Active housing design that supports health

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Abstract. The research addresses the concept of active housing design and recent advocates of health. There is sufficient health evidence show changes in neighborhoods, streets, and buildings design encourage physical activity regularly, as a part of people's daily lives can be part of the solution to reduce risk factors and diseases. Inhibition of harmful behavior is an effective way to promote physical activity and encourage dynamic response is the most important in architecture. Therefore, interventions that promote physical activity are always accompanied by the addition of spatial value, and the built environment exerts potent effects on our health and well-being. As a result, the city had made a significant effort to encourage an integrated, small and connected community to increase opportunities for active transport, to reduce trip times between destinations and provide many recreational opportunities. A renewed understanding of these humanitarian needs to design buildings that influence behavioral patterns, design can discourage stable and passive behavior and it can enhance the attractiveness of healthy choices, building design has a significant impact on physical health, this understanding is not surprising because we spend most of our time at home.

Introduction

Physical Activity contributes to a sense of happiness and vitality, improves quality of life as we age, reduces the risk of disease, gives residents a better self-image and more social interaction, and reduces the risk of psychological problems such as depression, anxiety or aggressive behaviour. Healthy living According to public health organisations at the moment is represented by promoting active lifestyles, a change in the design of neighbourhoods, residential buildings and streets supports regular physical activity as a natural part of everyday life and can be part of the solution to reducing health problems, as most of us are not active enough and lacks 30 minutes of physical activity per day. However, to encourage physical activity, the biological and psychological needs of the population must be understood and taken as a starting point to reconsider the planning and to design the neighbourhoods. All of that inspires the initiatives the successful sanitary design with active housing design. The research problem was represented by the existence of a cognitive need to explore the concept of active housing design and identify its elements and mechanisms at the level of residential neighbourhoods and the building and its role in supporting health at these levels. The research assumed, firstly, the existence of design elements and mechanisms that activate space at the level of residential neighborhoods and residential building represents the Code of active design and secondly, the social environment affects the identification of elements of active design, and the research methodology was the following procedural steps:

- Define the concept of active housing design and identify the essential aspects and mechanisms at the level of residential neighborhoods and residential building.
- Extract the theoretical framework of active housing design and apply it to a range of global and local examples.
- Conducting a questionnaire to clarify the role of active housing design indicators at the level of neighborhoods and residential buildings in supporting the health of the population.
- Present findings, conclusions and recommendations.

Active housing design

Many studies have addressed the definition of the concept of active housing design. For planners, designers and other policymakers interested in creating a conducive housing...
environment, it is one of the strategies of facilitated architectural and urban design that can increase regular physical activity through environmental support for active transport, active movement in buildings and active recreation. (Rojkind, 2011). The City of North Vancouver (2015) study defined it as a building development approach that uses architecture and urban planning to support everyday fitness and encourage social interaction in buildings. It contributes through active planning and design principles to enhance the walkability of streets, sidewalks and active public spaces (The City of North Vancouver, 2015). Also, Price & Fenton (2015) study defined it as a model policy adopted by local governments to develop and support healthy lifestyles by facilitating participation in sport and physical activity, helping participating parties shape the current and future built environment to maximise opportunities for communities to be naturally active as part of life. Journal (Price & Fenton, 2015) (Webb & Schneider, 2015) defined active design as translating health research into design solutions and giving a role to architecture and urban planning to improve public health and well-being and promote recovery in life in living spaces. The study showed that movement trends within the workplace pave the way for an active design of the workspace. Today, many spaces are designed with various work zones to support different work patterns and functions that change throughout the day. This kind of modern planning has increased in recent years and has led to a significant change in how space is used. This change can contribute to Increase the movement and to achieve the main objective of the active design, through collaborative workspace design as an example of active design (Webb & Schneider, 2015).

According to the World Health Organization, Gladki Planning Associates study (2014) defined Active City as a city that create opportunities and continuously improve them in social and built environments and expanded community resources to enable all its citizens to engage in physical activity in everyday life according to a comprehensive approach for the residential environment the most essential unit of the built environment to promote active and healthy living. In which the active design is based on the physical environment to create healthy places that encourage the active living of all residents according to design principles that guide the changes in neighborhoods, streets and buildings so that physical activity becomes a regular part from the daily lives of the most significant number of people (The City of North Vancouver, 2014). While, the study (Burden& Bloomberg, 2013) defined it as an approach based on the development of urban planning and architectural solutions to support healthy communities, and linked to initiatives and policies that promote the structure of healthy neighborhoods through the design of spaces that encourage movement and physical activity, which is to stimulate the walkway and the design of sidewalks, by inviting architects and developers to trace the footprint of the population as a footprint for their buildings, and to design sidewalks on that basis. When the Active design using sidewalk experiment can be considered a resource and toolkit for communities promoting physical activity by transforming their built environments, or for communities seeking to improve health and integrate physical activity into our daily lives through intelligent design.

Active design that based on the formation of the sidewalk experiment aims to be a participatory tool and thus serves as a tool for those who make up the built environment to facilitate participatory pedestrian design, and to understand that the wide sidewalks are essential in the pursuit of a healthy, active, sustainable and flexible environment for future generations. Active design uses the conceptual framework (street room) to deal with the complexities of shaping this space and addressing both quantitative and qualitative factors. (Burden& Bloomberg, 2013). The Yaghooti (2013) study also defined active design as the design of a built environment that directly affects public health and invites the architect, the urban planner, the landscape architect, the public official and the owner of the building to help contribute to the
solution, in doing so, and focuses on four primary ways in which to present promote healthy habits: active alternative transport, active buildings, active recreation, and access to healthy nutrition (Yaghooti, 2013). Based on the foregoing studies that dealt with the concept ranged from being a design tool, design strategy, policy or approach, and a shared responsibility of all parties, but they differed in terms of the scale within which they appear, including what they identified at the level of residential neighbourhoods, including those identified at the level of Residential buildings, living spaces, city and walkways, however, agreed on its role in promoting activity, fitness and interaction. So, the research defines active housing design as: an integrated design tool to excite the internal and external spaces of the building and residential complex by adopting design mechanisms with a developmental approach to planning and designing neighbourhoods and residential buildings in order to support and protect public health life, working to enhance existing spaces by modifying or changing the pattern of space efficiency, or adding architectural details to existing structural elements, or reshaping architectural components of space. To clarify the aspects of active design should explain its importance and principles.

**Importance of active design**

Sustainability has become necessary in the construction industry as soon as the benefits of its design strategies appear in both the human and economic aspects. So when designing buildings that encourage physical activity, initial investments can be matched by benefits such as improved accessibility, energy efficiency, increased productivity, enhanced exit times, reduced absenteeism, and a healthier society. Therefore, Active design working on:

1. Raising the economic value of a housing unit is more attractive to tenants and owners, which is reflected in the housing market and the chances of supply and demand, as active places have more extensive economic benefits not only in terms of benefits of investment in infrastructure, but in terms of the value of houses and this can have a positive impact on overall development scalability.
2. Raising physical activity with open spaces and community facilities to increase opportunities for participation in sport and physical activity by providing safe opportunities for physical activity in many low-income neighbourhoods.
3. Establish or maintain a viable and well-functioning system to ensure a healthy, flexible and self-sustaining environment.
4. Provide affordable housing designs on how low-cost and straightforward design changes can help promote active living among affordable housing populations of all ages, where residential rehabilitation work can play a crucial role in the fight against obesity and creating healthier and more sustainable communities.
5. Synergy with other spatial planning objectives, such as sustainable design and universal access, by choosing stairs instead of the elevator, cycling instead of driving, and participating in active recreation rather than watching TV, which reduces energy consumption and greenhouse gas emissions.

**Principles of active housing design**

The principles of active housing design are an alternative transportation, active buildings and healthy nutrition. The alternative transport is to increase access to cycling routes and safe walking, which means creating roads that can be used safely for cyclists and pedestrians. While active residential buildings contain elements within the urban fabric that allow access to alternative transportation, active recreation is achieved through increased access to parks, outdoor yards and playgrounds and access to healthy nutrition come through the introduction of community gardens and urban farmers markets (Yaghooti, 2013). These principles are a tool for the designer and the planner, the activity for all as a principle embodied as facilities and open spaces available to all support the activity for all, while walking and cycling networks are embodied by connecting all destinations such as housing, schools, shops, community facilities, workplaces, open spaces and sports facilities with direct, legible and integrated networks of safe walking and cycling routes, In terms of multifunctional
open space networks, it is the establishment of a network of multifunctional open spaces in all communities to support activities while taking into account sustainable drainage systems requiring adequate infrastructure. Interior and exterior design of active buildings provide opportunities for physical activity in and around buildings. (Price & Fenton, 2015). Networking, building density, location of recreational facilities in residential neighbourhoods, street patterns and green spaces are the most important design tools affecting the physical activity of the population. At the street level, the sidewalks are wide enough for children to play, while the seats at regular distances enable the elderly to take a short walk, and the building designs defined to support the development of the overall residential environment (BETA, 2016). It is clear from the above that the principles of active housing design deal with the comprehensive housing system represented by the housing unit and the technical and social infrastructure of the neighbourhood and the same degree of importance with the possibility of the adoption of these principles as design tools for the scheme and designed to achieve active housing design, which entails studying the specificity of active housing design at different levels.

Active design levels
Spatial conditions throughout the world play an essential role in the degree of human physical activity, including all levels of the city and urban planning and access to neighbourhoods and residential units in addition to including street patterns and green areas affecting the physical activity of the population, which requires the integration of this aspect in the development process, this paragraph will discuss the most important levels as follows:

City-level: according to the World Health Organization, shows that it is able to create and continuously improve opportunities in social environments to enable all its citizens to engage in physical activity in daily life and according to an approach in the residential environment to promote active living (Gladki Planning Associates) This is achieved through the integration of physical activity with daily routine, including play and hiking in the gardens and the adoption of the concept of active transport which refers to all forms of human energy travel such as walking and cycling. As the majority of the population is willing to swap large houses for small ones to live within easy reach of commercial and recreational areas (Ibid) that is leading to the concept of Moving City, which focuses on human-urban interaction, is the challenge of creating a physical space to create conditions that help to make continuous physical activity and an essential part of life.

The level of residential neighbourhoods: On the urban scale of communities, the main factors include networks; density of construction, location of amenities; street patterns and the presence of green spaces are the most critical elements that affect the physical activity of the population. While emphasising the interconnectedness of these spaces as nodes within the tissue, this tissue is perceived as a network of small spaces that are spatially linked to social benefits with health potential that enhance social processes depending on the strength of interconnected networks.

Building Level: Interior design at the building level plays a vital role in the active design. Slopes and stairs help promote increased physical activity. The visual communication between the floors and their clarity from the main entrance to be attractive (Yaghooti, 2013)

IDENTIFY THE ELEMENTS OF ACTIVE DESIGN IN NEIGHBORHOODS AND RESIDENTIAL BUILDINGS FROM THE PREVIOUS STUDIES

1. Anderson Study, 2014: The study identified the most important aspects of active housing design at the level of neighborhoods and residential building, at the level of neighborhoods were the playgrounds to promote physical literacy and allow preschool children, adolescents, adults and the elderly to participate in physical activity and include shadow structures to enhance safety and providing water fountains, meditation spaces, bold art spaces to support active play, as well as outdoor paths to increase visual appeal through hiking, leisure and cycling trails near water parks and green spaces while providing fair lighting is good along the tracks to improve the walking experience to be connected to various other events, in addition to provide signage along the external routes, and linear parks to provide linear space for active play to support traditional play areas, and
community gardens as plots of land to encourage the physical activity of the population and work in agriculture and provide fresh vegetables and fruits to promote the activity of the elderly and create opportunities for children to grow with their parents using planter boxes and green roofs at the level of different buildings. At the level of the housing unit, stairs represents the most important things to increase the frequency of their use and make them more visible and aesthetic expected in a prominent place near the main entrance of the building, with direct visual access, in addition to the design of common spaces to increase activity during leisure and taking into account to locate them in central places that provide visibility and access to the play areas allowing parents to monitor. The study pointed to the elements of active housing design at the level of residential neighborhoods represented by stadiums that contain shadow structures, fountains, meditation spaces and art spaces, in addition to tracks for walking and biking with linear parks and green roofs. At the level of the housing unit, the most important thing is the stairs near the entrance with common spaces.

2. **Study of Active Design in Buildings “BETA, office for architecture and the city”, 2016**: The study indicated that semi-public outdoor spaces are accessible to residents as a destination in a secondary urban pathway so that they can be revived and upgraded while restricting access to certain hours to prevent inconvenience and introducing street-level functions such as a grocery store or nursery that creates direct destinations and generates urban diversity. The study also showed the most important elements of active housing design at the level of the residential building by placing gyms in clear locations on the first floor or ground floor with a view of the courtyard and the street with the addition of intermediate activities to the inner courtyard as a common reading area and tennis table room or a garden with the roof made available for an attractive program as it can be an attractive destination surface because it is within nearby distance of each end of the building. Residential blocks in urban areas with a height (4-8 floors) are a promising environment for physical activity through the use of stairs from the entrance area and connecting the pavement, courtyard, ground floor, roof and residential units among them and making the entrance courtyard transparent and open horizontally and vertically to enhance social character and make the courtyard attractive by turning it into a destination and accessible to residents and provide seats, trees and other sources of shade, fountains and sports equipment to encourage use with access to it not only from the ground floor but from other floors through stairs and slopes, however, the entrance is an essential obedience between the various roads and can encourage physical activity by establishing connections linking the street with the courtyard and the roof with the basement makes the lobby transparent and open horizontally and vertically. With an interest in designing the basement and making it a pleasant destination by allowing daylight to have direct access from the entrance hall and allocating it to group events. The study also showed the importance of converting the outer spaces into semi-public spaces by employing kiosks, shops and nurseries with access control and protection. The study also showed that the common spaces that are at the level of the housing unit are gymnasiaums, common reading areas, a table tennis room or a garden with the activation of the basement area and the roof and the entrance area as a link space for levels horizontally and vertically, with emphasis on the element of stairs and its location near the entrance in addition to the inner courtyard and easy access from different levels and is furnished with seats, trees and sports equipment.

3. **Study of Bloomberg, Michael R., Guidelines Design Active Promoting Physical Activity and Health in Design, 2010**: The study revealed the most critical elements of the active design of the residential building represented by steps, attractive and comfortable stairs, walking routes inside the buildings and the provision of central physical activity spaces (Bloomberg, 2010) In addition to children's play areas as common spaces, patios, roofs and ceilings are designed for children's play when traditional spaces such as parks and outdoor gardens are not available for practical use by children and their families. It also showed elements of active design of residential neighborhoods represented by gardens, open spaces and recreational facilities so residential buildings designed to enhance and provide easy access to nearby gardens and public spaces and grouping open spaces in one large area instead of dispersing into smaller parts to accommodate multiple forms of entertainment for families and provide running tracks, sports fields and fountains with interest in areas between residential
buildings. With the design of pedestrian paths to encourage walking and give the streets a human scale and separate pedestrians and cyclists from moving vehicles using street furniture, trees and other infrastructure. The elements of revitalization of the residential building represented by the stairs and steps with open links inside the building to increase opportunities for activity among the residents. The active spaces are roof, ceilings and courtyard, while, the elements of revitalization of residential neighborhoods are parks and central parks and areas between residential buildings and paths for pedestrians and cyclists.

4. City of North Vancouver Study, 2015: The study aimed to identify the most important design tools that enable the designer and the planner to implement the active design at the level of the residential building as follows:

The primary and secondary stairs as a prominent location near the main entrance of the building and visually emphasize it to accommodate traffic in both directions and external corridors within the residential building to expand meeting opportunities for residents of the building and joint events inside the building, these indoor spaces support social networking such as dining, entertainment, shared reading and gymnasiums. In addition to outdoor recreation areas for all ages to play and provide opportunities to make new friends connect with the community garden, residents can grow food, plants and mix, providing access to affordable local food. The elements of activation of the housing unit are the primary and secondary stairs in addition to open links such as external corridors to meet the residents and recreational areas and gardens outside on the level of floors, while the internal joint activities are activities of common dining and reading and gyms.

5. Mahdi, & Al-qaissi, The Activation Mechanisms of Co-Housing Design, 2017: The study indicated that the design of participatory residential space is determined by the level of self-selection of the user, which aims to achieve the spaces of the building and the residential neighborhood according to the mechanisms dealing with residential participatory space. At times, it carries the concept of Collaborative Housing, which is the mechanism of designing the Participatory Mix Uses Space to create interaction and sharing among the residents of the complex. While, on the other time, the concept of Collective Housing, which adopts the mechanism of saving space for some residential activities (semi-private) such as dining places, living space, children’s play space etc., where the areas of the apartments are deleted to be shared with the residents of the complex as public spaces participatory, in exchange for the provision of other residential spaces Save and Share. The quality of the mechanisms was also affected by the social and climatic environment of the region, where the residents preferred the second mechanism (Save and Share) through the questionnaire conducted by the study as being more adapted to the social environment of the study area, the theoretical framework for the elements of active housing design supporting health presented as in Table 1.

| Table 1. The theoretical framework of the elements of active housing design supporting health,  |
| (Reference: Researchers depending on mentioned theories above) |
| The main element | Secondary element | possible values |
|------------------|-------------------|----------------|
| Elements of Activation residential neighborhoods | Tracks | Cycling |
| | Parks | Linear |
| | | Centralized clustered |
| | | Areas between residential buildings |
| | | Green surfaces |
| | Playgrounds | Shadow structures and play equipment |
| | | Fountains |
| | | Art spaces |
| | | Meditation Spaces |
| Elements of Stairs and steps | | Primary and secondary |
Activation the residential building

| Shared active events | Proximity to doorways |
|----------------------|-----------------------|
|                      | Gyms                  |
|                      | Dining spaces         |
|                      | Common reading spaces |
| Shared active spaces | The inner courtyard   |
|                      | Easy access from different levels |
|                      | Suitable furnishing (seats and trees, sports equipment, tennis court or table) |
|                      | the roof               |
|                      | Basement               |
| Open links            | Outdoor level gardens |
|                      | Recreational areas     |
|                      | External corridors to meet the population |

RESEARCH SAMPLES

1. The First Project: Bronx, New York

Location: This project is located in (Bronx) in (New York), the building consists of 8 floors, in a corner in the housing development for the post-war era, which consists of 15 high-rise residential buildings, the building under study contains 100 units Residential, Figure 1.

Project Description: L-shaped building, the floor has 16 units, 8 units directly facing the street, eight units overlooking the backyard). The courtyard: The courtyard can only be accessed through the ground floor via a corridor adjacent to the lobby and the management office. It is built on a garage, limited in the courtyard to accommodate significant exterior elements such as trees or deep topological features such as ponds. Greenhouse: The building boasts a unique feature, commercial greenhouse on the roof; this requires a separate elevator at the southern end of the building. Basement: There is storage space for bicycles in the basement, although the layout of the greenhouse vertical movement unit (elevators and stairs) that are causing global warming requires cyclists to reach the bicycle store through either the building elevator, lobby or parking ramp. Vertical movement: building elevators, located inside the lobby, are visible to users of the building. Stairs are also close but not very clear, unattractive to users, as they generally look tight and require more effort when using.
Objective: The study proposes revisions to the building design and site design to achieve the following purposes, (Fig. 2a and Fig. 2b):

- Enhance the use of stairs in the building.
- Increase the variety of opportunities for recreational games involving physical activity (moderate to strong) for children between the ages of 3 to 18.
- Increase children's physical activity by promoting opportunities and participates in the parents' fitness site along with children's activity venues.

Active design strategies include Revisions to achieve the above objectives:

Objective (to promote the use of a staircase in the building), the activation strategy was:

- Identify the stairs near the entrance to the building, integrate with the main areas of direction and movement and make the location of the modified lobby near the entrance.
- Design elevators to be less visible and interesting than the stairs for people who can use the stairs, while providing easy access to people with disabilities.

**Space (1)** represents the (inner courtyard) quiet nature represents the roof of a garage area (10000 m²).

**Space (2)** represents (community room and fitness hall) for the activities of the users of the building.

**Space (3)** represents (an elevator on the surface of the watery greenhouse).

**Space (4)** represents ramp to parking and secure bicycles storage.

**Space (1)** has been activated or revised (inner courtyard) to include eight areas of active activity and three quiet areas to provide a diverse mix of activities for children and adults.

**Space (2)** is a revitalised (community room and fitness room) that has been visually separated to provide independent spaces, physically isolate them from the yard and connect them visually to it.

**Space (3)** represents (an elevator on the surface of the watery greenhouse).

**Space (4)** represents ramp to parking and secure bicycles storage.
Space (5) The stairs of the building are located near the entrance and elevators, but they are very invisible.

Space (6) The elevators of the building are located directly across the hallway from the entrance door.

Space (7) The entrance of the building is located close to the intersection, connecting residents to entertainment facilities across the street.

**Fig. 2a, Ground Floor Plan (Existing Master Plan)**

- Design stairs to be more visible, more attractive and more interesting to encourage their daily use, replacing the solid staircase door with fire-resistant glazed door.
- Placing signs for vertical movement to encourage the use of stairs. Figure 3

Objective (to increase the variety of opportunities for recreational games involving physical activity (moderate to strong) for children aged 3 to 18). The activation strategy was:
- The building offers a great deal of Shared Spaces to support physical activity for people of all ages and abilities. They include an indoor fitness area, active and efficient courtyards, and stairs that attract users.

Objective (increase children's physical activity by promoting and sharing the main site of fitness opportunities along with children's activity venues). Activation strategies were:
- Provide Co-Located Spaces for parents' fitness along with particular activity areas for children, through the availability of a variety of equipment, physical activity areas and indoor play for adults and children to be an active Co-Located Spaces (active play space + stable active spaces)
- Provides an outdoor view of the indoor physical activity rooms created in the basement and visually connected through the wide window openings with the inner courtyard, and thus achieving parental control for their children abroad. Figure 4
2. Second Project: East Harlem Compound, New York:

The project is located in Harlem, New York, the building consists of mixed-income residents; there are many group activities and sports facilities nearby, including a public swimming pool, an ice skating rink and walking and cycling areas less than 10 minutes’ walk from the building. Project Description: The building is a U-shaped building, located on the street-facing the street. It has a private courtyard available to all residents. The ground floor contains commercial units. The residential units are in the form of a 4-storey building block on the east side of the complex, so they have access to the courtyard of the building directly from the patios and stairs, which connect the upper floors with the courtyard. Other residential units are connected to the courtyard from the lobby via elevators. Figure 5.

- Patio designed primarily as a reflective space for calm, with large cultivated areas, water elements and sculptures with long strip of grass.

- Lobby on the ground floor design as community halls for commercial use.

The study proposes to revise the design of the building and site to achieve the following purposes (Fig. 6a and Fig.6b):

- Increase the opportunities for physical activity (moderate to strong) for residents of all ages during all seasons.

- Increase the use of a staircase in the building.

Active design strategies to achieve the above objectives include:

- The goal of increasing the chances of physical activity (moderate to strong) for residents of all ages during all seasons, The strategy of activation, Figure 7-8-9-10:
  
  - Activate physical activity spaces to accommodate the different groups of occupants of the building. The yard has been activated with several features to promote physical activity among children of different ages and genders. The grass area with hills and play circles provided to attract younger children, while a solid surface and climbing wall supplied as a play area for groups.

  - Maintain green outdoor play areas adapting to physical and cognitive requirements of playing in green areas is an essential component of a child's development, natural areas with terrain or changing natural elements such as mulch paths can be creat within a children's garden area that adds some diversity within their play environment.

Co-locate play areas adjacent to an adult exercise space, allowing parents to exercise while watching their children play by placing two adult exercise stations along their mulch paths; the children are close to the stable surface play area and grass area. Design parks and playgrounds and creating a variety of climatic environments to facilitate activity in various seasons and weather conditions. Active patio elements can accommodate events during all seasons. For example, heights in the courtyard accommodate skiing and movement when the ground is covered with grass, as well as activities that include skis and...
snow-related activities during the winter months. Provide adequate bicycle facilities to stop along the track or at its final destination. Using covered parking for bicycles at the back of the yard and this area is easily accessible from the back gate, encourage residents to use their bikes while avoiding the need to transport bikes through the lobby.

Objective (to increase the use of the building), and the strategy of activation:

- Encourage the use of all stairs in a building, whether they are the main stairs or escape stairs which can also be a primary means of movement in the building. Activate the escape stairs located in the lobby, which were previously difficult to find, have become more apparent to encourage residents to use them as an alternative to elevators, especially for those living on the lower floors.

- Design stairs to be more visible to encourage daily use. Stairs are activated using fire-resistant glazed doors in escape stairs to indicate the availability of stairs for everyday use, (the more be visible, the more be used).

Figure 5. the building plan within the neighborhood, p. 59
unstructured play.

2. Trees and sculptures give the patio users privacy and isolation from the commercial part of the building.

3. The long water fountain wall provides privacy from the commercial space for residents who use the patio, but it does not bring enough view from the lobby and lack of attraction of residents to use the patio.

4. Although there is a grassy area in the yard but it does not encourage kids to play in it.

5. The tall trees adjacent to the empty wall of the commercial space on the ground floor provide a reflective environment for adults inside the courtyard.

6. Stairs hidden from users of the building; making lifts the only visible option for vertical movement.

7. There is a direct line of view between the street and the entrance door and the courtyard, although the narrow corridor leading to the courtyard restricts its visual presence from the lobby.

Figure 7 lobby and the existing plan and its relationship to stairs, elevators and the yard

Figure 8 activated lobby and its relationship to stairs, elevators and the yard

up on the mulch paths to encourage children to use them and adults who supervise children's toys in the vicinity.

2. Keep the trees and sculptures give the users of the yard privacy and isolation from the commercial part located in the building.

3. Activate the lobby by increasing the glass area to achieve a better view of the courtyard via the lobby. With a long water fountain wall, privacy from the commercial space is achieved, and the population is visually tempted to use the yard.

4. Use the back of the wall as a bicycle store.

5. Activate the empty wall of the commercial space on the ground floor by installing a 4 m high climbing wall with a padded safety surface above it.

6. Activate the courtyards by adding signs to activate the movement and locate the grass hills and play circles within the nest area, adjacent to the commercial part.

7. Activate the stairs in the lobby area by making it visible from the street and entrance courtyard doors.
QUESTIONNAIRE:
A questionnaire designed for all the elements shown in the framework related to the indicators of the active housing design supporting the health. So, the questionnaire process was distributed to the experts, specialists and students of the fourth stage in the departments of architecture, and in the light of the group of observations, the results were drawn. Table 2

| Questionnaire |
|---------------|
| Q / What is the role of the following indicators in supporting the health of the population in active environments? |
| Indicator | The grade of support for health in neighborhoods |
| Tracks and gardens | Excellent | Very good | Good | Average | Poor |
| Parks and gardens | Pedestrian Cyclists | Linear Centralized clustered Areas between residential buildings Green surfaces |
| Playgrounds | Employed as newsstands, shops, nursery |
| Semi-public outer space | Control and protection |

| Q / What is the role of the following indicators in supporting the health of the population in active housing units? |
| Indicator | The degree of support for health in housing units |
| Stairs and steps | Excellent | Very good | Good | Average | Poor |
| Gyms |
Common active activities
Eating food
Reading

Common active spaces
The inner courtyard
The Entrance
to
the Roof
Basement

Open links
Outdoor level gardens
Recreational areas
External corridors
to
meet
the
population

ANALYSIS OF RESEARCH SAMPLES
After describing the research samples, a questionnaire was formulated to evaluate (as in Table (1)) the amount of health achieved through the adoption of active design indicators at the neighbourhood level and the housing unit level, as shown in Table (2) and (3). The results of the analysis were extracted by emptying information related to active design elements and indicators into a particular table by Microsoft Excel, and the measurement was done by analysing the results as follows:

1. The results on single indicators supporting population health at the active neighbourhood level:
   The results of the analysis of the projects showed that the two indicators (parks and semi-outer space) recorded the highest percentage within single signs (the degree of health support at the level of neighbourhoods), by (33.33%). Figure 11

2. The results related to single indicators supporting population health at the active residential building level:
   The results of the project analysis showed that two indicators (common active spaces and common active activities) registered the highest percentage within single indicators (health support level at the residential building level), by 25%. Figure 12
Conclusions
1. Incorporate the principles of active housing design into the design process from the outset of master planning and take into account the recreation and health of local communities through activation of health, sports and physical activity priorities.
2. Provide open space and open and community facilities to support development that increases opportunities for participation in sports and physical activity.
3. Access to active housing design does not mean the achievement of all elements, whether at the level of neighbourhoods or the building, but to think about and include the design consciously.

Acknowledgments

We would like to express our appreciation to Mustansiriyah University, Baghdad, Iraq (https://uomustansiriyah.edu.iq/) and University of Technology, Baghdad, Iraq (https://uotechnology.edu.iq).

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