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Open space quality in deprived urban areas: user perspective and use pattern

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Abstract

This study examines the quality of open spaces in the most deprived areas in Edinburgh from the perspective of end-users; and the influence of the physical and spatial qualities on how open spaces in such areas are used. The study was informed by an extensive review of the literature and a critical analysis of the relevant Scottish policies and guidance. A case study of Clovenstone Gardens in the Wester Hailes district of Edinburgh, was chosen for this study. A four-fold methodological approach was used for data collection and analysis including semi-structured interviews, attitudinal questionnaire, observation study and space syntax analysis. The study showed that both the physical and the spatial qualities of the open space under study did not meet the user's needs and expectations. This includes aspects of cleanliness, maintenance, safety and the open space layout design and quality. On the other hand, accessibility has shown to achieve a satisfactory level.

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1. Introduction

Our green open spaces are the one public service that many people use on a daily basis, that impact on our sense of quality of life and on our physical and psychological wellbeing, and that are free and available to all regardless of their demographic characteristics and socio-economic status. The importance of green open spaces for any

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community is that they provide a space for social interaction, relaxation, restoration and contact with nature and they offer opportunities for leisure activities. This may be best summarized by Carret *et al.* (1992) who defined public open spaces as the common ground where people carry out their functional and leisure activities that bind a community. Open space has been studied widely in the literature. Several authors have discussed open space from different perspectives such as the visual characteristics of open spaces (Lynch, 1960); the visual description and aesthetics of open spaces (Cullen, 1961); the design characteristics of open spaces that help to prevent crime (Newman, 1973); pattern of people behaviour and space quality (Gehl, 1987); and evaluation of the quality of open spaces (Cooper Marcus & Francis, 1998). More recently, the restorative impact of green open spaces on users has been widely reported, see for example (Aspinall, *et al.*, 2013), (Hartig, 2007) and (Catharine, 2011). Other studies investigated the restorative component of green open spaces such as urban pocket parks (Nordh, *et al.*, 2011).

This has resulted in a blossoming interest in both policy and practice on the physical, social, psychological and economic benefits of green open spaces in urban communities, and subsequent increase in demand by the public for sufficient and high quality green open space in residential neighbourhoods.

There are three main factors that are related to the effective use of green open spaces namely, users' needs, quality of the physical features and the spatial structure of the space. Understanding user's needs is a cornerstone for any well-designed open space, the design that attracts people, facilitates their activities and encourages them to spend more time when undertaking these activities (Francis, 2003). The quality of the physical features of the open space has been seen as an important aspect that improves people's satisfaction and quality of life (Beck, 2009), promotes better use of public spaces (Gehl, 1987) and enhances the social, environmental and economic values of cities (Beck, 2009). Similarly, the spatial structure of urban open spaces has shown to be associated with how people move, gather and socialize in these spaces as evident in space syntax theory (Hillier & Hanson, 1984) (Hillier, 1996) (Ozer & Kubat, 2007). In addition to these three factors, the literature suggests that the microclimate characteristics have an impact on people experiences of open spaces (Nikolopoulou & Lykoudis, 2007) (Fontes, *et al.*, 2008) (Tsitoura, *et al.*, 2014). However, this particular factor is out of the scope of this study since this study was undertaken in one season.

The provision for and the access to open public spaces has also a democratic dimension. Since public open spaces, offers a space for expression of diversity and equality, the planning process of such places should involve all stakeholders regardless of their socio-economic and cultural backgrounds (Thompson, 2002). The aim is to ensure equal provision of green open spaces across the society including the most deprived areas and the socially marginalized in accordance with the democratic values.

In spite of this wide interest in open spaces, the most deprived areas still suffer from low quality and poorly maintained open spaces when compared to affluent areas. The *Urban Green Nation* report by the Commission for Architecture and the Built Environment (CAPE), the UK government's advisor on architecture, urban design and public space, found a clear disparity in quality and quantity of green open spaces in Britain relating to socio-economic backgrounds and minority ethnic groups, with deprived areas having poorer access to green spaces and the facilities that they did have were of poorer quality (CAPE Space, 2010). To the authors' best knowledge there is no similar study for Scotland. In spite of the fact that the Scottish Planning Policy document (The Scottish Government, 2010) states in paragraph 155, page 31: "*Statutory equal opportunities obligations should be taken into account when planning for open space and physical activity*", it seems that there is no policy concerned specifically with the quality of open spaces in poorer areas, nor guidance on how to design for this vulnerable communities.

The aim of this study is therefore to assess the quality of open spaces in the most deprived areas in Edinburgh, Scotland, as perceived by the end-users. The investigation includes three dimensions: i) end users' needs, perception, and attitude towards the open space in the most deprived neighbourhoods, ii) nature of activities which occur in these open spaces, and iii) the spatial structure of the open spaces and its relation to the occurring activities. The case study selected for this research is Clovenstone Gardens in the Wester Hailes district of Edinburgh where mixed-methods approach were used for data collection and analysis including semi-structured interviews, attitudinal questionnaire, behavioural mapping and spatial analysis.

2. Research framework

Although the word 'open space' is used widely in everyday life, it seems that there is no consensus about its definition. This is in part owing to the various types of spaces that can be listed under this generic term (e.g. streets, green areas, parks, squares, markets, etc). In addition, diverse spectrum of terms are used to refer to the open space

in the literature, legislations, policies and strategies such as public open space, green space and outdoor playing space.

Several authors have defined open space, each from his/her own perspectives, see for example (Oldenburg, 1989), (Carr, *et al.*, 1992), and (Beck, 2009). The city council of Edinburgh published the Open Space Strategy for Edinburgh (The City of Edinburgh Council, 2010) in which open space was defined as these open spaces in the urban areas and main rural west settlements of Edinburgh which meet the following criteria: if they are 500 square metres or more, regardless of ownership; not mostly private or shared residential gardens; and not agricultural lands. Francis (2003) on the other hand provided a comprehensive classification and definition of open space typologies. He classified open spaces into 12 categories and split these further into a total of 23 sub-categories. The green open space in the context of this study is understood in accordance with Francis' definition of "Neighbourhood Parks" typology, which he defines in page 6 as "*Open space developed in residential environments, publicly developed and managed as part of the zoned open space of cities, or as part of new private residential development, may include playgrounds, sport facilities, etc.*".

A key issue in designing green open spaces is to understand users' needs and expectations. The literature suggests that users' needs in green open spaces can be categorized into four categories i.e. comfort, relaxation, passive engagement, active engagement, discovery and fun (Francis, 2003). The Project For Public Space suggests four main ingredients for designing open space that encourages people to visit: accessibility, activities, comfort and sociability (Project For Public Spaces, 2000). Another study suggested that high-quality, functionality and safety are major needs for any well-designed open space (Gehl, 2007). The important issue is to provide opportunity to fulfil users' needs equally for all members of the community.

Another important issue in this context is the physical quality of the open space. In spite of the fact that green open spaces are made for people, activities carried out in these spaces differ in terms of type, quantity and duration. According to Gehl (1987), outdoor activities are classified into three categories that are common to all types of public realm: necessary, optional and social activities. In summary, necessary activities are musts; people will do them regardless of the environmental condition of the open space. Optional activities are voluntary and generally linked to enjoyment and self-fulfilment; they are remarkably influenced by the physical condition of the open space. Social activities are those activities which require the presence of other people to happen. Gehl argued that, when public spaces are of poor quality, only necessary activities occur. However, when these spaces are of good quality, a broad spectrum of human activities is probable including creative activities, such as painting and playing music.

Recently however societies have shifted from the necessary lifestyle to the optional lifestyle where the use of open spaces is not exceptional. This stresses that the quality of open spaces has become increasingly significant in facilitating the interaction between people and society, and between one person and another (Gehl, 2007). High quality and well managed open spaces contribute positively to the social, economic and environmental value of cities (Beck, 2009). Open space designed to high standards reflect simultaneous public benefits to their users, whereas mistreated, poorly managed and maintained open spaces would influence their surrounding areas negatively as they create the sense that they are ignored and uncontrolled areas, which encourage anti-social behaviour, vandalism, graffiti and rubbish, and make these areas unpleasant to visit (CABE, 2005).

In addition to users' needs and the quality of open spaces, there is a growing body of literature which focuses on how the spatial structure of the built environment influences people's behaviour in open spaces. This school of thought is generally known as Space Syntax theory (Hillier & Hanson, 1984). Several quantitative measures of how spaces are connected to each other have been developed with space "*Integration*" being the most important one. Many studies have reported strong correlation between open space Integration value and density of people in the space with more visible and more accessible spaces encourages more movement and activities, whereas segregated spaces are less inviting, see for example (Hillier, 1985), (Hillier, *et al.*, 1993) and (Ozer & Kubat, 2007)). In fact, space syntax measures have shown to be linked to not only people behaviour but also perception (Alalouch & Aspinall, 2007), (Alalouch, *et al.*, 2009).

To sum up, the major three factors that influence the use pattern of green open spaces that are discussed above form the framework for the current study as shown in Figure (1). These are: users' needs, open space quality and the spatial structure of the open space.

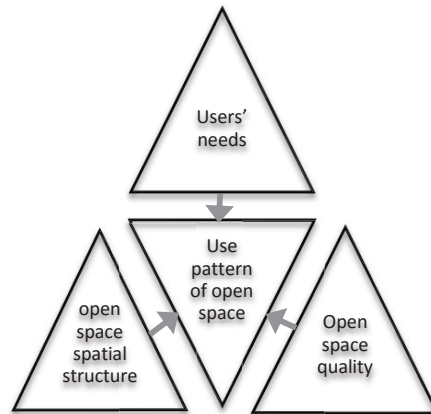


Figure 1. Factors influencing the use pattern of open spaces which form the research framework.

3. Deprivation and open space policy in Scotland

The importance of open space for communities is well recognized in the Scottish policy. The Planning Advice Note (PAN65) states that *"Open spaces are important for our quality of life. They provide the setting for a wide range of social interactions and pursuits that support personal and community well-being"* (Scottish Executive, 2008). The Scottish Planning Policy Document puts emphasis on the equality and inclusion in planning the open space in Scotland, as it states in paragraph 155: *"Within settlements there should be spaces that can be used by everyone regardless of age, gender or disability. Statutory equal opportunities obligations should be taken into account when planning for open space and physical activity"* (The Scottish Government, 2010). The Open Space Strategy for Edinburgh (The City of Edinburgh Council, 2010) specifies, in page 13, the Local Green Space Standards as follows: *"Houses and flats should be within 400 meters walking distance of a significant accessible greenspace of at least 500 sq. m. and good quality (for parks and gardens) or fair quality (for other types)"*. The Scottish Executive Social Research (Scottish Executive, 2005) recommended that there should be 4 acres (1.6 ha) per 1000 person, or 1 acre per 100 houses in large developments. This small put representative sample of policies shows that there are general standards for green open spaces that apply to all types of neighbourhoods. Although the Scottish Neighbourhood Statistics estimates that 14% of Edinburgh population are income deprived, it seems that the Scottish policies and strategies do not distinguish between the open space in deprived neighbourhoods and other areas.

4. Methods

Due to the multifaceted nature of this research, a four-fold methodological approach was adopted for the data collection and analysis, and applied to Clovenstone Gardens in Edinburgh as a case study. A series of semi-structured interview with end-users informed the development of a paper-based questionnaire to capture the perceptions and attitudes of the local population towards their open space. This was followed by an observation study to provide information on how the space is being used. Finally, the spatial structure of the case study was analysed using one of space syntax analytical technique namely Visibility Graph Analysis (VGA).

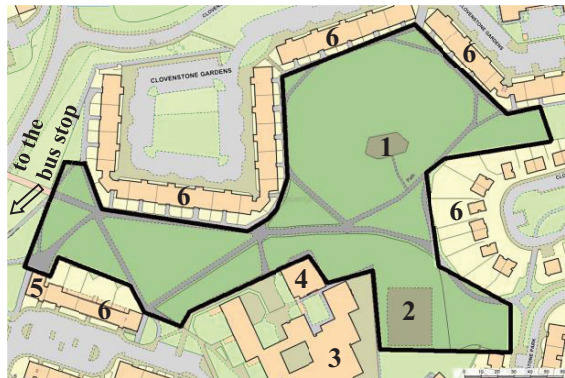
4.1. The case study

The case study selected for this research is Clovenstone Gardens which is a residential area located in Wester Hailes suburb in the west side of Edinburgh near to the city Bypass (A720). It is connected with the city centre by Lanark Road and Calder Road, a distance of about nine kilometres away. The development in this area started in early 1970s as a post-war housing estate. It was mostly owned by the city council. Private houses have started to be built

within this council locality in the last twenty years. Later on improved versions of council housing were built. The Scottish Index of Multiple Deprivation (SIMD) classifies Wester Hailes as one of the most deprived areas (15%) in Edinburgh in terms of income, one of the worst areas (5-10%) in terms of education, employment and crime in Edinburgh, and the worst area (5%) in terms of Health (The Scottish Government, n.d.).

The LUDA project, one of the European Union projects, investigated the large urban deprived areas in Europe (LUDA, 2005). The project identified Wester Hailes as a large urban distressed area in Europe. It is stated in the LUDA report, on page 42, that Wester Hailes “suffered from a range of problems. These included social problems linked to high levels of crime, drug and alcohol abuse and low educational achievement. Economically, the area suffered from high unemployment and low income levels”. The report noted the relatively large open spaces in the area, it states, on page 41, ‘Wester Hailes is notable for having lots of public open space with parks, play areas and inter-connecting pathways’. This increases the significance of these spaces in the residents’ everyday life and open opportunities for improvement.

Within Wester Hailes the green open space of Clovenstone Gardens was selected for this study due to its central location within entire residential council estate neighbourhood where the local school and community centre of the area is accessible directly and by walking. The open space encompasses several amenities such as a playground for children, football pitch, local shop and a bus stop as shown in Figure (2). In spite of this, initial inspection by the authors revealed that the space is under-used, suffers from low level of quality and is poorly maintained.



1: Playground, 2:Football pitch, 3: Primary school, 4: Community center, 5: Local shop, 6: Dwelling.

Figure 2. Green open space in Clovenstone Gardens and its surroundings (Original map: Digimap)

4.2. Semi-structured interviews

Semi-structured interviews were conducted with 10 residents of Clovenstone Gardens (2 mothers with babies, 2 fathers with toddlers, 2 college students, 2 single mid-age females, and 2 secondary school children) aiming at exploring the end-users’ concerns and opinion about their green open space. The interviews were structured around the issues that were suggested as important by the literature and covered the respondents opinion and concerns regarding the physical quality, social function, safety, maintenance, activities and accessibility of the green open space. Conversations were in general short and condense and lasted between 10 and 15 minutes. All interviews were voice-recorded.

4.3. Attitudinal questionnaire

A paper-based questionnaire was used in this study to capture people’s attitude and opinions regarding the open space under study. The questionnaire was informed by the results of the semi-structured interview and designed around Canter’s (1977) ideas on people’s aspect to space. This includes three areas: perception and attitude towards the place, activities carried out in the space and the environmental features of the place. Three types of 5-point Likert scales were used: agreement scale was used to measure respondents’ agreement to a set of attitudinal statements, scale of importance was used to measure how important some of the activities are for respondents, and satisfaction scale was used to allow respondents to indicate their satisfaction level with the quality of some of the

environmental features in the open space. A random sampling strategy was adopted and the questionnaire was administered on site. Data from the questionnaire were coded and analyses statically using SPSS software.

The sample was as wide-ranging as possible, varied in age and gender, and restricted to Clovenstone Gardens residents. In total, 46 valid questionnaires were completed. Although this sample might not represent the population of Clovenstone Gardens as a whole, it provides useful information due to the relatively small population in the area. The Scottish Neighbourhood Statistics website indicates that the population in the Data Zone where Clovenstone Gardens is located -i.e. data zone: S01001864- was 1424 inhabitant in 2013 (Scottish Neighborhood Statistics, n.d). The sample was balanced in gender (45.7% male and 54.3% female) and was predominantly middle-aged respondents. More than 80% of the sample have children. Of the subjects, 21.7% visit the open space on a daily basis; 34.8% visit the open space 2-4 times a week, 26.1% visit the open space 2-3 times a month; and only 17.4% indicated that they do not use the open space.

4.4. Observation study

A structured observation study was conducted in June to capture the usage pattern of the space in a 'real life' environment. This method was used in the context of open space research by Whyte (2001) and we followed his technique. The data were collected from two locations on an ordinary week day and during a weekend day. On each day, the data collection occurred three times –i.e. morning, afternoon and evening- for a one-hour period each time. The observer recorded the six activities obtained from the interviews - i.e. walking, playing, walking dogs, cycling, sitting and sport (see the results section)– for each of the three user groups: children, adults and elderly people.

4.5. Space Syntax Analysis

In order to perform Space Syntax accessibility analysis of the spatial structure of the green open space in Clovenstone Gardens, DepthMap software was used. DepthMap has shown to be an effective tool for analysing and assessing spatial environments, and obtaining a meaningful understanding of the spatial relationships in order to explain different behaviours in different types of spaces, see for example (O'Sullivan & Turner, 2001), (Cutini, 2003) and (Guney, 2007). Several techniques have been developed under the umbrella of Space Syntax with Axial Lines and Visibility Graph Analysis (VGA) being the basic ones and the ones that are most used. We use DepthMap software to perform VGA as it provides a more detailed insights into the spatial structure. We limit our analysis to one measure, namely Integration, which has showed to be linked to people movement in space as mentioned earlier. The aim is to provide better insight into how the spatial structure of the open space in Clovenstone Gardens influences the way by which this space is used.

5. Results

5.1. Users' needs, concerns and activities

Interviews were transcript and analysed qualitatively. Trends and common themes in answering the questions across the sample were identified. The primary aim of these interviews was to elicit the end-users' concerns and needs with regard to the open space within their neighbourhood, and to identify the activities carried out in these spaces. The intention is to use these in the design of the paper-based questionnaire used in this study.

The analysis revealed that the open space forms a major part of the everyday life of Clovenstone Gardens residents. In spite of the fact that participants viewed this open space as a space for socializing and leisure, its importance seems to lie in its function as a "neighbourhood hub" that connects the different facilities together e.g. shop, bus stop, etc., and the wide visual access it provides which contributes to the sense of safety.

Activities practiced or observed in the space included: accessing other services in the area, meeting friends, playing with friends, walking, walking with the baby, using the playing ground, cycling, playing football on the pitch and walking dogs. Participants indicated that they want to practice other activities but the open space does not support them. These activities are swinging, sitting on the grass, playing with sand, gathering for BBQs, and skate-boarding. When asked the general question 'what is wrong with this open space?' participants expressed a relatively large number of concerns. The most frequently mentioned one is related to the cleanliness - i.e. dogs' dirt - followed by

the low quality of the playground. Other concerns include safety, noise, dogs, broken glass, low quality of the surrounding buildings, lack of benches, drunken teenagers/adults and poor maintenance.

Priority for improvement was given to the playground in terms of quantity of the available options and quality of the existing equipment's. Participants wanted to have a well-maintained play ground with more variety of activities that would suit a wider range of users. In addition, water features and flowers were seen as an effective way to improve the open space. The results of the interviews is summarized in Table (1) and used to design the questionnaire.

Table 1. Summary of the main themes came out of the interviews.

Concerns				Activities		
Cleanliness	Safety	Physical qualities	Poor maintenance	Carried out	Observed	Activities not supported
Dogs' waste	Drunk people	Vandalism	Playground	Access to other services walking	Cycling	Sitting on the grass
Litter	Aggressive teenagers	Accessibility	Walkways		Walking dogs	Playing with sand
Broken bottles and glass	Unsafe playground	Playground	Grass and trees	Playing on the grass	Using the football pitch	Gathering for BBQs
		Lack of benches		Socializing Walking babies Using the playground		skate-boarding swinging

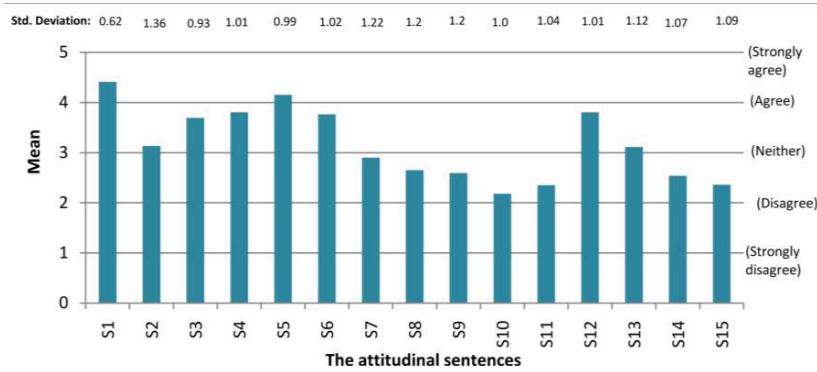
5.2. Users' satisfaction of and attitude toward the open space

Respondents were asked to indicate their opinion about some statement related to their open space. These were obtained from the results of the interview. Figure (3) shows the mean and standard deviation for each of the 15 attitudinal questions.

There is a general agreement that the open space is well connected and accessible by walking (S1 mean= 4.4). the results with regards to sense of safety was not exclusive (S2 mean= 3.1). On average, the respondents agreed that teenagers cause disturbance (S3 mean= 3.7) and that there are signs of vandalism in the local open space (S6 mean=3.8). Although the broken glass is a major concern for the respondents (S4 mean=3.8), the dog waste appears to be the most problematic (S5 mean= 4.2). The playground was perceived to be in an unpleasant condition (S7 mean= 2.9), not suitable for children (S8 mean= 2.7) and under-equipped (S9 mean= 2.6; S10 mean=2.2). In addition, the respondents wanted more sport facilities (S11 mean= 2.4) and more plants, such as trees and flowers (S12 mean= 3.8). Generally speaking, respondents felt neutral about how inviting their open space is (S13 mean=3.1) but perceived their open space as unclean (S14 mean= 2.5) and does not help them to practice the activities they want (S15 mean=2.4).

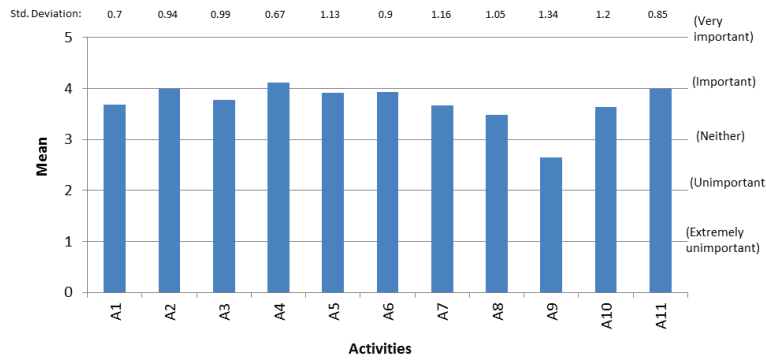
In the second section of the questionnaire, respondents were asked to indicate how important some of the activities elicited from the interview are for them. The results are shown in Figure (4). Almost all activities were considered as important by the participants. The most important activity is walking (A4 mean =4.11), which is a necessary activity, followed by meeting friends/socializing (A4 mean =4) which is a social activity, and relaxation/restoration (A11 mean =4) which is an optional activity. This comes in accordance with the classification proposed by Gahl (1987) of outdoor activities as explained earlier and suggests that, in spite of the poor condition of the open space in Clovenstone Gardens, people still value optional and social activities. This reflects the significance of improving the quality of this open space to allow people to practice these activities. The previous section of the questionnaire showed that, on average, respondents disagreed that their open space allows them to practice the activities they want.

In the third section of the questionnaire, a 5-point satisfaction scale was used to capture respondents' satisfaction level of the quality of the some of the physical features of the green open space. The results are shown in Figure (5). The accessibility of the open space and its connection with the public services and transport were seen as satisfactory (EF5 mean=3.65; EF6 mean=3.83). In addition, the quality of the football pitch was considered as satisfactory (EF4 mean=3.13). In contrary, the other environmental features did not meet a satisfactory level, with 'cleanliness' being the most unsatisfactory feature (EF9 mean=2.1).



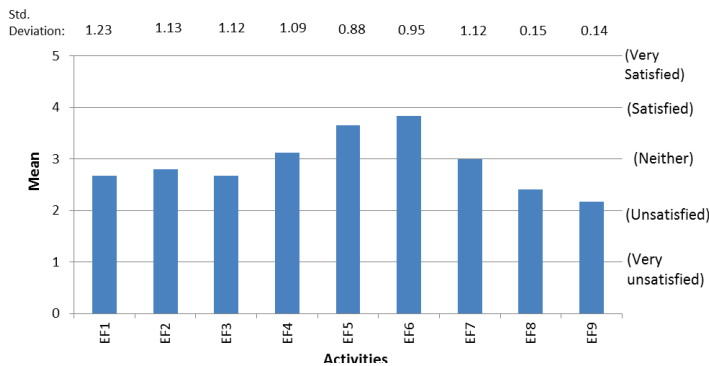
S1: My local open space is accessible via walking, S2: It is safe to walk through my local open space after the sunset, S3: Teenagers cause disturbance in the local open space, S4: The broken glass is a major problem in my local open space, S5: Dog wastes prevent me from setting/playing on the grass, S6: There are evidences of vandalism in my open space, S7: The play ground is in pleasant condition, S8: The playground is safe and clean for children to play in, S9: There are enough equipments in the playground, S10: There are facilities in the playground for teenagers use, S11: There are enough sport facilities within my local open space, S12: I would like to see more trees and flowers in the green area, S13: I feel the open space in my neighbourhood is inviting, S14: I feel my local open space is clean, S15: I feel my local open space allows me to practice the outdoor activities I want.

Figure 3. Respondents’ attitude toward the green open space in their neighbourhood (n=46).



A1: Access other services, A2: Meeting friend/socializing, A3: Playing with friends, A4: Walking, A5: Walking the baby, A6: Using the playing ground, A7: Playing football in the grass, A8: Cycling, A9: Walking the dog, A10: Playing football at the pitch, A11: Relaxation/restoration.

Figure 4. Importance of activities for the respondents (n=46)



EF1: Walking routs/pavements, EF2: Planting and vegetation, EF3: Playground, EF4: The football pitch, EF5: Accessibility, EF6: Connection with the public services/transport, EF7: The visual context, EF8: Maintenance, EF9: Cleanliness.

Figure 5. Satisfaction with the open space environmental features (n=46)

5.3. Use pattern of the space

The observation study covered activities obtained from the interviews - i.e. walking, playing, walking dogs, cycling, sitting and sport. The data collected provide an indication of the usage patterns of the space at different times and days. Figure (6) shows that the most frequently occurring activity during the week as well as in the weekend is ‘walking’. All other activities occurred remarkably less often. The author observed that people walked in the open space to get to other services, such as the bus-stop and the shop, or to reach the school and nursery. This type of walking is a necessary activity, unlike walking for leisure and psychological restoration. All other types of activities observed are optional activities. It is not surprising to find that the least occurring activity is ‘sitting’ since the open space lacks any seating facilities. In addition, the grass does not encourage people to sit and relax due to the low level of cleanliness and the presence of dog waste. This was reflected in the general dissatisfaction about the cleanliness in the area as reported earlier.

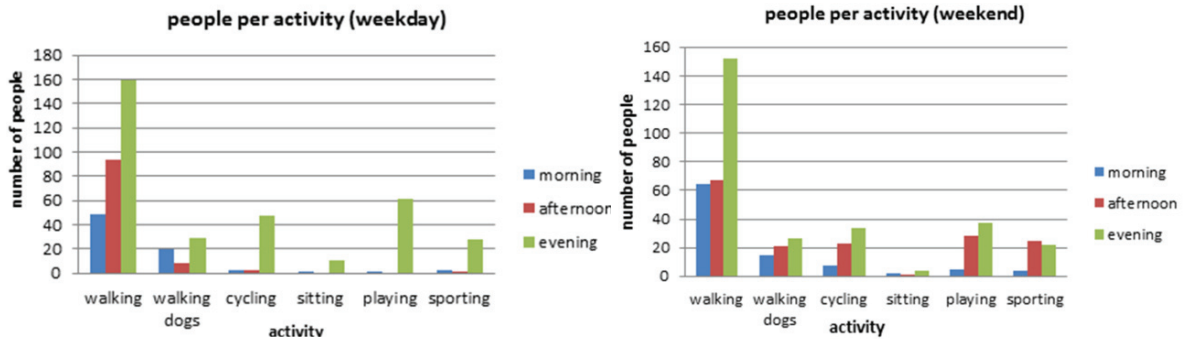


Figure 6. Number of people observed per activity (weekday and weekend)

5.4. Visibility Graph Analysis

Visibility Graph Analysis was conducted for the physical layout of the walking routes in Clovenstone Gardens using DepthMap software. Although DepthMap calculates several measures that describe the spatial structure of the area under study, only the measure of spatial Integration was included in this study as explained earlier. Figure (7) shows the distribution of the Integration values as calculated by VGA and DepthMap software.

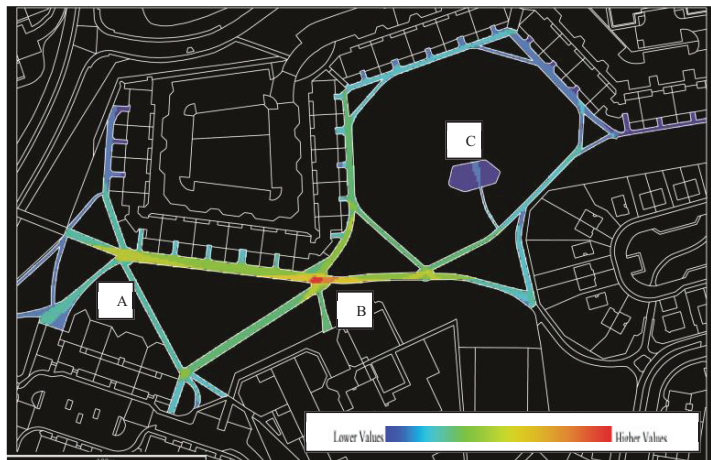


Figure 7. The visibility graph map showing the distribution of the Integration values (A: junction A, B: junction B, C: Playground)

The visibility graph map shows that the area is generally not well integrated with the most integrated area lies in the route junction (B). The area lacks a well-integrated plaza that attracts movement and activities. This supports the finding from the observation study which suggested that most of the activities occurring in this space are necessary activities. The playground (point C on the map) is the lowest integrated area which, along with its poor quality and the lack of equipment (see the questionnaire analysis), provides an explanation of why this space is under-used. A remarkable number of children activities were observed in point A where the Integration values are reasonably high. This attracts movement and activities more than its immediate surroundings. The analysis of the spatial structure suggests that the open space in Clovenstone Gardens does not attract optional activities due to the low level of integration.

6. Discussion

Access to good quality open spaces is associated with improvement in well-being, user satisfaction, quality of life, and it contributes to social inclusion. Quality of the physical features, side by side with the spatial structure of the layout, have a direct impact on how open spaces are used in terms of type of activities, duration of activities and number of people visiting the open spaces. However, open spaces in the most deprived areas appear to be of lower quality and often experience less maintenance when compared with wealthier areas. The focus of this study was on the assessment of the quality of open spaces in the most deprived areas in Edinburgh, as perceived by the end-users; and the influence of physical and spatial qualities on how open spaces in such areas are being used.

This study found that there is a general dissatisfaction with the quality of green open space in the case study. This is constant with the finding of CABE report (CAPE Space, 2010) which found that people in deprived areas in England are significantly less satisfied with the quality of their open space when compared with the satisfaction level in affluent areas. The study concluded, in page 18, that “*quality is systematically worse in deprived areas and better in less deprived areas*” with resident satisfaction falling from over 80% in the most affluent areas to around 50% in the most deprived areas.

The qualitative analysis of the interviews revealed a range of activities occurred within the open spaces including accessing to other services in the area, meeting friends, playing with friends, walking, walking the baby, using the playing ground, cycling, playing football on the pitch and walking dogs. A number of concerns with regards to the open spaces were also revealed. These were categorized into four high-level concerns i.e. Cleanliness, Maintenance, Physical quality, and Safety. The observation study confirmed the occurrence of these activities. It has been evidenced however that necessary activities occurred more than optional and social activities. In particular walking to get to other services such as the shop or the bus-stop was observed to occur remarkably more frequently than all other observed activities. Koohsari and colleagues (2013) found that perceptual qualities of public open space including safety and aesthetics of the built environment are associated with greater walking. It is suggested that the poor quality of the open space has transferred the space into a “inter-connecting hub” instead of a recreational and social space. In fact, this is in line with Gehl’s (1987) classification of outdoor activities in which he linked the type of activities occurring in outdoor spaces to the quality of the physical environment. Gehl, in page 13, stated that “*when outdoor areas are of poor quality, only strictly necessary activities occur*”. The findings of this study clearly showed that the open space in the case study is used mainly for necessary activities. The lack of optional and social activities is probably due to the low quality of this open space as confirmed in the questionnaire results where the quality of most of the environmental features of the open space did not reach a satisfactory level from the users’ perspective.

The quantitative analysis of the questionnaire data revealed that people felt strongly about dog-waste, evidence of vandalism, disturbance by teenagers, broken glass, the poor condition of the playground, lack of sporting facilities and lack of planting and vegetation. These appear to be major areas for improvement. There was also general dissatisfaction in terms of the environmental features of the open spaces. In particular, the playground and the walking routes were considered to be in an unacceptable condition. Many of these amenities are part of the responsibility of the local authority. This is constant with an earlier study which found that the strongest explanatory variable for resident satisfaction with their neighbourhood is “Satisfaction with local authority’s green/open space service” (CAPE Space, 2010). As a result of the low quality of the open space, lack of seating facilities, and low level of cleanliness, some important optional activities that are expected to occur in such space are almost not exist, such as the use of the space for relaxation and psychological restoration. This activity is particularly important as the role of open space in promoting health and wellbeing is widely recognized (Villanueva, et al., 2015).

It was also revealed that there is a wide range of activities that end users consider important in spite of the lack of facilities/equipments that are required for these activities to occur. This was particularly important for certain age-groups, i.e. teenagers.

In terms of the spatial structure of the layout, it was found that the open space in the case study has 'low integration' values which, according to space syntax theory, suggests low connectivity and that fewer people are invited to hold their activities in this open space. Our study shows however that most of the activities occurring in the space is walking to access other services and is not leisure walking. Several studies found that street connectivity has a negative effect on leisure walking (Koohsari, *et al.*, 2013), (Oakes, *et al.*, 2007), which suggests that the low connectivity of the open space in our case study did not discourage the occurrence of leisure walking. In fact, respondents were satisfied with the accessibility and connectivity of the open space. This suggests that the factors that explain why the open space is used mainly to access services and not as a place for recreational activities and social interaction are not spatial but rather perceptual and related to how users perceive the quality, safety and the cleanliness of the green open space in their neighbourhood.

Simple modifications to the physical layout could alter the integration pattern and subsequently encourage people to visit and use the spaces more frequently and for longer periods, potentially to do optional and social activities. Such modifications could be, creating a central high-quality plaza with seating facilities and enhance the connectivity of the lowest integrated areas such as the playground by providing wider well-designed accesses.

This study did not explore the influence of demographic or cultural factors on how users perceive the quality of their open space nor considered the possible effect of microclimate characteristics on users' experience of the open space. Another limitation of this study is that it is limited to one case study in Edinburgh. Future research should take into account preferences and needs of different age groups as well as different cultural backgrounds, and consider the use pattern of open spaces in different seasons and environmental conditions. Several deprived areas should be included in future endeavours for cross validation as well as including affluent areas to act as control cases.

7. Conclusion

The current study adds to rapidly expanding body of research on urban green open spaces by examining the spatial and perceptual qualities of open spaces in the most deprived areas from end-user's perspectives. We found that in spite of the reasonable awareness of the importance of open spaces in urban life in the relevant policies in Scotland, the quality of open spaces in the most deprived and low income areas have been poorly addressed at the policy level. Such areas are of a lower quality, poorly maintained and are under-used. More emphasis needs to be placed within the current policies and guidance on aspects of quality when planning or designing open spaces in the most deprived areas as well as aspects of maintenance and post occupancy evaluation.

The findings revealed that the open space in deprived areas, such as in Clovenstone Gardens, plays an integral part of the residents' everyday life. However, factors such as low quality of the open space, low level of cleanliness, insufficient maintenance, low sense of safety and the open space layout design contribute to the space being under-used. Main activities occur in the space are essential activities with very little optional and social activities occurrence due to the poor quality of the space and insufficient urban equipment and furniture. Understanding end-users' needs, perceptions and attitudes toward their open spaces is a pre-requisite for a successfully designed open space and should be therefore taken into account in the design process of old and new open spaces in the most deprived areas aiming at improving the use pattern and maximizing its use by different user groups.

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