Malaysia Government imposed the first MCO lasted until 3 May 2020 to curb the spread of the virus. MCO measures encompassed restrictions on movement and international travel and mandated the closure of business, educational institutions, and industry and sports activity.

The data was collected using the online questionnaire survey (using Google Form) and randomly distributed to the participants who were work-from-home full-time in public and private organizations. Participants are from various professions (professionals, technicians, and associate professionals, managers, service and sales, clerical support workers, crafted and trade workers, plant and machine operators, and assemblers). The questionnaire was distributed through social media such as Facebook to reach as many respondents to participate. At the time of data collection, all participants were work-from-home full-time. The duration of the study to be responded to is within a month, from 13 April until 31 May 2020, as many of them continue to work from home when the first MCO has been extended and relaxed to Conditional Movement Control Order (CMCO) until October 2020. Only important sectors are allowed to continue their operation with limited operational hours during the MCO and CMCO. The estimation of the sample size is 100 as the population size is unknown. But, the researchers attempted as much as possible to get the respondents among the full-

time workers. As a result, the survey only managed to collect 74 responses from the employee (41.9% male and 58.1% female). Participation in the survey was voluntary, anonymous, and without any reward. Participants were also informed that the content of the study would only be used for this research purpose and following the confidential principles.

Table 1 presents the IEQ that has been demonstrated in the questionnaire to test the significant relationship between the IEQ and the work stress level while working remotely during the MCO and CMCO. For this study, the items in IEQ have been modified to suit the research aims which is an attempt to identify the significant relationship compared with mental well-being and work stress level. The IEQ items applied not gave focus on the architectural and interior design quality, building facility quality, and standard of maintenance, but on environmental psychology. Besides, the effects on the state of indoor environment condition of the following variables were analyzed to achieve the research aim:

i. Gender of the respondent
ii. Years of working experience
iii. Position
iv. Category of family member
v. Types of house

Table 1. List of Indoor Environmental Quality (IEQ) adopted in the questionnaire for the survey

Aspects	Questionnaire items	Survey questions	Rating scale
Spatial comfort	Personalization of work area	My home-working space can be adjusted or personalized to meet my preferences.	1 = Disagree 7 = Agree
	Degree of freedom to adapt	How satisfied are you with the degree of freedom to adapt your home-office space (e.g air conditioning, opening the window, lighting) to meet your preferences?	1 = Dissatisfied 7 = Satisfied
	Comfort of furnishing	Please rate how comfortable your home-office space's furnishing is (e.g chairs, desk, lamp, equipment).	1 = Uncomfortable 7 = Comfortable

	Cleanliness	Describe the level of cleanliness in your home-office space.	1 = Uncomfortable 7 = Comfortable
	Space for breaks	My home has a pleasant space for breaks and relaxation.	1 = Disagree 7 = Agree
Indoor quality thermal comfort	Air quality	Describe the satisfaction level of indoor air quality at your home.	1 = Dissatisfied 7 = Satisfied
	Temperature condition	Describe the level of comfort of indoor climate and thermal.	1 = Uncomfortable 7 = Comfortable
Noise distraction and privacy	Unwanted interruption	The home-office space's layout enables me to work without distraction or unwanted interruptions.	1 = Disagree 7 = Agree
	Visual privacy	My home-office space provides adequate visual privacy (not being seen by others).	1 = Disagree 7 = Agree
	Noise	Describe your comfort level of noise quality at home (not being overheard by others).	1 = Uncomfortable 7 = Comfortable
Visual comfort	Lighting	Describe your satisfaction level with the lighting comfort at home (e.g amount of light, glare, reflections, contrast).	1 = Dissatisfied 7 = Satisfied
	Color	What is the dominant color in your home?	N/A
Overall satisfaction	Overall work area comfort	How satisfied are you with the overall comfort of your home-office space?	1 = Dissatisfied 7 = Satisfied
	Productivity	How does your home-office space influence your productivity?	1 = Disagree 7 = Agree
	Health	1. Describe your stress level when joining or conducting the online meeting before the pandemic. 2. Describe your stress level when coping with the ICT tools during the outbreak.	1 = Negatively 7 = Positively

		3. Do you feel any emotional exhaustion or burned out in the past few weeks? 4. The factors that cause you emotional exhaustion or burned out.	

Modified from Rapoport, 1969; Vischer, 2007

The results applied Standard Deviation (SD) for the IEQ questions because SD provides an indication of how far the individual responses to a question vary or deviate from the mean. SD will tell us how spread out the responses are. Are they concentrated around the mean, or scattered far or wide? Low standard deviation means data are clustered around the mean, and high standard deviation indicates data are more spread out. By using the Likert-scale measures, did all respondents rate the IEQ in the middle of the scale, or did some agree or satisfy, or disagree or dissatisfy? Looking at the mean alone tells only part of the story, yet all too often, this is what the research focuses on. The distribution of responses is important to consider and the SD provides a valuable descriptive measure of this IEQ.

ANALYSIS AND FINDINGS
Respondents Profile
This study included 74 employees (41.9% male and 58.1% female). The average age of the respondents ranges from 31 to 40 years (standard deviation 2.3, minimum 21, maximum 60). This range of age is known as the "active workers" category. Most respondents are professionals (e.g., teachers, lecturers, designers, accountants, and architects), as well as those working in sales and services, and were able to work remotely. Their nature of work could be freely conducted anywhere and anytime, or based on a flexible working style that only required them to work with information and communication technologies (ICTs), including smartphones, laptops, or desktop computers. In contrast, for other technical professions, such as plant and machine operators and technicians, working remotely is difficult because of the requirement to work on-site with tools, equipment, or machines. Approximately 58% of the respondents reported having 1 to 4 members of their household and 60% having at least one child, with 35% of them reporting having children younger than 12 years old. According to Galanti et al. (2021), there is a strong correlation between the number of people in a household and workers' productivity when working from home. The higher the number of people in a household, the more likely workers to feel stressed, especially among women, resulting in low productivity and decreased performance.

The result also shows that 45.9% of the respondents are the head of the family which is slightly similar to the number of male respondents, and 54.1% are not the head of the family. As the head of the family, they play a major role in managing the household. Only 5.2% of the employees in the sample reported being involved in work-from-home (such as working as clerical support workers) before the pandemic and the rest of the respondents were work-from-home for the first time.

Table 2. Demography background of respondents

Particulars	Frequency (n=74)	%
Age		
21 – 30 years old	21	28.4
31 – 40 years old	25	33.8
41 – 50 years old	19	25.7
51 – 60 years old	9	12.1
Gender		
Male	31	41.9
Female	43	58.1
Employment by Occupation		
Professionals (e.g teacher, lecturer, manager, engineer, designer, accountant, architect)	17	24.0
Technicians and associate professionals (e.g lab assistants)	6	8.0
Manager	7	9.0
Service and sales (e.g sales and marketing, finance, hotel, telecommunication)	21	28.3
Clerical support workers (e.g administrative clerk, receptionist)	18	24.0
Crafted and related trade workers	2	2.7
Plant and machine operators and assemblers	3	4.0
Working Years		
1 – 5 years	25	33.8
6 – 10 years	29	39.1
More than 10 years	20	27.1
Head of Family		
Yes	34	45.9
No	40	54.1
Number of Households		
1-4	43	58.1
5-10	31	41.9
Types of House		
Detached (>3,800 sq ft)	11	14.9
Semi-detached (2,400 - 3,800 sq ft)	11	14.9
High-cost terrace (1,400 sq ft to 2,400 sq ft)	20	27.0

Medium-cost terrace (1,000 sq ft to 1,400 sq ft)	18	24.3
Low-cost terrace house (800 sq ft to 1,000 sq ft)	1	1.4
High-cost apartment (1,000 sq ft)	4	5.3
Medium-cost apartment (800 sqft to 900 sqft)	7	9.5
Low-cost apartment (700 sqft)	2	2.7

Source: Collected from primary data

As seen in table 2, the survey's aim is to ascertain how respondents' backgrounds and degrees of comfort with their home offices relate to their ability to work remotely from home. The demographic information is crucial to this study in order to assess whether the respondents have accurately reflected the intended target sample and to enable comparisons across a range of variables. According to the results, the respondents' ages ranged from 21 to 60 years old, indicating that they are a diverse working group. Most of the respondents belong to professional groups (e.g., teachers, lecturers, designers, engineers, it engineers, accountants, architects, or hr officers), which allows them to work from home as their roles do not demand physical work and do not require the physical presence of other personnel. This is followed by employees in the sales and services sectors, such as sales and marketing, finance, hotels, or telecommunications. Approximately 46% of the respondents are the heads of their families, and this can be related to the percentage of male respondents (41.9%), whereas 54.1% are not the heads of their families. This outcome is critical for understanding the roles that the heads of the family play in juggling household workloads, especially when there are more than 5 people in a household (41.9%). Working from home during the mco may become another factor that contributes to the well-being of workers' mental health.

Of the respondents, 27.0% reside in high-cost terrace homes, measuring from 1,400 square feet to 2,400 square feet, followed by those living in medium-cost terrace homes (24.3%). The limited space in the houses may contribute to the conflict of unclear psychological boundaries between home and work, resulting in more working hours per week compared to the usual office hours when working on-site. These extra work hours might be stressful and challenging for work-life balance. The finding is similar to that of several other secondary sources. Anka et al. (2020) reported that in the United States, 25% of remote workers feel that they are overworked. It indicates that they are engaged remotely for more than 40 hours per week. Of remote workers, 15% also attend more than ten online meetings per week. Besides, the limited space at home and the high number of people in a household prove to be difficult in terms of arranging a good home-office space. They may occupy an undesignated workspace such as the dining hall, the living hall, or the bedroom, since all rooms will likely be occupied.

Table 3 presents the reliability rate from the SD and mean value. The average SD is between 1.2 to 2.2 indicating that the responses were very

polarized, where most respondents had no reliability issues with rated on a scale of 7 points. The SD for high-cost terrace houses, low-cost terrace houses, and medium-cost apartments score the higher SD.

Table 3. The relationship between types of house and work stress when remote working during the pandemic

Types of House	1	2	3	4	5	6	7	N	Mean	SD
Detached	-	-	1	1	1	5	3	11 15.0	4.00	1.414
Semi-Detached	-	1	2	1	4	3	-	11 15.0	4.13	1.727
High-cost terrace	2	3	4	2	3	5	1	20 27.0	3.82	2.228
Medium cost terrace	1	1	1	2	1	6	2	14 19.0	3.43	1.902
Low-cost terrace	-	1	-	-	1	1	2	5 6.5	3.69	2.175
High-cost apartment	1	1	1	-	1	-	-	4 5.4	3.14	1.754
Medium cost apartment	-	1	1	1	1	2	1	7 9.4	3.44	2.128
Low-cost apartment	-	-	1	-	1	-	-	2 2.7	3.55	1.901
Total	4 5.4	8 10.8	11 15.0	7 9.5	13 17.5	22 29.7	9 12.1	74 100.0	3.52	1.942

Note:

1	No stress
2	Slightly stress
3	Somewhat stress
4	Moderately stress
5	Sometimes stress
6	Severely stress
7	Extremely stress

As illustrated in table 4, there are two types of home-office space: an isolated or specific home office and a flexible home office (irawanto et al., 2021). An isolated or specific home office is a dedicated work space with proper workstations (e.g., table or desk and chair) and hardware setup (e.g., monitor, laptop, printer, speakers, microphone, etc.) That has a sense of privacy and clear flow. Some respondents (68.9%) said that they have a flexible home office, which means they occupy spaces around the house, while 81.1% of them have an adjusted (modified) home office space. This result is related to the type and size of the house. Some respondents experience close interpersonal contact as they often use the same space for many activities, such as in the bedroom, which serves as their work space. A number of studies conclude that the use of space is not isomorphic among cultures. Each culture has specific variables that influence the use of space. Respondents may sometimes be working in the living room, the bedroom, or any unused room/space that can be converted into a home office space to meet their comfort and work needs.

Table 4. Types of home-office space among respondents

	N	**%**
Type of home-office space		
Isolated/specific home office	23	31.1
Flexible home office	51	68.9
Adjusted and personalized home-office space		
Yes	60	81.1
No	14	18.9

Home-office space assessments and environmental psychology when remote working

Work stress or burnout in this current situation can cause role ambiguity, overwork, and role conflict, while time pressure can reduce job satisfaction, productivity, and performance. This study explored the home environment as a mediator for the relationship between work-from-home and the well-being of mental health. One of the space assessments is colour, which is an important variable in interior design as it is relatively easy to alter the atmosphere of an environment.

Table 5 illustrates the several dominant colors in the respondent's house; white, cold, warm, and monochrome color. 59.5% of the respondents have mentioned that white is their house's dominant color, followed by cold colors such as blue, green, and purple (24.3%), and warm colors such as orange, red, and yellow (18.9%), and monochrome only report 8.1%. The color green is associated with moods such as comfortable, calm, and serene, while orange color is associated with moods such as excitement, distress, and upset. Research on Goldstein's theory of color perception has found that red has stimulating effects

on human behavior and emotions (Kwalleket et al., 2005). The purpose of the study was to investigate the effects of red versus green room colors on individual perceptions of stress. It suggests a relationship between colors and emotions, with warm colors associated with aroused feelings and cool colors with calming ones. Previous research led to the hypothesis that subjects would have higher scores on the Depression, Anxiety, and Stress Scale when tested in red color in a room compared to a green or white room. Besides, previous studies also have assessed effects on overall mood there is evidence that the significant effects of a bright red room may have effects on human stress, degree of uncertainty, fear, and physiological responses. However, the most dominant color in the respondent's house is white as white is a standard color that does not affect any moods and emotions (Kwalleket et al., 2005). In this case, determining factors of life stress is important for all workers, and the environment is often overlooked as a trigger to emotional states of being when working from home.

Table 5. The dominance of color in respondents' home

The dominance of color at home	N	%
White	44	59.5
Cold colors	18	24.3
Warm colors	14	18.9
Monochrome colors	6	8.1

Table 6 presents the list of environmental psychology that this research applied to test how they affect the worker's comfort level for a space for a break and relaxation when working remotely. There are ten (10) criteria tested including the space for break and relaxation, lighting, indoor climate and thermal comfort, noise quality, indoor air quality, space without distraction or unwanted interruption, visual quality, furnishing, cleanliness, and degree of freedom.

Table 6. The comfort level of respondents' home-office space

Pleasant spaces for break and relaxation				
	N	%	Mean	SD
Very disagree	1	1.4		
Disagree	2	2.7		
Slightly disagree	4	5.4		
Neither agree nor disagree	11	14.9	5.42	1.44
Slightly agree	18	24.3		
Agree	16	21.6		
Mostly agree	22	29.7		

For the assessment of pleasant spaces for break and relaxation, the respondents are required to respond from very disagree to mostly disagree on their spaces for a break and relaxation at home. The SD of 1.44 shows that the individual responses on average were far over 1 point away from the mean of 5.42. The N value supports the result of SD that most of the respondents mostly agree that they have a pleasant space for break and relaxation. The space may be the bedroom, balcony, yard, or living room.

Table 7. The lighting comfort of respondents' home-office space

Lighting comfort				
	N	%	Mean	SD
Very disagree	1	1.4		
Disagree	4	5.4		
Slightly disagree	9	9.5		
Neither agree nor disagree	11	12.2	5.45	1.21
Slightly agree	15	20.3		
Agree	12	16.2		
Mostly agree	22	29.7		

Most of the respondents (29.7%) mostly agree with the lighting comfort of the home-office space. The satisfaction of lighting comfort includes the amount of light, glare, reflections, and contrast. The SD of 1.21 presents that the individual responses on average were over 1 mean away from the mean of 5.45.

Table 8. The indoor climate and thermal comfort of respondents' home-office space

Indoor climate and thermal comfort				
	N	%	Mean	SD
Very uncomfortable	3	4.1		
Slightly uncomfortable	4	5.4		
Uncomfortable	10	13.5		
About half of the time	6	8.1	4.84	1.58
Little comfortable	22	29.7		
Usually comfortable	20	27.0		
Very comfortable	9	12.2		

Only 29.7% (or 22 respondents) of the respondents said that they are little comfortable with the indoor climate and thermal in their house which affects their productivity level when working from home and contributes to well-being. On a basis, thermal comfort can be assessed through the design of the building and heating, ventilation, and air conditioning systems, to provide comfort. The value of SD is 1.58 presents that the individual responses on average were over 1 mean away from the mean of 4.84, a bit lower than other IEQ.

Table 9. The indoor air quality of respondents' home-office space

Indoor air quality				
	N	**%**	**Mean**	**SD**
Very dissatisfied	2	2.7		
Dissatisfied	2	2.7		
Slightly dissatisfied	6	8.1		
Neither satisfied nor dissatisfied	9	12.2	5.34	1.50
Sometimes satisfied	10	13.5		
Satisfied	30	40.5		
Very satisfied	15	20.3		

40.5% or 30 of the respondents were satisfied with their indoor air quality at home. The value of SD is 1.50 presents that the individual responses on average were over 1 mean away from the mean of 5.34. The larger value of the mean states that the scale congregates on the satisfying scale.

Table 10. Types of home-office space's layout and respondent's comfort level

The home-work office's layout enables work without distraction or unwanted interruption				
	N	**%**	**Mean**	**SD**
Very disagree	7	9.5		
Disagree	4	5.4		
Slightly disagree	8	10.8		
Neither agree nor disagree	12	16.2	4.57	1.76
Slightly agree	13	17.6		
Agree	24	32.4		
Mostly agree	6	8.1		

32.4% of 24 respondents agree that their home-office space's layout enables them to work without distraction or unwanted interruption such as noise, children, furniture, or others. This result supports the response that 68.9% of the respondents have a flexible home office and they can be adjusted and personalized according to their preferences and comfort level. The SD of 1.76 is slightly higher compared to other IEQ attributes, while the mean value is 4.57. It shows that the individual responses on average were far over 1 point away from the mean of 5.42.

Table 11. The visual privacy of respondents' home office space

Visual privacy				
	N	%	Mean	SD
Very disagree	10	13.5	4.32	2.035
Disagree	7	9.5		
Slightly disagree	11	14.9		
Neither agree nor disagree	6	8.1		
Slightly agree	13	17.6		
Agree	15	20.3		
Mostly agree	12	16.2		

The survey found that the distribution of the mean for visual privacy in their home is regular. Only 17.6% and 20.3% of the respondents slightly agree and agree that they have good visual privacy. Respondents who are working from home are significantly more likely to have a partition or segregate space that is able to maintain privacy by means of doors and physical layouts. Rapoport (1969) explains that the English are also private people, but manage their psychological distance from others via verbal and non-verbal means such as voice/sound and eye contact. The SD of 2.03 and mean value (4.32) are slightly lower compared to other IEQ attributes.

Table 12. The comfort level of respondents' furnishing home living

Comfortable furnishing				
	N	%	Mean	SD
Very uncomfortable	1	1.4	4.99	1.512
Slightly uncomfortable	5	6.8		
Uncomfortable	8	10.8		
About half of the time	10	13.5		
Little comfortable	16	21.6		
Usually comfortable	24	32.4		
Very comfortable	10	13.5		

From the results, it can be reported that most of the respondents scored comfortable furnishing. In the enterprise working environment, they are working from home routinely enlarged and positive change in social recognition of the contactless-working style expanded with the settlement of a new working environment. A new space-created home furnishing is required for sharing work and rest beyond the existing interior concept. Home furnishing includes furniture, lighting, wallpaper, bedding, carpet, and interior equipment. The interior environment style needs to be created as a new one to satisfy the needs of the comfort home furnishing in various aspects such as aesthetics, function, and

economic utility for making their interior environment for the main space for working and relaxing.

Table 13. Level of cleanliness of respondents' home office space

Level of cleanliness				
	N	**%**	**Mean**	**SD**
Slightly poor	1	1.4		
Poor	2	2.7		
About half of the time	5	6.8	5.73	1.076
Clean	18	24.3		
Usually clean	30	40.5		
Very clean	18	24.3		

The majority of home-office respondents reported that the level of cleanliness was clean to extremely clean, while 40.5% of respondents rated their space as usually clean because they always maintain their space tidy to improve their comfort and mood. The SD of 1.076 shows that the individual responses were significantly different from the mean of 5.73.

Table 14. Degree of freedom of respondents' home office space

Degree of freedom (e.g air conditioning, opening the window, lighting) to meet respondents' preferences				
	N	**%**	**Mean**	**SD**
Dissatisfied	1	1.4		
Slightly dissatisfied	6	8.1		
Neither satisfied nor dissatisfied	9	12.2	5.43	1.228
Sometimes satisfied	15	20.3		
Satisfied	30	40.5		
Very satisfied	13	17.6		

Respondents were asked how much their home office space influenced their daily productivity. Most of the respondents rate the degree of flexibility in their home office space as occasionally satisfactory to extremely satisfactory. It can be stated that most respondents' homes have adequate lighting and ventilation, allowing them to receive sufficient amounts of sunlight and thus increase their productivity and focus. Furthermore, most urban houses built in the 2000s were planned with excellent natural light and ventilation to comply with local authority requirements for house design.

Table 15. The respondent's daily productivity when working from home amid the Covid-19

Daily productivity				
	N	**%**	**Mean**	**SD**
Very negative	1	1.4		
Negative	1	1.4		
Slightly negative	4	5.4		
Neither negative nor positive	16	21.6	5.20	1.303
Slightly positive	18	24.3		
Positive	22	29.7		
Positively	12	16.2		

On average, only 27% of the respondents rated their daily productivity as positive and slightly positive, while 2.8% reported it to be extremely negative and negative. Despite this, it can be said that the distribution of daily productivity percentage is more on a positive scale. This shows that employees did not have any issues working from home as their organisations have introduced flexible-working options amidst the MCO and CMCO. Employees were able to cope with their workloads and technological tools. Besides that, they could also cope with the appropriate technology and its equipment when working from home, especially when meetings need to be held virtually. The SD of 1.30 shows that the individual responses were significantly different from the mean of 5.20. The N value supports the result of the SD, that the distribution of the mean is far from 1 point, being closer to 5 to 7 points.

DISCUSSION

The questionnaire survey results revealed new insights into the variables of indoor environmental quality that influence workers' behaviour when working remotely, such as their mental health and perceptions of their living environment. COVID-19 provided the world with the opportunity to experience working from home, which had long been a desirable work option for many organisations worldwide. According to preliminary research on workers' reactions to working from home for the first time, the initial reactions to the new working arrangement appear to be favourable. The survey discovered that workers aged 21–40 years had to juggle home and work commitments simultaneously for both their husband and wife, especially those who are the heads of their families. For those who stay with more than 5 people in a household in a metropolitan area, living with limited space, such as in high-rise apartments, results in many distractions, discomfort, and an imbalanced work-life. Hence, learning how to manage remote work can reduce the perception of family-work conflict. In addition, organisations must support employees' time management skills, which will enable them to divide the

two spheres equitably. Employees ought to provide the right attention to the right task at the right time to minimise distress and promote their own mental recovery.

Aside from job conditions and work-from-home opportunities that contribute to the well-being of mental health, the IEQ, as one of the components of the built environment, plays an important role in promoting good mental health. The IEQ aspects include spatial comfort, thermal comfort, noise distraction and privacy, and visual comfort. Every aspect has 15 items to ask the respondents regarding their home office space. Using a seven-point Likert scale to measure employees' satisfaction, agreement, and comfort level in the home-office space, the results indicate that the respondents' home office space is of the adjusted (modified) type, which allows them to rearrange the space layout according to their comfort level and working needs. However, this may depend on several factors, such as the type and size of the house, floor area, and the number of people in the household. Most of the respondents were satisfied and scored high levels of comfort in several IEQ aspects, such as a dedicated space for break and relaxation (e.g., balcony, bedroom, study room, living hall), lighting, indoor air quality, cleanliness, degree of freedom, and furniture arrangement. These aspects scored a mean of more than 5 and a SD of between 1.0 and 1.2, which is close to the positive value.

No significant relationship was observed between IEQ and productivity levels. Most of the respondents felt slightly positive and positive when working from home. Only some of them were unable to describe whether they felt negatively or positively or felt totally positive about their daily productivity levels. The results prove that workers may have strong self-leadership and autonomy, and these two criteria have a positive relationship with work-from-home productivity during the COVID-19 pandemic. Future studies are recommended to incorporate job demands from a more diverse employment sector with a different position on the relationship between work-from-home demands and IEQ.

Despite the strengths of the current view, such as its rigorous theoretical framework and the breadth of literature it provides, some limitations need to be addressed. This study focused on a specific time frame during the MCO. Consequently, future research may reach different findings and conclusions, especially with regard to working from home among female workers as a norm to adapt to certain crises. The results demonstrate a strong relationship between working from home and IEQ. Most of the respondents were comfortable and satisfied with their present indoor environmental quality. However, this study did not intend to test the relationship between indoor environmental quality and productivity when working from home, although there is a question in the survey regarding productivity and stress. In conclusion, the present study achieved the first hypothesis: working from home is positively related to indoor environmental quality, although many other variables provide only a small account of the many

dynamics underlying the complex phenomenon of work-from-home practice. On this basis, it is important that future studies take other constructs into consideration, with a more specific research design and a more representative sample, particularly on job and personal resources.

CONCLUSION AND RECOMMENDATIONS
Overall, the findings suggest the importance of IEQ on individuals' comfort and mental well-being when working from home, as this has become a new policy in most Malaysian organisations following COVID-19. From the results, most of the IEQ scores were more than 1 and had the highest mean, which demonstrates a positive scale. The respondents' input on IEQ also indicates their mental well-being since IEQ strongly affects workers' stress and productivity levels when working from home. However, despite limitations due to a relatively low number of respondents, this study recommends extending the research to include gender and productivity levels that may affect employees' mental well-being (the third hypothesis—Factor 3) as a result of working from home. These have a positive influence on work stress due to other factors such as social isolation, work-life balance, and family commitments. The COVID-19 pandemic has forced workers to engage in extra work, even going so far as to work overtime because they must complete their assigned tasks. This study also found that in the early stages of the pandemic, workers were still adapting to the new norm of working from home and familiarising themselves with their home-office space setup. These have affected their comfort, productivity, and stress levels. Therefore, future research should aim to explore how this relationship may affect organisations in terms of their readiness levels when the work from home policy is implemented.

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