

Research Article

Role of Urban Public Space in Sustaining Mental Well-Being: Inferences from Pandemic Scenario

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Abstract: People go to urban public spaces for their needs of social interaction. It has been established that social interactions in public places hosting various active and passive activities have multiple psychological health benefits. However, public spaces have ceased to be public during the pandemic. The public realm, which was highly visited, had transformed into mostly inactive spaces, and particularly during the lockdown, they were completely deserted. This paper attempts to understand the association between restrictions of use in public spaces and the mental well-being of citizens during the first wave of Covid-19. The survey was conducted through an online questionnaire (n=277) to analyze their current living condition, the effect of the lockdown on their daily life, their perception of the future, activities they are missing, and their perceived stress due to the restrictions. Results from the statistical analysis show that higher perceived stress is associated with being unable to visit public places and not being able to connect with other people during the first lockdown. The study comprehended the difficulties of staying indoors and being unable to interact in urban public spaces socially. The research also infers that being unable to use urban public space for the natural reason of social interaction has negatively impacted mental well-being.

Keywords: Covid 19 & lockdown; public spaces; loneliness; mental well-being; stress

1. Introduction

The coronavirus 2019 (COVID-19) pandemic is the global crisis of our time, and it has led to long-lasting disruptive and traumatic consequences worldwide. The COVID-19 pandemic has resulted in dramatic loss of human life worldwide, about 6,945,714 deaths as of June 2023 (Chauhan, 2021a) and unprecedented challenges to public health and well-being (ILO et al., 2020). According to a survey, "Impact of COVID-19 on mental well-being worldwide 2021", published by Statista Research Department on Dec 7, 2022, 40 percent of respondents declared that the COVID-19 pandemic had a negative impact on their mental well-being (Statista, 2021.). As has been the case, the coronavirus spread with such a speed and intensity across the world due to the interconnectedness of the globalized world that most countries imposed temporary shutdowns as a strategy to contain its spread (Abusaada & Elshater, 2020; Chauhan, 2021b). Many countries imposed restrictions such as social distancing, isolation, and stay-at-home requirements (Abusaada & Elshater, 2020; Veeroja & Foliente, 2021).

In India, the outbreak started on 2nd March 2020, and after that, the cases increased exponentially (Senapati et al., 2021). The government of India imposed nationwide complete lockdown for 68 days limiting the movement of the entire 1.38 billion population (COVID-19 Lockdown in India - Wikipedia, n.d.). Restrictions on the use of public spaces and physical distancing were the prime policy measures to reduce the transmission of COVID-19 and protect public health (Kapoor, 2021).

In response to the fear of coronavirus and the subsequent lockdown, the people had to stay indoors, the normal day to day frequency of people meeting with family and friends got reduced and they were not able to socially interact in the public spaces (Abusaada & Elshater, 2020; Gehl, 2020; S. Singh et al., 2020). As rightly stated by Greek philosopher - Aristotle, "Man is by nature a social animal; an individual who is unsocial naturally and not accidentally is either beneath our notice or more than human. Society is something that precedes the individual" (Aristotle, as cited in Cristian, 2016). The restrictive use of urban spaces has resulted in a social disconnect, putting many into acute stress that was likely to influence their well-being (OECD, 2020; Zhang et al., 2021). This increase in social disconnection generated loneliness and isolation among people - about a 5 percent increase in the prevalence of loneliness across individual studies, on average (Winerman, 2022). In a way, the pandemic has lent us a hand in acknowledging the need for social interaction and the need to visit the urban public spaces.

The study was conducted during the time when most of the world's population had to follow the government mandates of being indoors and hence were not able to visit urban public spaces. The objective of this study would be to see how COVID-related restrictions on using public spaces have affected citizens' ability to carry out their daily activities, as well as their need for social interactions. The survey was conducted with an online questionnaire that incorporates the perspectives of individuals from various parts of the country. This online survey looks at the role of urban public spaces on social interactions in India prior to, and during, the COVID-19 pandemic and discusses the importance of social connection to maintain well-being.

The lockdown and change in usage pattern of urban public spaces then, have prompted more than one question "How the reduced usage and restrictions in visiting urban public spaces have impacted citizen's mental well-being? Do people's mental health suffer due to lack of social interaction caused by restricted visits to Urban Public spaces?". What is the relationship between citizen's well-being, social interaction, and urban public spaces?"

Urban Public Spaces and Mental Well-being

Urban public spaces are lively assets of a city (Mandeli, 2019) that allow a wide range of activities, attract users across different ages, abilities, and socioeconomic statuses, enhance the possibility of exchange, and increase the potential of social interactions (Zamanifard et al., 2019). Public spaces include streets, walkways, parks, public transportation facilities, shopping facilities, and other spaces where people congregate or pass through (Tonnelat, 2010; Zamanifard et al., 2019). Good urban spaces support and promote public and communal life, which is an essential counterpart to our private home and workplaces (Mehta, 2007). People rely heavily on public places not just for leisure but also to perform daily activities, such as commuting to and from work and home, shopping for essentials, eating, talking, walking etc. Urban public spaces are very important for supporting public life (Gehl, 2020), as well as for generating "city moments" where strangers enjoy a shared experience (Whyte, 1980). When people interact with others, they feel stronger bond with their society and the space (Bigdeli Rad & Bin, 2013). Unrestricted meetings in public space and unlimited pedestrian mobility in a city are important markers of healthy urban communication (Gumpert & Drucker, 2008).

Studies show that social interactions improve people's well-being, satisfaction with life and happiness as well as reduce psychological distress such as anxiety (Helliwell & Putnam, 2004; Smith et al., 2020a). Social interactions contribute to an increased sense of purpose, belonging and self-worth and motivate people to take better care of themselves which lead to improved mental health (Kawachi & Berkman, 2001). Social interaction also lightens the mood and makes one happier (Mercy Care, n.d.). People with positive mental health tend to have certain directions in life, e.g., meeting people and socializing, actively participating in organized activities, spending quality time with family, etc. Lack of social interactions, on the other hand, has been found to reduce quality of life, well-being, mood (Cacioppo et al., 2010; Golden et al., 2009). The social isolation or disconnection and the resulting feeling of loneliness worsen mental health (Bowins, 2021).

Moreover, research has shown that increased exposure to natural light, independent of the effect of physical activity, can alleviate the symptoms of insomnia (Hood et al., 2004). It is recognized that a better-experienced urban public space could have advantages for people's psychological and physical health, which eventually could contribute to their overall quality of life (Maller et al., 2009; Sefcik et al., 2019). It's important to comprehend

the link between urban public space and mental well-being while many countries imposed restrictions such as social distancing, isolation, and stay-at-home rules when the World Health Organization (WHO) declared COVID-19 a public health emergency of worldwide concern (Veeroja & Foliente, 2021).

Impacts of Restrictions on use of public spaces on well-being

Amid the COVID-19 crisis, all had to feel the sting of having lost our familiar, vibrant, social, and lively public places (Honey-rosés et al., 2020). Now, it is necessary to gather the pattern of daily activities in urban public spaces and the changes the pandemic has brought about. The impacts of the lockdown have been disruptive and changed the way in which humans perform their daily activities and go about their routine lives. In an online survey conducted during the time of the first lockdown in the UK (in May, 2020), the negative impacts of the pandemic on daily lives, reported by people were 'problems working and schooling from home', 'loss of social activities', 'not being able to see family', 'loss of freedom', 'health and financial stressors' and 'frustration with inappropriate actions of other people, especially the government and media' (Hampshire et al., 2021).

COVID – 19 had also led to a massive mental crisis as it made people stay indoors for longer periods and has taken away people's daily work, home and school routines and regular visits to public spaces (Chauhan, 2021a; Hampshire et al., 2021; Honey-rosés et al., 2020), which had eventually led to the symptoms of depression, anxiety disorder, intrusive thoughts, insomnia, and acute stress (Marroquín et al., 2020).

The restrictions on public spaces, social distancing and isolation may lead to loneliness and boredom thus negatively impacting mental well-being (Figure 1). Social isolation, opposite to social connectedness, is related to psychological distress, such as anxiety, depression, anxiety, depression, stress, and loneliness (Ami & David, 2020; JONES Dan et al., 2021; Miller, 2020; Smith et al., 2020b; Tull et al., 2020). While social isolation and loneliness were prevalent in the population prior to COVID-19, quarantine and social distancing recommendations have skewed the graph, which is a severe problem. A study that included 1,228 adults (80% from the U.S., the UK, Canada, and Australia) and was conducted by the company Social Pro reported that within the first month of COVID-19, loneliness increased by 20 to 30 percent, and emotional distress tripled (Holt-Lunstad, 2020). A study in Singapore also witnessed a significant increase in depressive symptoms after the lockdown, and results showed a general reduction in positive emotions due to changes in the outdoor interactions (Olszewska-Guizzo et al., 2021).

Quite understandably, restrictions associated with the immediate risks of the coronavirus were prioritized for public health. Social isolation and loneliness are associated concepts and often co-occur – loneliness can lead to isolation, and vice versa (Shankar et al., 2011). Loneliness is a universal emotion, subjective to everyone. Research clearly states that loneliness and depression (a severe mental illness) are intricately connected (Miller, 2020). While several surveys and studies are still ongoing to capture the full extent of the problem, current evidence suggests the pre-existing public health crisis of social isolation and loneliness may be far more widespread than previously estimated (Holt-Lunstad, 2020). COVID-19 is proving to be a particularly wicked disease not just because of its pathophysiology but also due to its imaginably catastrophic consequences for engendering loneliness (Miller, 2020).

Certain surveys have shown a major increase in adults who report symptoms of increased stress and anxiety. Stress is a normal psychological and physical reaction to the demands of life. Everyone reacts differently to difficult situations, and it's normal to feel stress and worry during a crisis. But multiple challenges, such as the effects of the COVID-19 pandemic, can push beyond one's ability to cope (A Mayo Clinic Staff, 2022). COVID-19-related social restrictions and potential health risks seem to affect emotions and worries in a large part of the population. Clear evidence of elevated tension, depression, anger, fatigue, and confusion, and reduced vigor were also identified in a survey conducted in Australia, representing significant mood disturbance (Terry et al., 2020).

The pandemic period also delineated the problem with increasing screen time, where overall digital device usage increased by 5 h, giving a plunge to screen time up to 17.5 h per day for heavy users and an average of 30 h per week for non-heavy users (Pandya & Lodha, 2021). Studies have indicated that higher screen time and loneliness is associated with poor emotional well-being and outdoor experience contributes to higher emotional well-being (Stieger et al., 2021). A study in the U.S. shows that during the early months of the COVID-19 pandemic, there is an increase in digital communications (social media,

texting, voice calls, email) to maintain social connectedness under limited in-person interactions or face-to-face interactions outside the home (Nguyen et al., 2021). Exposure to natural environments or outdoor spaces directly impacts well-being, and self-reported measures of emotions indicate that an activity in a natural environment has more positive impacts than activities in a synthetic environment (Bowler et al., 2010).

Accordingly, this research has aimed to decipher the impact on mental well-being due to the restrictions of use in urban public spaces during the pandemic. The study also examines the perceived stress of people who kept themselves away from the use of public spaces not only due to government mandates but also due to fear and anxiety of human-to-human transmission of the disease.

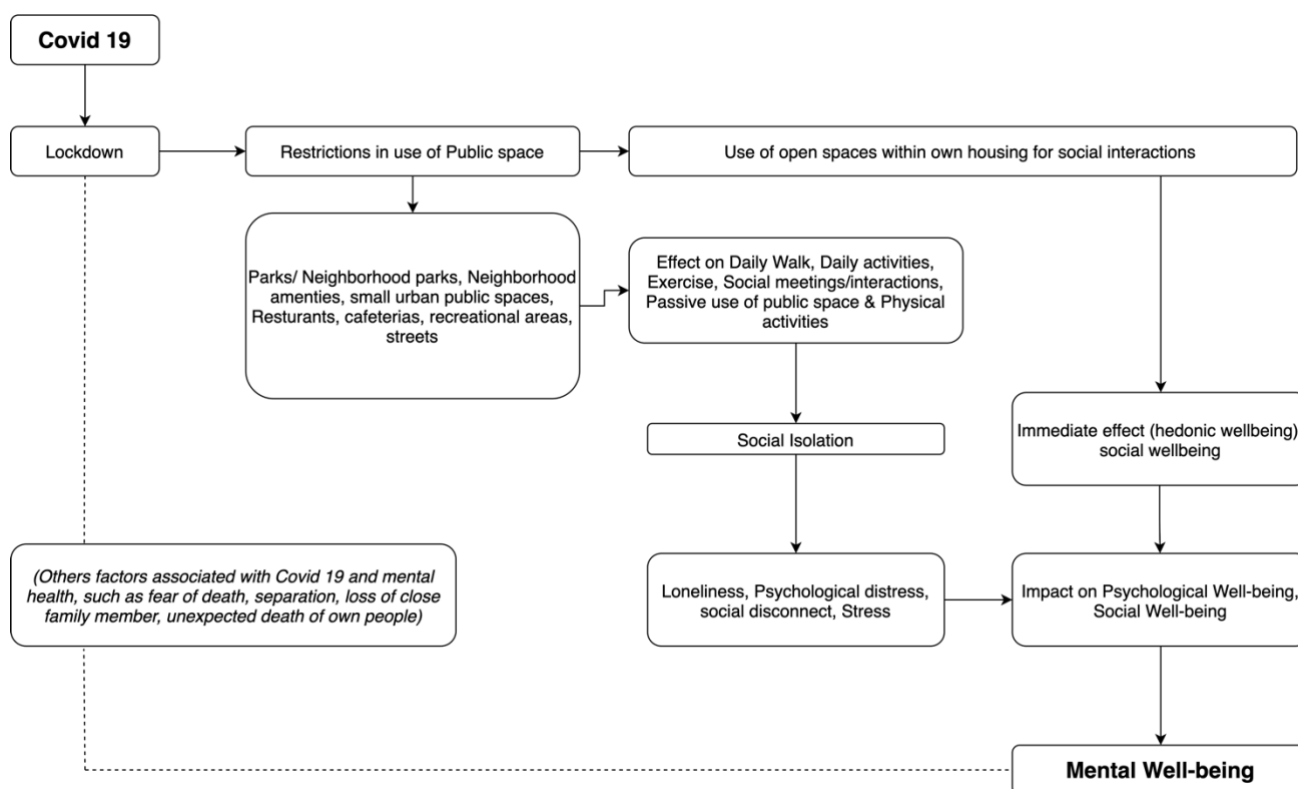


Figure 1 Restrictions in use of public space and impact on mental well-being

2. Methods

Likert scale questions, open-ended questions, and closed-ended questions were used to create the survey questionnaire. A web-based link was used to distribute the questionnaire via snowball sampling from April 2020 to July 2020. A respondent took about 7 to 10 minutes to complete the questions. Gender, occupation, and location were used in the survey to analyse the findings from a diverse sample population.

Independent variables

Sociodemographic: The survey started with questions related to socio-demographic characteristics including age, gender, and occupation, which could certainly affect the nature of stress people are experiencing,

Personal Experiences: The survey questionnaire was prepared with initial questions for understanding the daily activities during the lockdown such as if they had access to public space, travel for daily amenities measuring how far they had to travel for their daily

needs, how frequently respondents could have social connections/gatherings, and what relaxing activity they were involved with options of both indoor and outdoor activities to understand the nature of use of the spaces which people would access. This part of the survey was designed to analyse the transformation in day-to-day activities during the lockdown.

Living condition: This part of the survey schedule highlighted the housing typology which helped understanding the nature of movement respondents could have around their home. Another question highlighted with whom they are living and presence of open spaces such as a terrace or a courtyard which could be deciphered from the typology of the house they were living in as it can certainly affect the mental stress and frequency of social interactions with the people around.

Emotions and current feelings: This section had choice-based questions which could help to determine the respondent's current emotions they were experiencing, the list of emotions to choose from included negative and positive ones. The questions asked specified how COVID-19 impacted their feelings compared to before the pandemic.

Perception about future: The future perception of how people would feel post-pandemic in visiting public spaces and another question for understanding which place they would visit post lockdown, which could highlight the type of space as essential, were added to the questionnaire.

Activities currently missing: Activity people have been missing was added as an open-ended question to give freedom of expression to the respondents as it could hint towards the activity, which could distress or make people feel relaxed.

Dependent variable

Mental well-being: The last section of the questionnaire focused on understanding the impact on the mental well-being of the respondents by discussing the emotional effect, current feelings, perception about the covid-19 lockdown and future expectations. Lastly, to measure the change in perceived stress of the participants, a Likert scale question to be rated from 0 to 10 (0=no difference, 5=five times more stressful,10=ten times more stressful) was used at the end of the questionnaire.

Data Analysis

The data from the respondents are analysed using descriptive statistics and multiple regression analysis using Microsoft Excel and IBM SPSS software.

3. Results

Respondent's characteristics

Initially there were total number of 293 responses. Out of the 293 respondents, 277 were considered for the survey analysis after removing the duplications (respondents from out-of-India and those who did not complete the questionnaire). The respondents' demographic details show 50.9 % as male and 49.1 % as female. Responses showed that 87.4 % of people live with family members, 8.7 % live alone, and 3.6 % with friends (Table 1). The respondents were 18 and above from various parts of urban India. Most of the respondents are working professionals (56%), followed by students (20.6%).

Table 1 Respondent's demographic profile

Variable	Frequency	Percentage	Male %	Female %
Number of Participants	277			
Age	>18			
Gender				
Male	141	50.9		
Female	136	49.1		
Group wise				
18-25	51	18.4	15.6	21.3
26-35	103	37.2	43.3	30.9
36-45	69	24.9	20.6	29.4
46-55	27	9.7	7.1	12.5
>55	27	9.7	13.5	5.9
Location				
Mega city	60	21.7	15.6	27.9
Metro city	119	43	44	41.9
City	98	35.3	40.4	29.4
Living partners				
Friends	10	3.6	4.3	2.9
Family	242	87.4	85.1	89.7
Colleague	1	0.4	0.7	0
Alone	24	8.7	9.9	7.4
Occupation				
Student	57	20.6	22	19.1
Working Professional	155	56	52.5	59.6
Not Working	15	5.4	3.5	7.4
Self employed	28	10.1	14.9	5.1
Not eager to say	22	7.9	7.1	8.8

Effect of lockdown and Restrictions in Public Places

Effect on Daily life: The lockdown post virus outbreak had disrupted everyday life; it had completely transformed the activities and daily routines of almost all individuals worldwide. A significant change had been seen in the Indian context with the varied impact of lockdown on mental health. Figure 2 shows the effect on daily life due to lockdown and restrictions in public spaces. A high percentage of people (83.8% (M), 81.6% (F)) had no access to public space in lockdown. It thus limited the movement and accessibility, especially for people living in high-rise/multi-storeyed buildings. The lockdown had led to a higher percentage of screen time, and it was found that 39% (M) and 32.4% (F) were spending time in lockdown watching shows and movies followed by activity of indoor games with family (16.3% (M), 19.9% (F)) and exercise. Only people could go out for their daily essentials, and about 62.5% (M) and 52.5% (F) travel 0-1 km for their daily needs within their neighbourhood. When asked about their frequency of face-to-face social connections when the survey was conducted, 35.3% (M) and 31.9% (F) said no connections at all, and only 17.6% (M) and 15.6% (F) said they are socially connected every day. The participants understand the importance of public space in their daily lives as 39% (M) and 44.7% (F) stated that public space is very important. Only 2.9% (M), 2.1% (F) stated its importance as not at all.

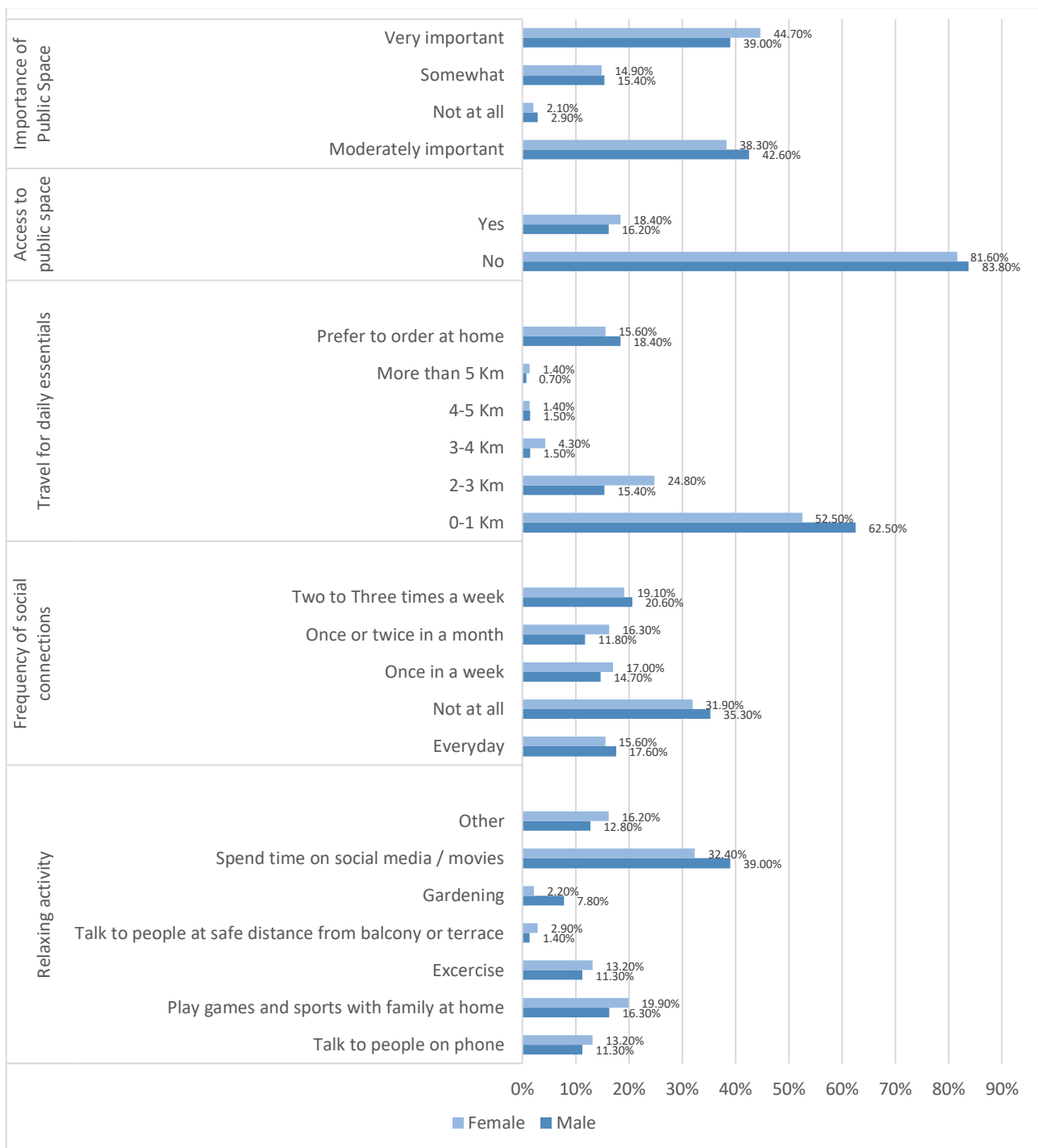


Figure 2 Effect on daily life after lockdown

Living condition: Since most of the time to be spent was indoor, housing quality and open spaces within the block or unit, were essential parameters that could have a substantial effect on the mental well-being. During the lockdown period, everyone moved to their hometown or to the respective places they belong to. 87.4% people were living with their family and 8.7 % were living alone (Figure 3). About 35.5% (M) and 61.8% (F) stated that they are living in apartments, and 41.1% (M) and 25.7% (F) are staying at their respective bungalows or residences (Figure 3). Most of them had open spaces at their respective places they are living, and 73.5% (M) and 65.2% (F) stated they had access to these open spaces and social connections through these spaces.

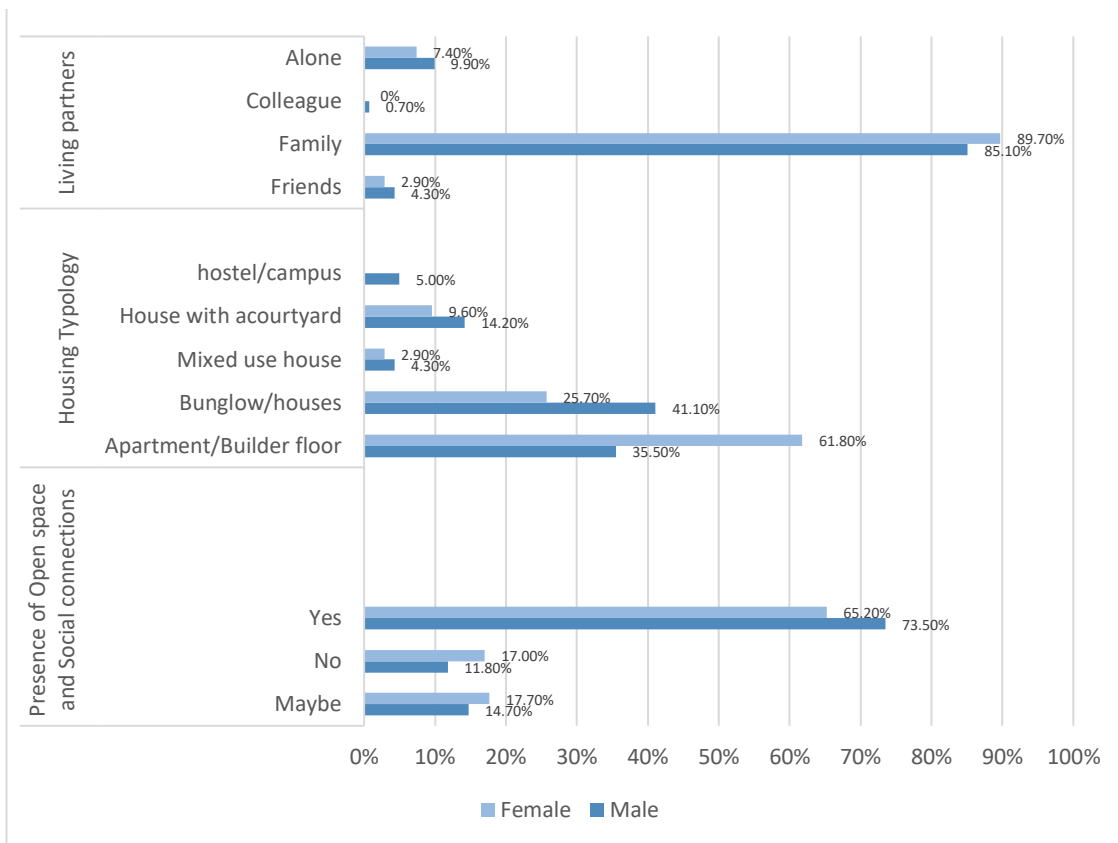


Figure 3 Living condition

Effect on current emotions and feelings: Figure 4 shows the current state of emotions and feelings of the resident when the survey was conducted. Two major changes people got affected by were low social connectedness (30.9 (F) and 30.5% (M) and low freedom of movement (35.3 % (F), 28.4 % (M), which were very much related to the overall well-being of the people. About 35.5% (M) and 33.8% (F) stated they were anxious and sad after the lockdown, and 19.1% (M) and 22.1% (F) said that they were having mixed negative emotions like stress, irritated and frustration. Social distancing, low freedom of movement and the fear of disease made people feel more anxious and stressed affecting the overall well-being of the people.

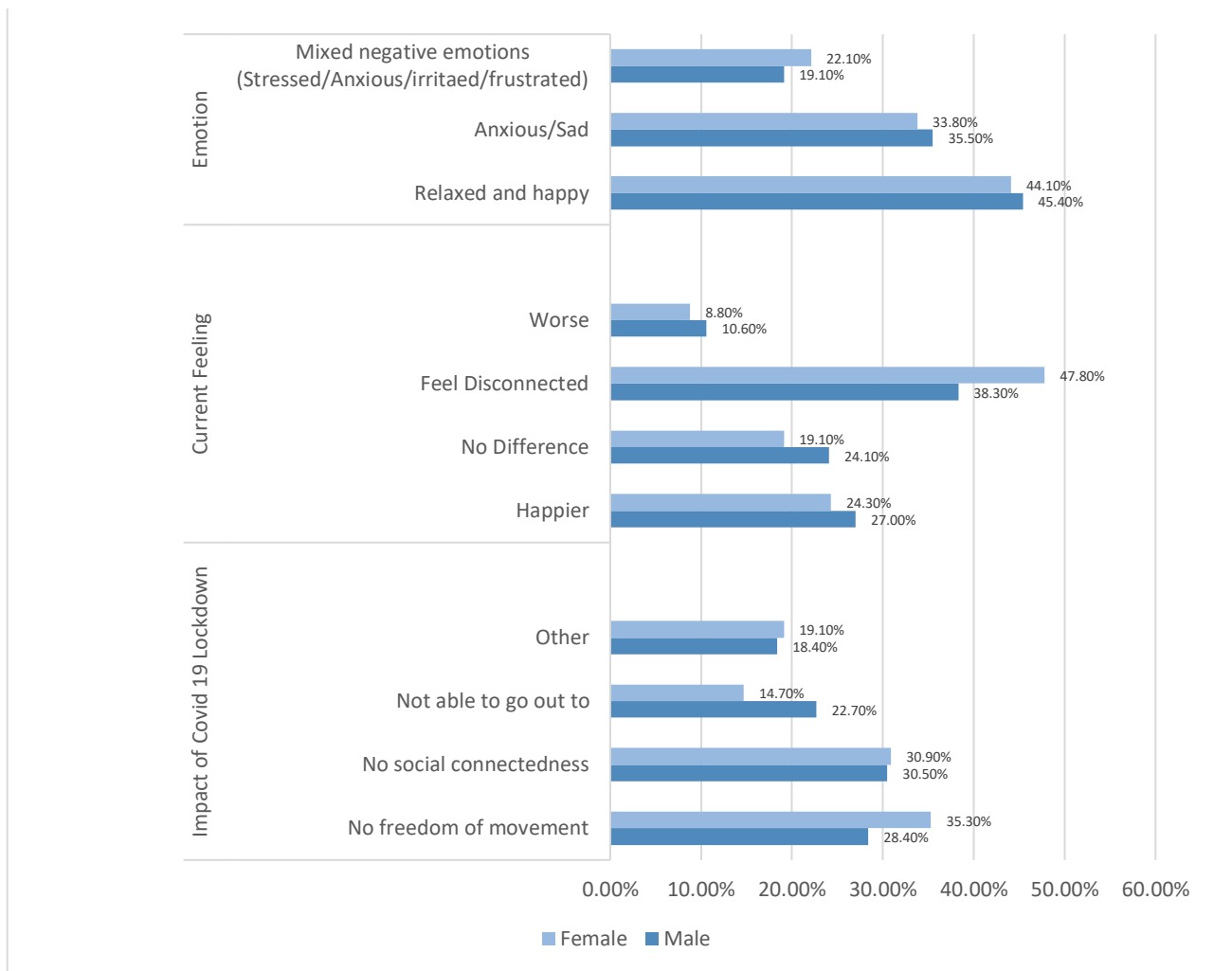


Figure 4 Effect on current emotions and feelings

Perception about future: Few questions were asked about their perception about future like places to visit after the withdrawal of the lockdown, and about 36.2% (M) and 50% (F) stated to visit family or friend's place (Figure 5). Most of the participants also stated that they were moderately scared to visit any public spaces post-pandemic. About 54.4% (M), 43.3% (F) said they are moderately scared, and 18.4% (M) and 14.9% (F) stated that they were petrified to visit any public spaces post-pandemic.

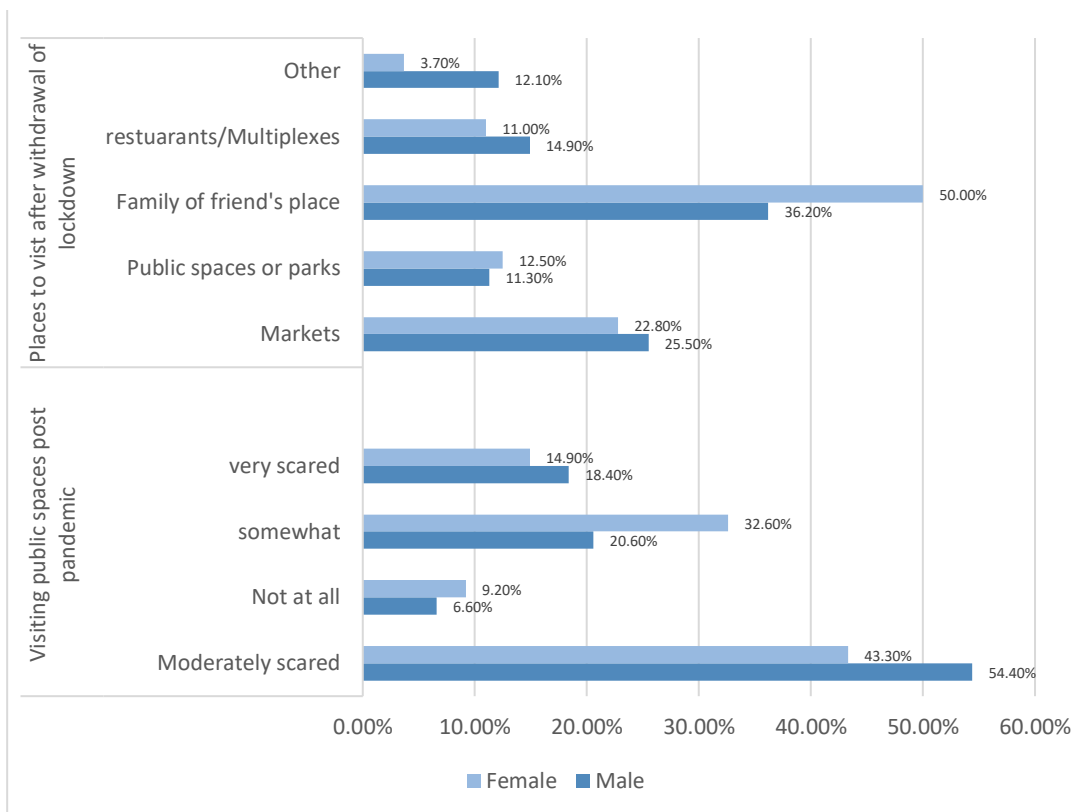


Figure 5 Perception of future

Activities participants are currently missing in their life: Leisure activities play a vital role in enhancing subjective well-being. Through active participation in leisure activities such as active socializing and going out visiting cultural events, family and home activities, people build social relationships, feel positive emotions, acquire additional skills and knowledge, finally improving their quality of life (Brajša-Žganec et al., 2011). Many people's happiness lies in making the routines of everyday life work, such that positive feelings dominate over negative emotions resulting from daily nuisances (Olsson et al., 2013). There were various activities being missed by the participants including socializing, physical activities, travelling, going to workplace, spending time outside, eating out, shopping and family, The most missed activity was found to be socializing with friends and family with 54.29% (M) and 49.23% (F) responding towards it followed by going to work/workplace with 14.29% (M) and 13.85 % (F) respondents (Figure 6). Socializing and friendships have been found to reduce the negative emotions of our daily life contributing to subjective well-being (Amati et al., 2018), the response from the people validates the results from that study.

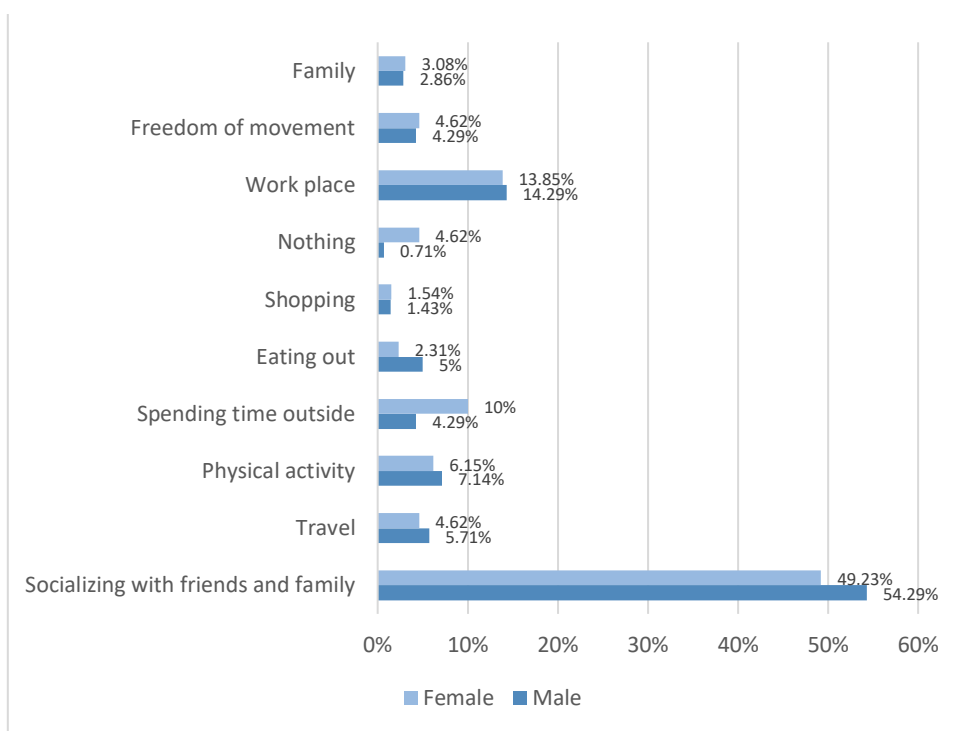


Figure 6 Activities participants are currently missing in their life.

Effect on different age groups

Approximately 15% of adults aged 60 and over suffer from a mental disorder (World Health Organisation, 2017). The increase in the world's ageing population has led to a growing need for health and social care services (Hackert et al., 2019). Neighbourhood environment has a greater impact on the elderly than on those in other age groups, and evidence recommends that supportive environments improve quality of life in older adults (Sugiyama & Thompson, 2007).

Along with the global increase of mental and physical illnesses (Giles-Corti et al., 2016), leisure inactivity has become prevalent in developed and developing countries (Cooper, 2005). Engagement in leisure activities contributes to subjective well-being, while the pattern of important leisure activities somewhat varies across different age and gender groups (Brajša-Žganec et al., 2011). From the aspect of built environment characteristics, leisure facility provision, walkability, and land use diversity are potentially associated with walk-based leisure activities (Liu et al., 2020).

A large-scale study in Japan and the U.S. has also shown that older people with more social contacts report fewer depressive symptoms (Sugisawa et al., 2002). Sociability has a significant role in helping people recover from psychological distress. In the case of older people, it is evident that social isolation and loss of daily activities can cause adverse effects on their mental health, leading to depression (A. Singh & Misra, 2009). It could be assumed that the restrictions had an adverse effect on elderly people.

Figure 7 shows people aged more than 55 years were more anxious, sad, and mixed negative emotions like feeling stressed, irritated, and frustrated than any other age group. Within the age group >55 years, 63% of them stated they be anxious and sad, and only 29.60 % of them stated to be relaxed and happy. Elderly people were found to be more disconnected and worse than any other age group. Within the age group >55 around 40.70% of the people stated to feel disconnected and 18.50 % of the people stated to feel worse (Figure 8).

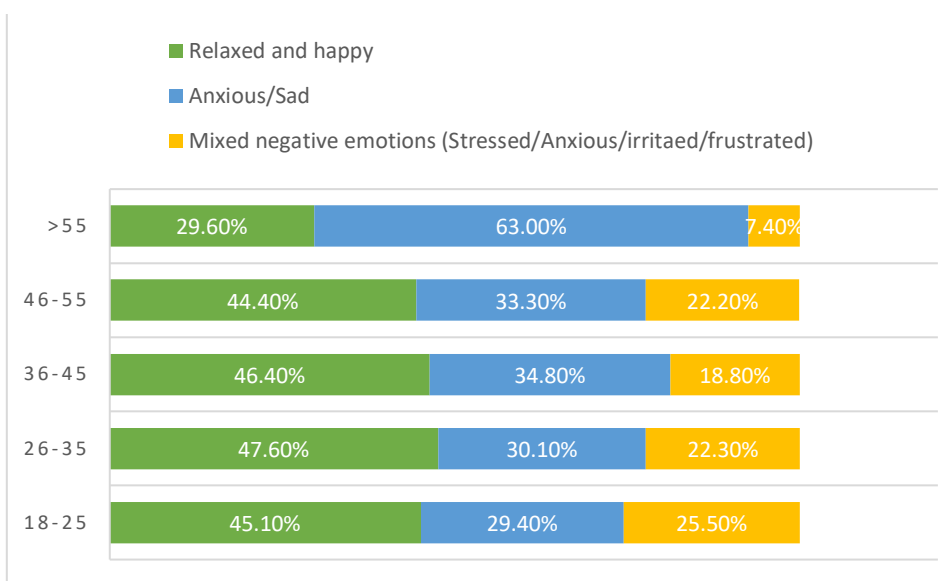


Figure 7 Comparison of emotional state with respect to age group

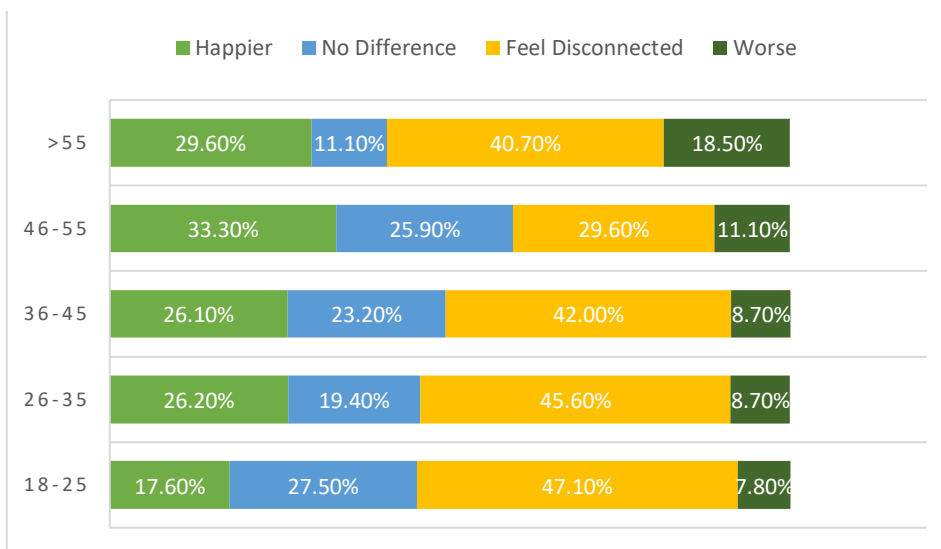


Figure 8 Comparison of current feelings with respect to age group

Association between different variables and perceived stress

Since we didn't have the data of perceived stress score pre-pandemic or reference point to compare, we divided the perceived stress scale (0-10) into parts, taking reference to the Box plot (Figure 9) showing key statistical properties of the variable. The perceived stress score could be interpreted as $x=0$ means no change, $x=2$ means two times more stressful than before, and when $x=10$, it means 10 times more stressful than before. The mean value of the female respondent's perceived stress score from $n=136$ is $\bar{x} = 4.75$, the lower extreme is 0, the lower quartile is 3, the median is 5, the upper quartile value is 7, and upper extreme value is 10. The mean value of male respondents' perceived stress score from $n=141$ is $\bar{x} = 4.94$, the lower extreme is 0, the lower quartile is 2, the median is 5, the upper quartile value is 8, and upper extreme value is 10. The mean value of overall respondent's perceived stress score from $n=277$ is $\bar{x} = 4.85$, the lower extreme is 0, lower quartile is 2, the median is 5, upper quartile value is 7, and upper extreme value is 10. Result shows males have slightly higher perceived stress (\bar{x}) than females, and variation of perceived stress is also higher in males than females.

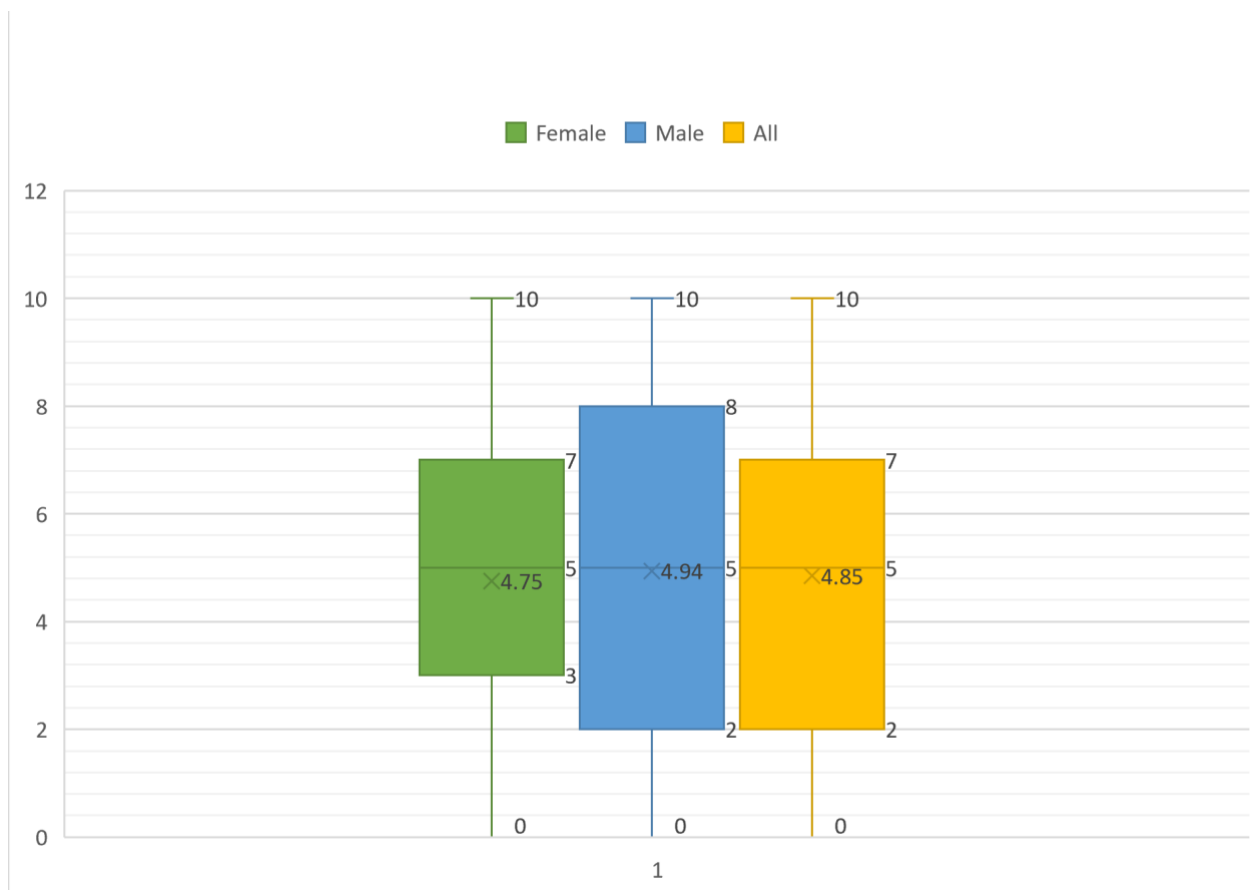


Figure 9 Box Plot of perceived stress score

Perceived stress score (0-10) was compared with their current feelings with respect to the pre-pandemic period (Figure 10). Results show higher perceived stress for those who have stated their feelings as worse as compared to the pre-pandemic period ($\bar{x} = 7$), followed by the perceived stress ($\bar{x} = 5.4$) for the people who stated to feel disconnected in comparison to the pre-pandemic period. The lowest is observed for people who stated to be happier ($\bar{x} = 4.1$).

Perceived stress score (0-10) was compared with respondent's perception of importance of public spaces (Figure 11). Results show that the perceived stress score is higher for those who stated to be very important ($\bar{x} = 4$), followed by moderately important ($\bar{x} = 3$), somehow important (2), and not at all important ($\bar{x} = 1$).

Perceived stress score (0-10) was compared with the typology showing varied mean values (Figure 12). Results show higher perceived stress for those living in apartments ($\bar{x} = 5.4$), followed by the perceived stress score for people residing on campus ($\bar{x} = 5.1$). The lowest is observed for people living in houses with a courtyard ($\bar{x} = 3.78$). Still, the results have a limitation, as there is a difference in the number of respondents from each typology.

It was possible to cross-validate, using the data presented in Figures 10, 11, and 12, that the respondents who had acknowledged feeling worse, the people for whom public places are important in their daily life, and the people who resided in their apartments had higher levels of perceived stress than the other respondents.

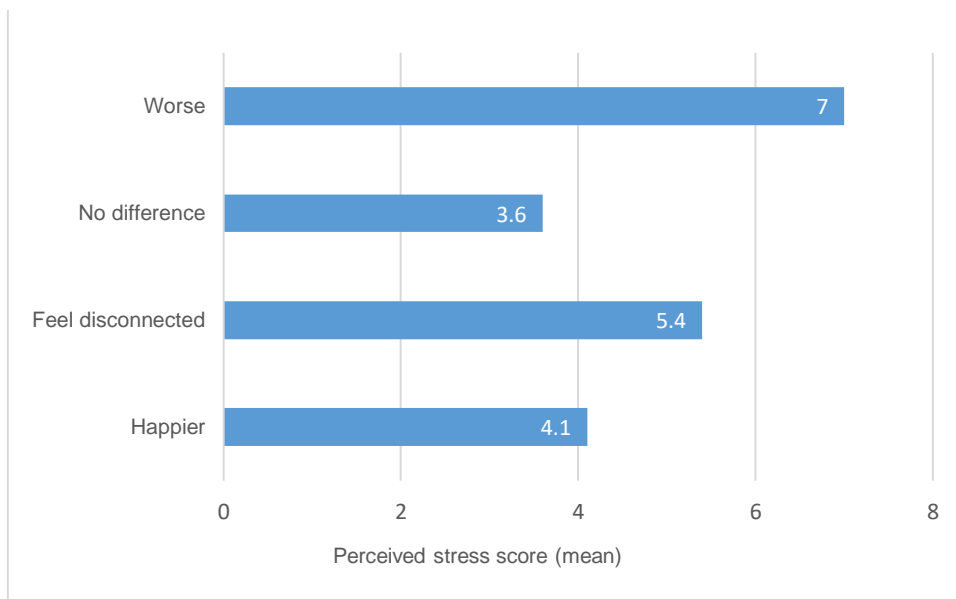


Figure 10 Comparison to pre-pandemic period, current feelings, and perceived stress

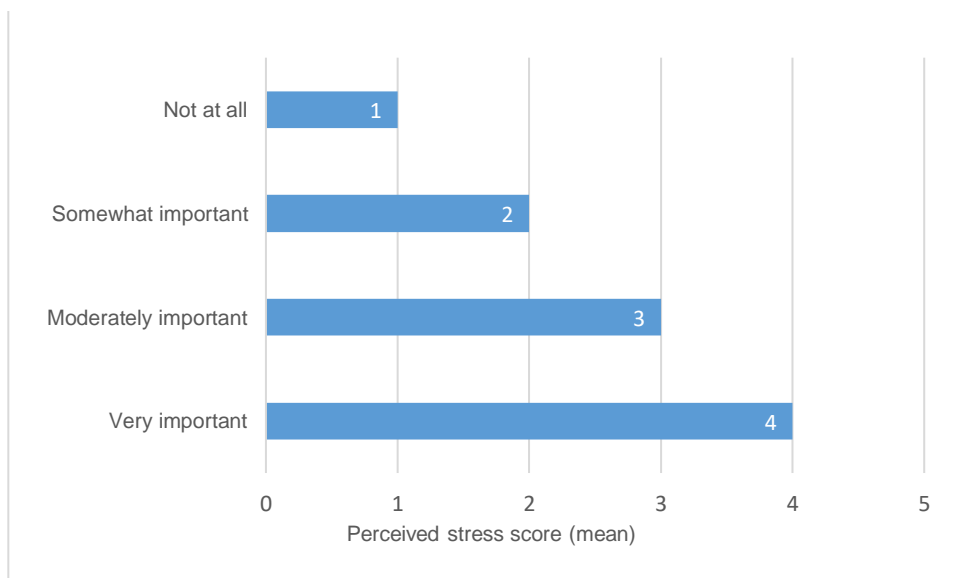


Figure 11 Perception of importance of public space and perceived stress

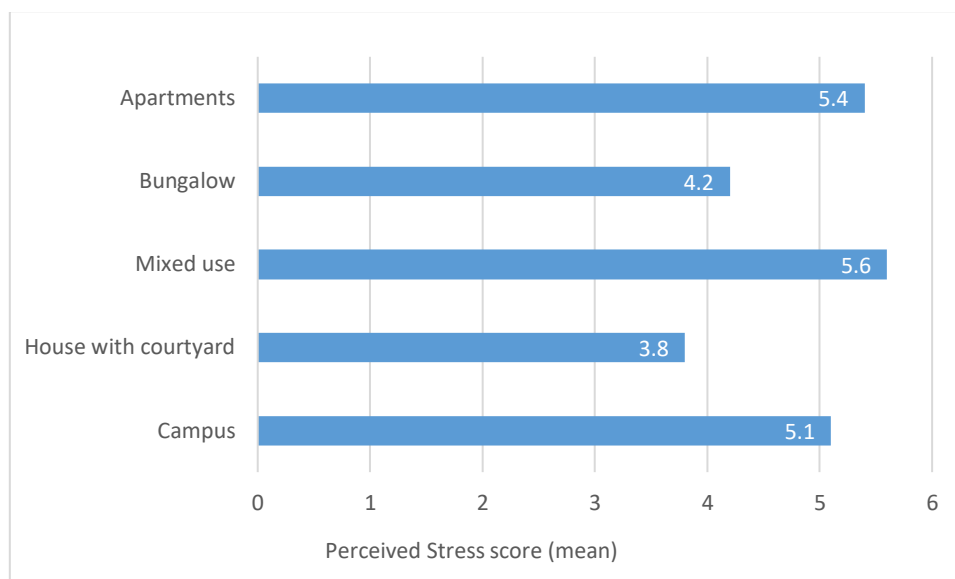


Figure 12 Typology and perceived stress

Multiple Regression analysis was conducted to find the association between perceived stress as a dependent variable with independent variables: Q1. scared to visit public space post lockdown (Not at all=0, Somewhat=1, Moderately scared=2, Very scared=3). Q2. connections with people now a days while keeping safe social distance (Everyday=0, Not at all=1, Once a week=2, Once or twice a month=3). Q3. open space of your house helping in maintaining social relations (Yes=0, No=2, Maybe=1). Q4. Importance of public space in daily life (Not at all=0, Somewhat=1, Moderately important=2, Very important=3). Q5. access any public space or park (abiding the government norms) (Yes=0, No=1). Dependent variable, perceived stress was measured through a Likert scale question, the level of stress these days, Rated from 0-10. (Demographic details like age, gender and with whom they were living were also included in the regression analysis model.

The overall regression model shows independent variables statistically significantly predict the dependent variable [$F(11,265) = 2.80, P < 0.05$] (Table 2). The $R^2 = 0.10$ depicts that the model explains 10% of variance with perceived stress. To see further which variables are associated, individual variable coefficients and significance values are being cross checked.

As shown in the Table 2, scared visiting public places post-pandemic ($\beta = 0.487, P < 0.05$), open spaces helping for maintain social connections ($\beta = 0.578, P < 0.05$) and access to public spaces or park ($\beta = 0.917, P < 0.05$) shows positive associations and significant relationship with perceived stress. Demographic details showed no significant relationship with perceived stress except staying with colleagues showed negative association ($\beta = -2.796, P < 0.05$).

Table 2 Results of regression statistics of independent variables and perceived stress

Regression Statistics					
Multiple R	0.322				
R Square	0.104				
Adjusted R Square	0.0671				
Standard Error	2.808				
Observations	277				
ANOVA					
	df	SS	MS	F	Significance F
Regression	11	243.429	22.129	2.805	0.001
Residual	265	2090.202	7.887		
Total	276	2333.631			
	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.452	1.283	0.352	0.724	
scared visiting any public spaces post pandemic	0.487	0.214	2.271	0.023*	
connect with people while keeping safe social distance	-0.020	0.114	-0.182	0.855	
open space in your house help you maintain social connectivity	0.578	0.237	2.441	0.015*	
essential of public spaces in our daily life to maintain social relations	0.282	0.218	1.290	0.198	
access any public space or park	0.917	0.464	1.977	0.0489*	
Age	-0.192	0.149	-1.292	0.197	
Gender (ref, female=0)					
Male	0.249	0.343	0.725	0.468	
Living with- Family (ref=0)					
Friends	0.461	0.882	0.522	0.601	
Colleagues	-2.976	1.429	-2.081	0.038*	
Alone	0.284	0.207	1.368	0.172	

* Means significant at the 5% threshold level

4. Discussion

When planning to build sustainable communities, it will involve collective approaches to achieve this response (Anderson & French, 2010), such as incorporating mental well-being aspects in the planning process. Well-being and happiness are the main characteristics to define a good life. Good mental health comprises our basic cognitive and social skills, our capability to empathize, recognize, express, and modulate our emotions,

cope with challenges, and enjoy life (Centre for Urban Design and Mental Health, n.d.) The relationship between the built environment and mental well-being is not straight. Instead, it's a complex phenomenon, one leading to another in several stages. For example, restrictions in use of public spaces are leading to social disconnectedness and consequently resulting higher perceived stress. A long-term effect would significantly bring a negative impact on mental health.

Our survey shows higher perceived stress is positively associated with feeling disconnected as a response. Results show that people were moderately scared of going to public spaces after lockdown, and a higher percentage of male respondents showed fearfulness towards visiting public spaces. This survey indicates that most people required access to public spaces and keep connected with others to cope with stress and maintain their well-being especially in their immediate context. Results also highlight increased screen time with a significant decrease in physical activity followed by possible reduction in social connections. Overall result shows the perceived stress score of the participants is $\bar{x} = 4.8$, which means people are 4.8 times more stressful than pre-pandemic period.

Figure 6 demonstrates that the male percentage is larger, emphasizing the fact that men are "very scared" in comparison to women. Males perceive stress as being higher than females do, even in Figure 9. Table 1 reveals that 3.5% of men and 7.4% of women are not working, indicating that more women stay indoors than men. It might be one of the reason that the fear of getting affected is less and has resulted in lower perceived stress in the overall female sample population compared to males.

Post-traumatic stress disorder after Covid-19 can be more prevalent among people with lower social support & among the people who experienced Covid related trauma. This can further reduce the movement to public spaces citing the scare of getting contracted (Taylor et al., 2020).

The perceived stress seems to be on the higher side of the average for residents of feeling worst and disconnected with comparison to pre pandemic period. The perceived stress also seems to be higher with the people's perception on importance of the public spaces and higher for residents of apartments or multi-storeyed buildings. In fact, typology as an urban element can impact significantly in enhancing social connectedness.

However, The COVID-19 pandemic and new measures that came along with it have had disparate impacts on the spatial experiences of housing (Valizadeh & Iranmanesh, 2021), the housing typology and the availability of neighbourhood park can also influence well-being during the time of lockdown and restrictions.

Restrictions during covid-19 had a high impact on the life of elderly people. And that there are a higher percentage of kids and elderly people in public spaces and a greater percentage of women than men in the studies carried out pre-COVID-19 (Gehl, 2020). Immediate environment and context, and quality of neighbourhood design play a vital role in maintaining their physiological and social well-being. For elderly people the immediate outdoor environment is very essential. Literature also supports the importance of neighbourhood walkability for the health behaviour and well-being of older people. For example, maintaining frequent familial contact, social participation, establishing new relationships and physical activity engagements may be effective strategies to safeguard the mental health in older people (Gyasi et al., 2019). Even our survey results shows that elderly people aged >55 were more anxious, sad, and mixed negative emotions like feeling stressed, irritated, and frustrated than any other age group.

Results from regression analysis also show significant relationship between access to public spaces, social connections, and perceived stress. The positive association means people who are scared to visit public places, and people who are not having open spaces in their house to connect with other people and those who do not have access to any public space or park will have a higher perceived stress. Saying with colleagues has shown negative association with perceived stress meaning, people who were living with their colleagues has lower perceived stress than others.

5. Conclusions

This section is not mandatory but can be added to the manuscript if the discussion is unusually long or complex. The paper describes the impact of the pandemic on people's daily lives and how it has affected their well-being. The study expressed people's anxiety while they were locked within and their desire to use public spaces. This research highlights the importance of urban public spaces in everyone's life and the necessity to be socially

connected. Due to the restrictions in public spaces, people suffered from social disconnection, which was a major source of stress.

This paper contributes to the emerging series of topics at the interface of COVID-19 and public spaces. Not only should we modify the structure of our public spaces to adapt to the new norm for healthier and safer environments, but we need also assure that we are socially connected. While we consider making modifications to the design, materials utilized, and maintenance of public space to combat the spread of the COVID-19 virus, we need also consider the social need for people to be connected. To increase population levels of happiness, a feature of well-being, it is recommended planners implement designs that support opportunities for social interaction, feelings of safety in the environment and increase access to open green space (Hugh Barton, 2003). For example, people are likely to prefer smaller parks, neighbourhood parks, and community spaces over large public spaces in the city. Small neighbourhood parks need to be further explored to provide future design guidelines to improve the quality of life when movement in large public spaces is restricted.

The change in preference will provide landscape architects and urban planners more scope in redesigning such areas to invite people for in-person interactions and social connections while maintaining social distancing. Covid-19 has highlighted the need to look at public spaces with respect to the impact on people's mental health, one such space which is crucial for everyday use is the street. The streets and streetscape design guidelines have been existing and are relevant for various positive transformations in our cities, while these guidelines can now be reviewed for better mental health specifically for alleviating anxiety (a pressing issue in the pandemic). It may require a combined perspective of practicing architects, urban designers with those of behavioral and health scientists and clinicians (Anand & Pujara, 2021).

There is also an opportunity for architects to consider housing typologies that allow people to engage visually through balconies, connected roofs, common areas, and so on. We could also consider redesigning public transit areas such as bus stops, paratransit nodes, and train stations with the element of social connection in mind while adhering to social distancing standards. Longitudinal investigations can support the findings of the article. Longitudinal studies are required to fully comprehend the influence of limitations on the use of public spaces in cities.

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