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ABSTRACT: People who lived through the COVID-19 lockdowns have been reported to experience temporary depression, loneliness, and discomfort. Balcony can serve as an accessible place of respite to ease emotional distress when being confined at home. This research aims to systematically study balcony usage and design preference as a space to achieve well-being. It is based on views of apartment dwellers who experienced lockdown measures during the COVID-19 pandemic. From literature reviews and surveys, 14 popular balcony activities and 29 balcony design elements were derived and used in a questionnaire supplemented with drawings to best illustrate some of the concept. 505 effective samples (N=505) were received from Taiwan, Vietnam, Indonesia and Portugal. Statistical analyzed results showed that Getting sun and air, Gardening, and Watching/Observing the street are the three most preferred balcony activities among these countries. The preferred balcony views, types, enclosures, decorations, and sizes are ranked with Friedman Test and summarized in this paper along with the relevant cultures and lifestyles discussion. The comprehensive findings of this study can offer architects and housing developers valuable insights for making design decision and promote well-being at apartment dwell balcony design.

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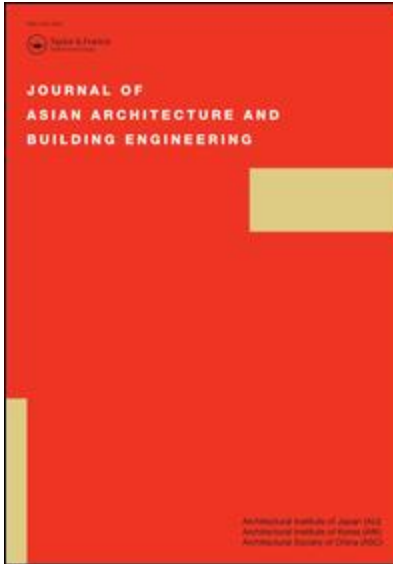
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Balcony Usage and Design Preference as a Space to Achieve Well-being

Journal:	<i>Journal of Asian Architecture and Building Engineering</i>
Manuscript ID	JAABE2310663AP
Manuscript Type:	Architectural Planning and Design
Keywords (up to 5):	balcony usage, balcony design, well-being, user preference, ranking
Categories:	AP: Architectural Planning and Design < Architectural Planning and Design

Balcony Usage and Design Preference as a Space to Achieve Well-being

For Peer Review

Abstract

People who lived through the COVID-19 lockdowns have been reported to experience temporary depression, loneliness, and discomfort. Balcony can serve as an accessible place of respite to ease emotional distress when being confined at home. This research aims to systematically study balcony usage and design preference as a space to achieve well-being. It is based on views of apartment dwellers who experienced lockdown measures during the COVID-19 pandemic. From literature reviews and surveys, 14 popular balcony activities and 29 balcony design elements were derived and used in a questionnaire supplemented with drawings to best illustrate some of the concept. 505 effective samples (N=505) were received from Taiwan, Vietnam, Indonesia and Portugal. Statistical analyzed results showed that Getting sun and air, Gardening, and Watching/Observing the street are the three most preferred balcony activities among these countries. The preferred balcony views, types, enclosures, decorations, and sizes are ranked with Friedman Test and summarized in this paper along with the relevant cultures and lifestyles discussion. The comprehensive findings of this study can offer architects and housing developers valuable insights for making design decision and promote well-being at apartment dwell balcony design.

Keywords: balcony usage; balcony design; well-being; user preference; ranking; COVID-19 lockdowns

1. Introduction

The recent COVID-19 pandemic caused a significant impact on human health and a high death toll in many countries. According to the World Health Organization (WHO) statistics, up to December 2022, there were 650 million confirmed COVID cases and claimed 6.66 million lives worldwide (WHO, 2022). To control the spread of virus, many countries employed lockdown measures. Having lived in a period of social isolation and social distancing, people's physical and mental health started to take a toll (Brooks et al., 2020). The reported number of people with depression increased. As people long for connection to nature and society, an increase use of balcony space was reported (Khalil & Eissa, 2022). News media broadcasted people singing, waving flag, launching firework, working out and cheering and clapping for medical personnel (Aydin & Sayar, 2020; BBCs, 2021). Thus, from architectural design perspective, balcony became the new space for social connection and physical activities during lockdowns (Maiztegui, 2020). Understanding balcony usage during the pandemic lockdown and determining what design factors will encourage balcony usage for future balcony design are the aims of this research. The concluded preferred balcony design factors can serve as a basis for architects and housing developers in planning and designing future apartment balcony for healthy living.

1.1. Balcony usages

Throughout history, balconies have served various functions, including providing elevated platforms for public figures to project authority over the gathered public. At one point, balcony was even used as a lavatory (Carlotta & Origoni, 2020). The balcony acts as a unique transitional zone that links the outdoor and indoor surroundings, facilitating a range of a variety of activities like laundry, gardening, leisure, and dining (Lin, Ni, Xiao, & Zhu, 2022). In current days, in many countries, getting sun and air, studying, reading, and painting are common activities found in balcony; especially in Asia, balcony is often used as a utility

balcony for laundry work, clothes drying and storage space. Figure 1 showed a typical balcony in Taiwan that was used as a utility space.



Figure 1. Common balcony usage of apartments in Taiwan as a utility space.

Moreover, prior to the COVID-19 pandemic, apartment balcony has been considered an intermediate and private space in urban cities (Cowan, 2011). During the pandemic, balcony became more public and used as social spaces (Maiztegui, 2020) sang, danced, and held parties (Problovski, Sherman, & Melnikova, 2020). There are studies also pointed out that planting or gardening on balcony for sense of healing and self-sufficiency edible garden are the popular activities and methods to promote well-being (Kwong, Siu, & Chung, 2004). As the usages of balcony can be diverse, in conjunction with the literature review, this study also conducted two mini surveys in Taiwan, Vietnam, Indonesia, and Portugal to understand balcony usage and common activities conducted on balconies. The reason for including only these four countries lies in the fact that the authors, who are originally from these countries and are now studying together in the same place, possessed the means to collect data and had a deeper understanding of the cultures and influence. To shorten the paper and avoid the unnecessary details, the fourteen common balcony activities derived from the literature

reviews and surveys are summarized in Table 1. For design strategies and discussion purpose, the fourteen activities are further categorized into the three dimensions of well-being as defined by WHO to cultivates well-being (WHO, 2014). The three dimensions are physical, spiritual, and social.

Table 1. List of fourteen common balcony activities.

Dimension	Activity	Reference
Physical	Gardening	Adams, Leibbrandt, and Moon (2010); Park, Shoemaker, and Haub (2008)
	Exercise (Yoga/Pilates/ Gymnastics)	Janke, Nimrod, and Kleiber (2008); Services (2018)
	Housework (Cleaning, Laundry)	Murphy, Donnelly, Breslin, Shibli, and Nevill (2013)
Spiritual	Getting sun & air	Genoe and Zimmer (2017)
	Studying/Reading/Painting	Lampinen, Heikkinen, Kauppinen, and Heikkinen (2006)
	Remote working	Hong, Hasche, and Bowland (2009)
	Drinking and dining	Strain, Grabusic, Searle, and Dunn (2002)
	People watching/Street observation	DeVault (2000)
	Playing with children/pets	Mullee, Coleman, Briggs, Stevenson, and Turnbull (2008)
	Smoking	Hui, Reeder, Gee, and Darling (2011)
Religious activity	Hong et al. (2009)	
Social	Interacting with neighbors	Hong et al. (2009); Jang, Mortimer, Haley, and Graves (2016)
	Talking/texting on the phone	Hong et al. (2009); Jang et al. (2016)
	Participating in communal activity (Clap-for-caregivers)	Janke et al. (2008); BBCs (2021)

1.2. Balcony design elements

Building code, structural requirement, façade aesthetic, climate condition, safety, privacy, and culture are factors that are often considered during balcony design. Based on relevant literature reviews shown in Table 2, twenty-nine common balcony design elements are proposed to use for this study. The 29 elements are further divided into four design categories for type, view, enclosure, and decoration. The types of balconies were classified based on how a balcony is structurally attached to the building (Blonder & Bereznyak, 2017; Mirabi, Nasrollahi, & Dadkhah, 2020). As shown in Figure 2; Extruded & open, Half extruded & Half recessed, and Fully recessed are the three types of balcony and used in this study.

Table 2. List of balcony design factors and elements that are derived from the literature reviews.

Factor	Element	Reference
Type	Extruded & open Half extruded & half recessed Fully recessed	Mirabi et al. (2020); Blonder and Bereznyak (2017)
View	Courtyard (Greenery, quietness) Neighbors (Chat with neighbors) Street (Retail shops, street life, pedestrian traffic) Traffic (Vehicle traffic) Natural scenery (River, sea, mountain)	Kwong et al. (2004); Marshall (2013); Blonder and Bereznyak (2017); Molaei, Hashempour, and Tang (2021)
Enclosure	Open Clear glass Mosquito screen Security bar Shading	Marshall (2013); Blonder and Bereznyak (2017); Ultav (2019)
Decoration	Foldable Chair/Table Fixed Chair/Table Greenery (Green plants) Flowerpots (Colorful flowers) Outdoor Rug/ Floor Pillow Shading (Umbrella/awning) Lighting Mosquito Screen Insect Repellent Light Small water feature BBQ grille Color painted wall Sink/ faucet Electrical outlet Floor drain Outdoor heater	Kwong et al. (2004); Stamp (2018); Chen, Tsaih, and Li (2019); Aydin and Sayar (2020); Molaei et al. (2021)

**Figure 2.** Three proposed balcony types in questionnaire.

Moreover, as providing view out of an apartment is considered a critical aspect that could influence the usage of balcony, five views are used to understand which is more favorable in this study (Blonder & Bereznyak, 2017; Kwong et al., 2004; Marshall, 2013;

Molaei et al., 2021). The views included Courtyard (Greenery, quietness), Neighbors (Chat with neighbors), Street (Retail shops, street life, pedestrian traffic), Traffic (Vehicle traffic) and Natural scenery (River, sea, mountain).

Yet, as balconies can also be enclosed for security purposes or to shield occupants from natural elements like rain and wind (Blonder & Bereznyak, 2017; Marshall, 2013; Ultav, 2019), this study also presents five distinct kinds of enclosures. The five distinct enclosures are Clear glass, Mosquito screen, Security bar, Shade, and Open (no enclosure) and as showed in Figure 3. As the decoration elements in a home can be functional or ornamental, in this research, 16 decoration elements are presented in Table 2 already (Aydin & Sayar, 2020; Chen et al., 2019; Kwong et al., 2004; Molaei et al., 2021; Stamp, 2018).

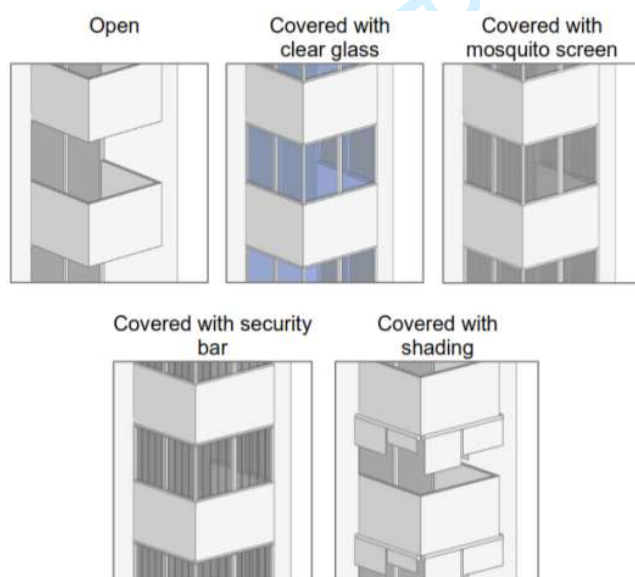


Figure 3. Five proposed common balcony enclosures.

Lastly, beside balcony types, views, enclosures, and decorations; size of balcony can also be a factor to promote usage. Therefore, as illustrated in Figure 4, four balcony sizes are proposed in this research and are differentiated by their functionality and number of occupants.

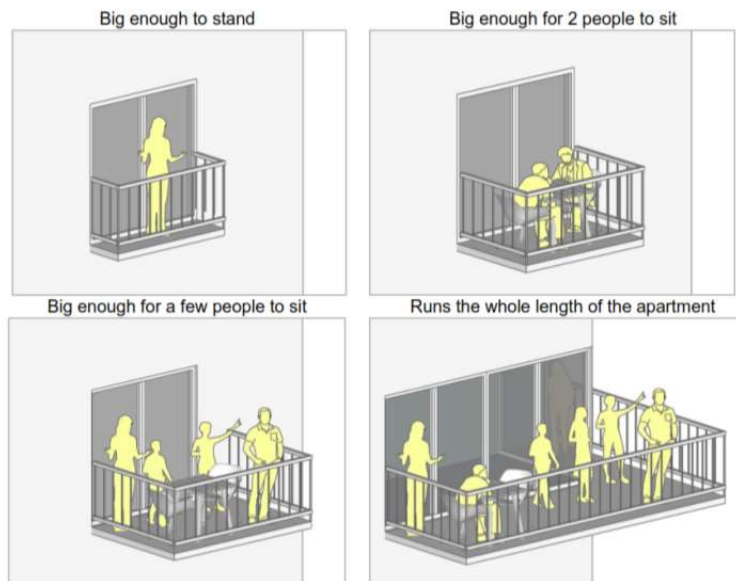


Figure 4. The size of the balcony is determined by the functional performance.

1.3. Novelty of study

The novelty of this study lies in its systematic study of preferred balcony usages and design elements aimed at promoting well-being for future apartment balcony designs among Taiwan, Vietnam, Indonesia, and Portugal. It draws inspiration from the lessons learned during the stringent COVID-19 lockdowns, marking the first attempt to understand cultural differences and preferences among these countries.

2. Method

2.1. Research questions

As the objective of this study is to learn the design preferences of balcony and to learn what design factors will encourage usage of balcony in apartment buildings for Taiwan, Vietnam, Indonesia, and Portugal; this study established six research questions and as listed below.

- What are the preferences for balcony usage among the four countries?
- What are the preferences for balcony types among the four countries?
- What are the preferences for balcony view among the four countries?
- What are the preferences for balcony enclosure style among the four countries?

- What are the preferences for balcony decoration elements among the four countries?
- What is the preference for balcony size among the four countries?

2.2. Questionnaire

A questionnaire with 21 questions based on balcony activities and design elements listed on Tables 1 and 2 is developed and can be accessed in this link¹. It was written in five languages: English, Chinese (Mandarin), Portuguese, Vietnamese, and Indonesian (Bahasa) and divided into three parts. Part 1 asked for participants' background information. Age, gender, working status, countries of residence and dwelling conditions are included. Part 2 included questions regarding balcony usage and activity type prefer and performed by the respondents. Part 3 included questions regarding five design factors: type, view, enclosure, decoration, and size. Presenting questions such as "Which type of balcony will encourage you to use the balcony more?". In Part 3, a five-point Likert scale was used; with 1 = Not encouraging, 2 = Slightly encouraging, 3 = Moderately encouraging, 4 = Very encouraging, and 5 = Extremely Encouraging. The questionnaire was given out online via social network groups (Facebook, Instagram, etc.) and communication apps such as LINE to people who lived in urban areas and experienced some degree of lockdown during the recent COVID-19 pandemic. 505 effective samples were received (N=505).

2.3. Background of respondents

People with different upbringing and cultural backgrounds, geographic regions, and ages may have different views (Chen et al., 2019). The survey was conducted in November of 2021, out of the 505 participants, 65 were 18~24 years old, 222 were 25~40 years old, 175 were 41~56 years old, and 43 were 57~75 years old. There were no respondents over 75 years old. There were 343 female and 159 male respondents, with 3 respondents who preferred not to express their gender. Out of 505 participants, 75.2% of the participants were working. The

¹ Questionnaire in English version. <https://forms.gle/vwtohQ392c7ZFRBS9>

number of Taiwanese was 195 people, Portuguese was 157 people, Vietnamese was 107 people, and Indonesia was 46 people. Regarding household size, 80.1% of the total respondents had 2 to 5 members in their households. 12.7% respondents lived alone, and 7.2% of people lived in a family with more than 5 members. From the effective sample, the 505 respondents either lived or at the time lived in an apartment with a balcony. Respondents who had not lived in a place with balcony were not included in this research. Moreover, 28.1% of the participants lived on the 1st to 2nd floors, 33.9% lived on the 3rd to 5th floors, 32.1% of the participants lived on the 6th to 16th floors, and 5.9% on the 16th floors or higher of apartment buildings. Table 3 summarized the respondents' background information with detailed subgroup and values for frequency, valid, and cumulative percentage.

Table 3. Respondents' background.

Category	Subgroup	Frequency	Valid Percent	Cumulative Percent
Age group	Age 18-24	65	12.9	12.9
	Age 25-40	222	44.0	56.8
	Age 41-56	175	34.7	91.5
	Age 57-75	43	8.5	100.0
	Total	505	100.0	
Gender	Female	343	67.9	67.9
	Male	159	31.5	99.4
	Prefer not to say	3	0.6	100.0
	Total	505	100.0	
Working status	Student	61	12.1	12.1
	Working	380	75.2	87.3
	Semi-retired	15	3.0	90.3
	Retired	24	4.8	95.0
	Other	25	5.0	100.0
	Total	505	100.0	
Country of residence	Taiwan	195	38.6	38.6
	Portugal	157	31.1	69.7
	Vietnam	107	21.2	90.9
	Indonesia	46	9.1	100
	Total	505	100.0	
Size of Household*	1	62	12.3	12.3
	2~5	407	80.6	92.9
	over 5	36	7.2	100.0
	Total	505	100.0	

* Number of people in the household.

2.4. Quantitative data analysis methods

Descriptive statistics analysis was performed in this study first to summarize the groupings of the participants' data (Parvin, 2007) then to summarize the results of balcony activities. As this study used Likert-scale questions in part 3 of the survey and with two or more groups of participants, the median test was applied to find out the central tendency of populations. This study was under the assumption that there was no continuous normality distribution, thus Friedman Test with mean rank was used to verify the ranking of preferred balcony types, outlook, enclosure, and decoration as well as to demonstrated the significant differences among different nationality groups (Sidney, 1957). The above stated descriptive and non-parametric statistical analysis methods were performed with IBM SPSS Version 28.

3. Results and Discussion

3.1. Preference on balcony usage among the four countries

Even after being confined to home for a long period of time during lockdowns, respondents reported conducting more physical and spiritual activities, but far fewer social activities on balconies. As showed in Table 4, during the pandemic lockdown; spiritual activity conducted on the balcony accounted for 58.56% of all activities. Physical activity accounted for 30.23%, and the lowest was social activity, which accounted for only 11.22%.

Table 4. The activities conducting on balcony among four countries during COVID-19 Pandemic lockdowns.

List of Activities		Taiwan	Portugal	Vietnam	Indonesia	Overall
Physical activity	Count	263	135	140	36	574
	% of Total	13.85%	7.11%	7.37%	1.90%	30.23%
Spiritual activity	Count	278	480	258	96	1112
	% of Total	14.64%	25.28%	13.59%	5.06%	58.56%
Social activity	Count	50	92	54	17	213
	% of Total	2.63%	4.84%	2.84%	0.90%	11.22%

Percentages and totals are based on responses.

As shown in Table 5, based on descriptive statistic value, the top three activities conducted on the balcony are "Getting sun & air", "Gardening" and "People watching/ street observation". This indicates that people had a higher need for spiritual and physical health

than social interaction. However, there was a significant difference among people residing in four countries. In Portugal, Vietnam, and Indonesia, “Getting sun & air” was evaluated as number one activity conducted on balconies. However, in Taiwan, it was scored as a third preferred activity. Despite earlier research indicated that during lockdowns, balconies became the space where people can have contact to the outside world (Aydin & Sayar, 2020); most Taiwanese answered that the balcony was mainly used for “Housework: Cleaning, Laundry”. This can be explained that apartments in Taiwan is traditionally designed with at least one balcony for housework purpose. The subtropical and tropical climates in Taiwan allowed for clothes washing and drying on these balcony spaces. Likewise, hang-drying clothes on balcony space is also a common practice in Indonesia, it is scored 3rd of the most conducted activity in balcony in this survey while in Portugal and Vietnam, this activity scored 7th. During a post-survey interview, respondents from Portuguese and Vietnamese living in urban areas said that it was a personal and privacy consideration to not hang their clothes on the balcony. Clothes are often machine dried in dedicated laundry room.

During the pandemic, lockdown measures prevented people from being in close contact with people outside their homes. So, it was not surprising that “People watching/ street observation” scored high in activities conducted, with order in 4th in Taiwan, 3rd in Portugal, 3rd in Vietnam, and 2nd in Indonesia. “Gardening” was scored 2nd for most conducted activity in Taiwan and Vietnam, which echoes earlier research that easy access to green space and nature (Krzymińska, Bocianowski, & Mądrachowska, 2020) helped to reduce stress and fatigue (A. I. Ribeiro et al., 2021). Gardening was considered as both physical and spiritual activity contributing to two of the three dimensions of well-being (Adams et al., 2010; Park et al., 2008).

One activity that scored differently among four countries was “Drinking and dining”. This activity was chosen by most Portuguese as the 2nd most conducted activity. In the post-

survey interview with Portuguese respondents, they said that the restaurants with balconies or terraces in Portugal were common, and having meals outdoor of home were comfortable and preferred. During the lockdown period at home, Portuguese people enjoyed eating and drinking on their home balconies.

On the other hand, the three activities scored lowest are “Interacting with neighbors”, “Participate in communal activity” and “Religious activities”. It showed that social interaction during lockdowns at home is not high. The number of people participating in community activities on balconies was minimal and most of them use balconies for physical and leisure activities. Yet, it was quite surprisingly to learn that the religious activity perform on balcony among the countries has the lower order then the study was anticipated.

To summarized, the results of order showed that the need for physical and spiritual activities was generally valued during the pandemic. The results can help architects and local administrators make design decisions and regulations such as creating good and open views, a large enough space for sunbathing and breathing, or with suitable balcony size for organizing dining activities within the family and utilities use.

Table 5. Order of activities conducting on balcony among people residing in different countries.

Order	Taiwan	Count	Portugal	Count	Vietnam	Count	Indonesia	Count
1	Housework: Cleaning, Laundry	133	Getting sun and air	128	Getting sun and air	74	Getting sun and air	36
2	Gardening	115	Drinking and dinning	88	Gardening	70	People watching/ street observation	26
3	Getting sun and air	105	People watching/ street observation	79	People watching/ street observation	66	Housework: Cleaning, Laundry	20
4	People watching/ street observation	83	Studying/ Reading /Painting	73	Drinking and dinning	39	Gardening	13
5	Talking/ texting on the phone	41	Gardening	67	Studying/ Reading/Painting	39	Talking/ texting on the phone	13
6	Studying/ Reading/ Painting	31	Housework: Cleaning, Laundry	56	Talking/ texting on the phone	38	Studying/ Reading/Painting	10
7	Drinking and dinning	24	Talking/ texting on the phone	55	Housework: Cleaning, Laundry	36	Drinking and dinning	8

8	Smoking	17	Playing with children/pets	50	Exercise: Yoga/Pilates/Gymnastics	34	Smoking	6
9	Exercise: Yoga/Pilates/ Gymnastics	15	Smoking	34	Remote working	15	Remote working	5
10	Playing with children/ pets	12	Remote working	27	Playing with children/pets	10	Exercise: Yoga/Pilates/Gymnastics	3
11	Interacting neighbors	6	Interacting neighbors	22	Smoking	10	Interacting neighbors	3
12	Remote working	5	Participate in communal activity	15	Interacting neighbors	10	Religious activity	3
13	Participate in communal activity	3	Exercise: Yoga/Pilates/Gymnastics	12	Participate in communal activity	6	Playing with children/pets	2
14	Religious activity	1	Religious activity	1	Religious activity	5	Participate in communal activity	1

The number is based on responses.

3.2. Ranking and preference on balcony type among countries

As presented in Figure 2, Extruded & open, Half-extruded & half-recessed, and Fully recessed were the three types of balcony used in the questionnaire. To find out the ranking among the four countries on preferred balcony type, Friedman Test was performed. As indicated in Table 6, all ranking of four countries achieved the P-value <0.05, hence, the mean rank of the three balcony types had a significant difference ranking. Results showed “Fully recessed” balcony had the lowest ranking in all four countries, “Extruded & open” ranked 1st in Portugal, and “Half-extruded & half-recessed” ranked 1st in Taiwan, Vietnam, and Indonesia.

As mentioned in post-survey interview, Portuguese loved to dine on balcony, and “Extruded & open” balcony had the spatial quality to allow for outdoor dining. “Half-extruded & half-recessed” balcony type was preferred by Taiwan, Vietnam, and Indonesia. Respondents from these three countries indicated “Getting sun and air” in balcony was one of the top three activities performed in balcony and showed in Table 5. The climate classifications in these countries were tropical and temperate hot and humid types. Thus, although it was desirable to sit on the balcony for fresh air, recessed balcony would provide

better shading and protection from the Sun during the summer seasons.

Results from Table 6 also indicated that “Fully recessed” is less preferred balcony type in all four countries. The removal of a preexisting balcony and its integration into the indoor living space leads to the loss of an intermediary zone that acts as an environmental buffer, thereby forfeiting the benefits associated with having a transitional area between the indoor and outdoor environments. The absence of spaces like balconies results in a significant spike in energy consumption (Leigh, Bae, & Ryu, 2018). However, since fully recessed balcony can block harsh sunlight and solar radiation from entering interior space and reduce cooling load to saving energy (Hilliaho et al., 2015), this type of balcony was still found in high-rise buildings in these countries. The two types of balconies, the Extruded & open and Half extruded & Half recessed, were preferred over the Fully recessed type. These two types allowed more direct sun and more air exposure, which echoed the respondents’ selection of two most conducted activities: “Getting sun and air” and “People watching/Street observation”.

Table 6. Ranking of preferred balcony type of four countries.

Ranking	Taiwan (N=195)	Mean Rank	Portugal (N=157)	Mean Rank	Vietnam (N=107)	Mean Rank	Indonesia (N=46)	Mean Rank
1	Half extruded & half recessed	2.25	Extruded and open	2.27	Half extruded & half recessed	2.41	Half extruded & half recessed	2.27
2	Extruded and open	1.97	Half extruded & half recessed	2.11	Extruded and open	1.87	Extruded and open	2.08
3	Fully recessed	1.79	Fully recessed	1.63	Fully recessed	1.71	Fully recessed	1.65
	Chi- Square	26.122	Chi- Square	42.896	Chi- Square	32.780	Chi-Square	10.815
	df	2	df	2	df	2	df	2
	Asymp. Sig.	<.001	Asymp. Sig.	<.001	Asymp. Sig.	<.001	Asymp. Sig.	0.004

3.3. Ranking and preference on balcony view among countries

All rankings of preferred balcony views in four countries achieved P-values less than 0.05

and as shown in Table 7. The top two views were the same in all four countries, with “Natural scenery” ranked number 1, followed by “Courtyard”. With mean rank values higher than 3.90, this suggested that balconies with views to natural landscape or courtyard are preferred over street, traffic, and neighbors in 2.90, 2.34 and 1.93. Study pointed out that a green space had an immense impact on mental health, making people feel less distressed, less irritated and supports better mental balance (Aspinall, Mavros, Coyne, & Roe, 2015). A relaxing blue-green space was always appreciated and improves the quality of life (Krzymińska et al., 2020). This was further supported by people who experienced the COVID-19 pandemic lockdown, as they expressed connecting to outdoor space and blue-green features at home helped them stayed optimistic (Pouso et al., 2021). “Street” view in this study is referred to the smaller streets that may allow for people to watch and less traffic noise. The less preferred views were “Traffic” and “Neighbor”. This could be due to vehicle noise or privacy issue, as study has shown high traffic noise could elevate the blood pressure and the proximity between buildings and balconies affects residents’ living privacy (Pouso et al., 2021). In conclusion, balcony with view to Natural scenery or Courtyard were the preferred balcony view to foster well-being.

Table 7. Ranking of balcony facing view of four countries.

Ranking	Taiwan (N=195)	Mean Rank	Portugal (N=157)	Mean Rank	Vietnam (N=107)	Mean Rank	Indonesia (N=46)	Mean Rank
1	Natural scenery	4.39	Natural scenery	4.55	Natural scenery	4.41	Natural scenery	4.22
2	Courtyard	3.90	Courtyard	4.15	Courtyard	4.02	Courtyard	3.92
3	Street	2.76	Street	2.37	Street	2.88	Street	2.90
4	Traffic	2.02	Neighbors	2.29	Neighbors	1.86	Traffic	2.34
5	Neighbors	1.93	Traffic	1.64	Traffic	1.82	Neighbors	1.62
	Chi- Square df	464.758 4	Chi- Square df	489.825 4	Chi- Square df	294.421 4	Chi- Square df	108.47 4
	Asymp. Sig.	<.001	Asymp. Sig.	<.001	Asymp. Sig.	<.001	Asymp. Sig.	<.001

3.4. Ranking and preferences on balcony enclosure among countries

The ranking of five proposed balcony enclosure styles for the different countries had

significant differences with P-value less than 0.05 and as showed in Table 8. However, when looking at the ranking order, “Open” was ranked 1st in Portugal, Vietnam, Indonesia and ranked 2nd in Taiwan. “Shading” was the most preferred in Taiwan. It ranked 2nd in Portugal and ranked 3rd in Vietnam and Indonesia. Vietnamese preferred to have “Security bar” over “Shading”, and Indonesian preferred to have “Clear glass” then “Open” for balcony enclosure style.

In recent years, there had been reports of children falling from balconies in Vietnam. Thus, many families living in apartments opted to install safety nets or security bars on balconies and windows to prevent this kind of accidents (Giang & Nguyen, 2021). Hence, scenes of balconies with a grid or a security bar were gradually becoming popular in high-rise buildings in Vietnam.

Nonetheless, in general, “Open” balcony with no cover was most preferred by respondents. This was further supported by a correlation between Open balcony and the spiritual activities on balconies (sig. <0.05). The other different preferences may be because of the difference in culture, generation, or lifestyle.

Table 8. Ranking of balcony enclosure materials of four countries.

Ranking	Taiwan (N=195)	Mean Rank	Portugal (N=157)	Mean Rank	Vietnam (N=107)	Mean Rank	Indonesia (N=46)	Mean Rank
1	Shading	3.24	Open	4.30	Open	3.44	Open	4.22
2	Open	3.18	Shading	3.12	Security bar	3.22	Clear glass	2.97
3	Mosquito screen	2.95	Clear glass	2.96	Shading	3.04	Shading	2.87
4	Security bar	2.84	Mosquito screen	2.63	Mosquito screen	3.04	Security bar	2.63
5	Clear glass	2.81	Security bar	1.99	Clear glass	2.25	Mosquito screen	2.32
	Chi-Square df	16.916 4	Chi-Square df	227.731 4	Chi-Square df	43.22 4	Chi-Square df	50.416 4
	Asymp. Sig.	0.002	Asymp. Sig.	<.001	Asymp. Sig.	<.001	Asymp. Sig.	<.001

3.5. Ranking and preference on balcony decoration among countries

Decoration elements in a home can be functional or ornamental. In this research, to learn

more about which decoration elements can make balcony space more inviting, useful, and comfortable; sixteen decorations were listed. Respondents were asked to indicate, from a scale of 1 to 5, which decoration will encourage them to use the balcony more. There was a significant differences among people in different countries for the preferred balcony decoration and as shown in Table 9.

It was noted that in all four countries, “Greenery” was selected as as the top balcony decoration element, and followed by Flower Pots, Floor Drains, Foldable Chair/Table, and Lighting. When examining the correlation between activities and decorative elements on the balcony, “Gardening” and “Greenery” and “Flower pots” had correlation coefficient $\text{sig.} < 0.01$ and $R \text{ pearson} > 0.3$. Incorporating greenery, flowers and living spaces can play a pivotal role in enhancing the overall quality of life for residents and boosting their well-being. Furthermore, integrating green design can also contribute to increasing the economic value of housing (Juan & Tsaih, 2021). Echoing many other studies, that trees and green spaces significantly contributed to human mental recovery and a garden was thought of as an outdoor extension to the home that offered casual relaxation (Coolen & Meesters, 2011). Moreover, balcony with “Floor drain” was important for activities such as Gardening and Housework. Lighting might be an necessary item for Housework or Dining activities during nighttime. Foldable Chair/Table was also desired for activities such as reading, dining or sun bathing.

On the other hand, Outdoor heater, Fixed Chair/Table, Color painted wall, and BBQ grille were the least preferred decorations for the four countries. Vietnam, Indonesia and Taiwan had tropical and temperate climates. The average dry-bulb temperature in winter was about 20 degrees, so “Outdoor heater” was a non-priority element in these countries. Color painted wall was the least preferred decoration in Portugal, and it also ranked low in the other three countries, at 12th and 13th. Perhaps, it was because balcony is an outdoor space for

getting air, sun and views, so that the color painted wall was ranked lower than expected as a preferred decoration for these four countries. BBQ grille was the lowest ranked element in Taiwan. In order to understand this, it was worth mentioning that it was a common concern for Taiwanese that barbecue smoke can be harmful to human health and burnt meat can cause cancer (Chen et al., 2019). Finally, “Electrical outlet” was considered a necessary decoration on the balcony in all countries, ranking between 5th to 8th. To summarize the results, all of countries preferred to have “Greenery”, “Flowerpots”, “Lighting”, “Floor drain” and “Foldable Chair/Table” in their balconies. Architects and designers can consider choosing these preferred decorations for the balcony in an apartment to promote well-being.

Table 9. Ranking of proposed common balcony decoration elements of four countries.

Ranking	Taiwan (N=195)	Mean Rank	Portugal (N=157)	Mean Rank	Vietnam (N=107)	Mean Rank	Indonesia (N=46)	Mean Rank
1	Greenery	11.84	Greenery	11.79	Greenery	12.77	Greenery	12.47
2	Flower pots	11.49	Flower pots	11.30	Floor drain	12.18	Lighting	12.12
3	Lighting	11.40	Foldable Chair/Tabl e	10.92	Flower pots	11.11	Foldable Chair/Tabl e	11.53
4	Floor drain	10.56	Lighting	10.75	Lighting	10.33	Floor drain	11.52
5	Electrical outlet	9.87	Shading	10.28	Foldable Chair/Tabl e	10.18	Flower pots	11.16
6	Foldable Chair/Tabl e	9.65	Outdoor Rug/ Floor Pillow	9.39	Shading	8.89	Electrical outlet	10.22
7	Sink/ faucet	9.27	Fixed Chair/Tabl e	8.80	Insect Repellent Light	8.79	Shading	8.61
8	Outdoor Rug/ Floor Pillow	8.26	Electrical outlet	8.53	Electrical outlet	8.62	Insect Repellent Light	7.75
9	Mosquito Screen	8.06	BBQ grille	8.25	Sink/ faucet	8.50	BBQ grille	7.21
10	Shading	7.92	Insect Repellent Light	8.19	Small water feature	8.07	Small water feature	7.18
11	Small water feature	7.37	Mosquito Screen	7.42	Mosquito Screen	7.82	Outdoor Rug/ Floor Pillow	7.07
12	Insect Repellent Light	7.29	Outdoor heater	6.67	Color painted wall	6.95	Color painted wall	6.96
13	Color	6.14	Floor drain	6.65	BBQ grille	6.63	Sink/ faucet	6.23

	Painted wall						Faucet	
14	Fixed Chair/Table	5.98	Sink/ faucet	6.05	Outdoor Rug/ Floor Pillow	6.53	Mosquito Screen	5.87
15	Outdoor heater	5.55	Small water feature	5.64	Fixed Chair/Table	4.38	Fixed Chair/Table	5.68
16	BBQ grille	5.35	Color painted wall	5.36	Outdoor heater	4.26	Outdoor heater	4.42
	Chi-Square	784.67	Chi-Square	590.51	Chi-Square	521.0	Chi-Square	250.8
	df	8	df	1	df	4	df	3
	Asymp. Sig.	<.001	Asymp. Sig.	<.001	Asymp. Sig.	<.001	Asymp. Sig.	<.001

3.6. Preference on size of balcony

Apartment dwellers use balcony as a place to ease emotional distress when being confined to home for a long time. As balconies became a vital link between inside and outside, the home and the street, the leisure place for resting; balcony space had shown as a necessity in apartment buildings. Shown in Figure 4, most respondents preferred to have a balcony size big enough for family members, up to 51.5% of the respondents would like to have a balcony that “Runs the whole length of the apartment”, 34.9% of the respondents preferred a “Big enough for a few people to sit”, and 13.7% prefers a small balcony. Besides, 68.4% of respondents want to have a balcony attached to the living room. The living room as the central area within a house holds greater significance during daylight hours compared to the bedroom. Consequently, numerous housing units have extended the living room into the balcony to gain extra space (Seong, Lee, Song, Lee, & Lim, 2018).

3.7. Summary

The ranking of proposed balcony types, views, enclosures, and decorations based on Friedman Test are showed in Tables 6 to 9. To make it easier and insightful for architects and housing developers use, Table 10 showed the summarized results with Median score. An overall average preference from four countries is also indicated. The symbol o represented a

highly recommended element, with a Median greater than 4. The symbol of Δ represented a moderately recommended element, with a Median less than 4 and equal or greater than 3. The symbol x represented a Median less than 3 and is not recommended.

Table 10. Summary of preferred balcony design element of four countries.

Factor	Element	Taiwan	Portugal	Vietnam	Indonesia	Average
Type						
	Half extruded & half recessed	o	Δ	o	o	Δ
	Extruded and open	Δ	o	Δ	o	Δ
	Fully recessed	Δ	x	Δ	x	x
Facing view/Outlook						
	Nature scenery	o	o	o	o	o
	Courtyard	o	o	o	o	o
	Street	Δ	x	Δ	o	Δ
	Traffic	x	x	x	Δ	x
	Neighbors	x	x	x	x	x
Enclosure						
	Open	Δ	o	o	o	o
	Enclosure with clear glass	Δ	Δ	Δ	Δ	Δ
	Enclosure with shading	Δ	Δ	Δ	Δ	Δ
	Enclosure with mosquito screen	Δ	x	Δ	x	x
	Enclosure with security bar	Δ	x	Δ	x	x
Decoration elements						
	Greenery	o	o	o	o	o
	Flower pots	o	o	o	o	o
	Foldable Chair/Table	o	o	o	o	o
	Lighting	o	o	o	o	o
	Electrical outlet	o	o	o	o	o
	Shading	Δ	o	o	Δ	Δ
	Floor drain	o	Δ	o	o	Δ
	Insect Repellent Light	Δ	Δ	Δ	Δ	Δ
	BBQ grille	Δ	Δ	Δ	Δ	Δ
	Sink/ faucet	o	Δ	o	x	Δ
	Outdoor Rug/ Floor Pillow	Δ	o	Δ	x	Δ
	Small water feature	Δ	x	Δ	Δ	x
	Mosquito Screen	Δ	Δ	Δ	x	x
	Fixed Chair/Table	Δ	o	x	x	x
	Color painted wall	Δ	x	Δ	x	x
	Outdoor heater	Δ	Δ	x	x	x

o Highly recommend (Median ≥ 4)

Δ Moderately recommend ($4 > \text{Median} \geq 3$)

x Not recommend (Median < 3)

4. Conclusion

Throughout the recent COVID-19 lockdowns, access to outdoor spaces for social and

physical activities was limited. These lockdown measures and quarantines led a reported increased rates of depression, loneliness, discomfort, and negative psychological impacts, all of which significantly affected people's overall well-being. As individuals yearn for a sense of connection with nature and society, it becomes increasingly clear that the inclusion of balcony spaces for apartment dwellers is of paramount importance. Through this systematically study, the most performed activities in balcony during lockdown were identified as well as user's preferred balcony types, views, enclosures, decorations, and sizes among the four countries. Even though this study was limited to respondents from Taiwan, Vietnam, Indonesia, and Portugal; the statistically preference and significant differences were still found among the countries. It was evident that climatic, cultural, and lifestyle could affect people's preference for balcony usages and design elements. The comprehensive findings of this study can offer architects and housing developers valuable insights for shaping design choices and promote well-being at home. Future studies can be conducted with larger participant samples from more countries or regions, representing diverse climates and cultures.

Declaration of Interest Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Conflict of interest

The authors have no conflicts of interest arising from this study.

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Title: **Balcony Usage and Design Preference as a Space to Achieve Well-being**

Reviewed results:

General comment

In general, this research aims to prove that balconies in an apartment will provide additional space for human health/well-being during the Covid-19 period, especially during the lockdown period.

The main problem of recovering human well-being during the Pandemic is that many people feel depressed, isolated, hopeless due to limited space or places to travel, confined and some have had their work relationships terminated.

This research attempts to examine the usefulness of balconies for recovering human well-being and as a reference for balcony design, even though during times of depression and isolation, people would not pay attention to the details of balconies (elements), decorations and balcony shapes (rectangular, oval and trapezoidal). Full emergent balconies, half in and interior balconies.

Review suggestions:

1. Change title: Balcony usage as a space to achieve human well-being during Pandemic Covid-19.
2. Limit this research to just proving that people could use balconies as a space to recover from depression, feelings of isolation and mental health, entertainment and housework activities during pandemic lockdown.

3. Adding the abstract a conclusion statement at the end of the abstract.

4. In the Introduction (background), a brief explanation of human psychology and various types of depression disorder is explained. Those are related to human well-being factors.

5. Table 5 is simplified by eliminating the order column, the order of activities remains but number the order listed in the table is according to countries.

6. The conclusion is aimed more at the human well-being factors likes feeling better, tension released, more laughing, singing, frolic, harvesting fruit and vegetables after gardening at balconies not at the various elements, types and decorations of balconies as a reference for designing balconies. There are no tables describing how well human well-being and depression decreases or releases after using balconies.

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ACTION	COMPLETED	ID/TITLE	STATUS
Select... ▾	25-Nov-2023	JAABE2310663AP	Review in Process
		Balcony Usage and Design Preference as a Space to Achieve Well-being	Assignments: SO: Ong, John Cyrille