Collaborative Mapping of Urban Spaces for Active Ageing in the City

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Abstract: Sedentary lifestyles and physical inactivity affect the health of a large part of the world's population, being the cause of between 4 and 5 million deaths per year (World Health Organization, 2020). This work aims the creation of a collaborative digital mapping of public spaces which are favourable to increase healthy habits and physical activities for the elderly in the city, as well as its potential as a tool to promote these activities. The webGIS platform used serves as a tool for mapping the location of outdoor places for physical activity and its features. This public participatory geographic information system (PPGIS) provides information that can be consulted and uploaded after registration. It not only provides information about the places where elderly people can do physical exercise, but also to the local administrations about how urban spaces are used and their problems for promoting active ageing. One of the main contributions of this work is the study of urban spaces from a very specific approach: their ability to meet the needs of the elderly and to encourage the practice of physical exercise and relationships with other people. From the methodological point of view, the most innovative aspect is the qualitative work based on surveys and interviews with older people to find out their specific needs and demands regarding public spaces.

1 INTRODUCTION

Although there has been a significant development of sport as a form of leisure activity in recent years, physical activity in people's daily lives (home, work, shopping, mobility) has decreased considerably (Organización Mundial de la Salud, 2013). This reality, together with bad habits such as inadequate nutrition or smoking, contributes directly or indirectly to the appearance of diseases such as hypercholesterolemia, hypertension or obesity. In 2016, obesity affected 13% of the world's adult population and overweight 39% (OMS, 2021). According to the report on physical inactivity and sedentary lifestyles in the Spanish adult population, this inactivity is responsible for 13.4% of deaths per year in Spain, causing more than 52,000 deaths. Besides, and according to the same report, Spain is one of the most physically inactive countries in the European Union (Mayo et al., 2017). This problem is most evident in the case of elderly people, often with the added problem of unwanted loneliness.

In response to this problem, the new information and communication technologies (ICTs) can be a tool that can promote a healthier lifestyle. This can encourage the practice of physical exercise and help to connect people to carry out activities in a collective way. Previous studies have analysed the role of ICTs as tools to promote healthy habits and active ageing among local populations (Cornax-Martín et al., 2020). However, in many cases, the implementation of this type of strategy is conditioned by the digital divide suffered by the current generations of elderly people (Jones et al., 2015). Many daily activities that may seem simple at first turn out to be more complex as age and cognitive decline progresses. Therefore,

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the implementation of technological solutions are often difficult (Procter et al., 2014).

This work focuses on the creation and study of a collaborative mapping of public spaces that promote healthy habits and physical activities for older people in the city, as well as its potential to publicise these activities. For this purpose, a webGIS platform allows the representation of physical or sporting activities (through lines or points) and their geolocation in the urban environment with the addition of written or visual information on the quality of urban spaces.

Bailén-Miraflores (district of the city of Málaga) is proposed as a case study for this mapping. This urban environment has been chosen because it is an ageing area with a high number of elderly people living alone. Moreover, it is a neighbourhood that has many accessibility barriers and a lack of green spaces.

2 STATE OF ART

In relation to digital tools to promote healthy habits and the practice of health-enhancing physical activity (HPA)-, two types of platforms can be distinguished: the self-care and information platforms.

2.1 Self-Care Platforms

This type of platforms are based on user self-care. Its main function is to monitor the user's activity and transfer the data to experts or carers. It also offers information on activities, individualised entertainment or healthy lifestyle habits.

Due to the Covid-19 pandemic, recent studies have looked at the development of digital platforms with new approaches to improve the mental and physical health of the elderly (Ammar et al., 2021). Many of the current platforms are designed to promote physical exercise and the use of ICTs among the older population, but directly linked to the expert care agents - family or healthcare - of each user (Wang, 2023; Wu et al., 2017).

With these characteristics, we find two examples of platforms. On the one hand, the *Ehcobutler* project studies the creation of an open digital platform to help older people to live active and healthy lives (ehcobutler, 2015). The main objective is to help the elderly with cognitive impairment and to promote health and well-being. In this way, the application has different levels of intervention to help them to stay active, healthy and independent, maintaining a good quality of life.

On the other hand, the *wellCO Horizon 2020* project is investigating the possibilities of creating a platform for smartphone or tablet to provide personalised advice, guidance and monitoring of older people for the adoption of daily routines (WellCO, 2018). This platform is designed to use non-invasive technologies to promote and monitor the physical, cognitive, social and mental well-being of each user. In this way, the monitoring is followed by a multidisciplinary team of experts and close caregivers. This application works as a virtual assistant that will support older people in their self-care, improving the quality of life in their own social and territorial context through new technologies.

2.2 Information Platforms

This type of platforms focuses on providing information on activities and routines that promote active ageing. Their aim is to increase the meeting of older people and the amplification of their contact networks. We can find two types of platforms according to their management: governmental and association platforms.

2.2.1 Governmental Platforms

These are public platforms that emerge from the administrations to promote active ageing and provide information on activities in the city related to the elderly.

In this area, the platform *En Buena edad* offers services from the categories of *Health*, *Safety*, *Activities* and *Learn more* (Junta de Andalucía, 2018). This website allows to disseminate the activities related to these categories in the region of Andalusia (Spain) with the aim of connecting the older population. Due to the mobility limitations of the Covid-19, the platform *Andalucía Muévete* was created as a digital tool with videos and sports routines for the physical exercise of the elderly from their homes (Junta de Andalucía, 2021).

2.2.2 Association Platforms

The practices resulting from associations, citizens' initiatives and activities linked to active ageing reduce the feeling of loneliness among older people. Different associations have emerged with the aim of combating the loneliness of this sector of the population. To this end, many of them have developed digital platforms to create networks and connect members. Although most programmed face-to-face and dynamic activities, due to the pandemic, implementations have been developed to encourage virtual meetings, thus promoting the use of ICTs and social networks among older people.

The *Village* is an example of a citizens' initiative that has been implemented in the United States. This association emerged thanks to grouping of elderly residents to access certain services and activities (Scharlach et al., 2012). The success of the model and its expansion has generated a web-based system adaptable to the needs of each association (Village to Village, 2014). These web-based systems have enabled virtual meetings and activities in the pandemic (Galucia et al., 2021). *Beacon Hill Village*, the original *Village*, provides its users with a calendar of virtual activities, such as online yoga or exercise sessions.

Another example is the *Grandes Vecinos* platform, which provides a collaborative network offering different services of activities and accompaniment among the registered elderly (Grandes Vecinos et al., 2020). This platform works as a social network that allows the exchange of experiences between neighbours and seniors who request a specific activity such as walking or physical exercise.

3 BAILÉN-MIRAFLORES AS CASE STUDY

Bailén-Miraflores (with a population of 62,543 inhabitants) is one of the district with larger number of elderly people in the city of Malaga. Specific programmes have recently been set up to combat unwanted loneliness, such as the *Siempre Acompañados* programme by entities such as *Cruz Roja*, *La Caixa* and the support of the local administration. Therefore, there are some identified problems in these neighbourhoods: unwanted loneliness and health problems linked to sedentary lifestyles and lack of physical activity, among others. In addition to these problems, there are others related to the habitat and qualities of the physical environment, such as the high density of some of the neighbourhoods (exceeding 240 houses/ha), the lack of public spaces and green areas for a very large population in quantitative terms, or the poor state of the housing (communal housing developments since 1950).

4 OBJETCS AND METHOD

The main objective of this work is to build a collaborative mapping of the physical activities carried out by the elderly in the urban environment, as well as the representation of these spaces. The aim of the mapping is to:

- To create a tool to inform elderly people about the physical and sporting activities they can do in public spaces of the neighbourhoods where they live in.
- To understand some of the physical conditions of urban spaces that encourage or discourage outdoor physical activity. This can be useful for studying the relationship between urban planning, design and health.
- To offer information to the local administration about which spaces are used for the practice of HPA by the elderly.

4.1 Methodology

A phased methodology has been developed for the elaboration of the "Cartography of Healthy Activities and Healthy Spaces" as well as the achievement of the abovementioned objectives.

4.1.1 Identification of Accessibility Barriers through Fieldwork and Collaborative Mapping

Through field work based on direct observation, a visit to the area is carried out in collaboration with students from the School of Architecture - University of Malaga, in order to identify and map the architectural barriers of public spaces. For this purpose, 3 itineraries are carried out that cover a large part of the area, the architectural barriers are identified, classified by categories and registered in an open access digital platform, based on the use of geographic information systems. This platform (felt.com) allows users to work collaboratively and share information through a webGIS viewer. More details about this practice and academic collaboration can be accessed in (https://n9.cl/zhkvy9).

4.1.2 Identification of Sport and HPA Activities Carried out by Elderly by Direct Observation of Urban Spaces

A route that includes at least ten urban spaces (parks, squares and streets) to identify activities and meeting places is defined. Two visits are made to the different urban spaces on different days and at different times (one in the morning and the other in the afternoon, and on weekdays and weekends). The different physical and sporting activities carried out by older people (the age of 60 years is established for this consideration) are recorded in planimetries, and at the

same time photographs and videos are taken as complementary materials to analyse the activities and spaces later on.

4.1.3 Characterisation of Urban Spaces through Surveys and Direct Observation Method

The surveys are carried out among elderly people who exercise in urban areas including the following questions:

- When the activity takes place (whether occasionally or frequently).
- Description of the activity and the urban environment.
- Characteristics for which the location is chosen (the answer can be oriented on comfort parameters: natural areas, vegetation, adequate urban furniture, etc.).
- Needs for improvements in order to carry out the activity.

Site-specific characteristics are identified in the observations:

- The type of activities.
- The existence of specific facilities for these activities.
- The existence of adequate furniture or good maintenance (state of the pavement, cleanliness, etc.).
- The feeling of being a comfortable and safe space.
- Other parameters of environmental comfort (vegetation, shadows, noise...).

4.1.4 Realization of Focus Groups

With the aim of including the opinion of elderly people in the identification and evaluation of public spaces for healthy activities, a qualitative analysis with a participatory approach is carried out. Some focus groups are conducted in the area of work according to the Vancouver Protocol (WHO, 2007). A total of 10 focused groups with between 10 and 12 participants, according to Myers (1998), were made. The sessions lasted between one and two hours, and a total of 111 older people participated, with the age of participation in the focus groups being 55 years or older. The topics covered were related to the type of routines and healthy habits that the elderly carry out outdoors.

4.1.5 Graphic Representation of the Activities and Their Geolocation through the Use of a webGIS Platform

The *Activa Malaga* webGIS platform (www.activamalaga.com) is used as a collaborative map for the representation of outdoor sport activities by users in the urban space of the city of Malaga. For more information about the platform, previous works by the authors (Cornax Martín et al., 2018) can be accessed. The different physical exercise activities can be represented by points or lines. The former represents the specific urban areas where they are carried out; the latter shows the routes such as streets. Both geometries can be openly consulted on the web or mobile. However, users can also upload unmapped physical activities after registering with an e-mail account. In this sense, each user will be able to manage the information provided, so that data will be able to be edited or even deleted, as informal sporting activities in public spaces are dynamic in nature.

The registration of these activities includes the completion of some fields to be defined by the user: name of the activity, type of sport (e.g., running), timetable, description of the activity, and qualities and improvements of the urban space in a description box. In addition, a photo or picture as visual information can be attached to the fact sheet. Moreover, sporting events are mapped by points with the following information: event name, e-mail contact, webpage, description, location, organizer, date together with the start and end time. They only appear once loaded until the end of their programming, so the map is dynamic showing future sporting events all over the city.

5 RESULTS AND DISCUSSION

5.1 Identification of Accessibility Barriers in Public Spaces

Through fieldwork and the comments in the focus groups, the accessibility barriers in the neighbourhood were recorded. Collaborative mapping has made it possible to geolocate the unevenness, state of the pavement, lack of contrast in the materiality and obstacles. Of all of them, unevenness, excessive slopes and insufficient pavement dimensions are the main problems we have found in general.

5.2 Identification of Accessibility Barriers in Public Spaces

After asking some local agents and elderly people in focus groups, an itinerary has been defined for observations on urban spaces. An analysis of existing uses and facilities was also carried out in order to identify the most frequented areas. From this itinerary, 8 urban spaces for meeting, resting and/or practising HPA by elderly people have been identified. The different activities detected have been registered on the platform (www.activamalaga.com) corresponding to the following types:

(a) Walk for elderly people (1, 6 and 7). Activity carried out individually or generally accompanied by a caregiver.

(b) HPA in a fitness park (7). Activity carried out individually or in groups of 2 people generally. It should be noted that only 1 of the fitness parks (out of the 3 visited one) was used by elderly people.

(c) Petanque (Point 8 and 4). Activity carried out in groups.

(d) Yoga (Point 8). Group activity organised by the association on a regular basis.

(e) Rest in a bench area (Point 1, 6, 7 and 8). Activity generally carried out in groups of 2 or 3 people.

5.3 Characterisation of Healthy Urban Spaces

We have identified 8 urban spaces as places for HPA or meetings for the elderly. From these, 4 of them are urban parks, 1 is a large urban park, 1 is a large square, another is a petanque court, and the last one is a garden with an orchard which belongs to a neighbourhood association. In order to characterise these spaces, a series of surveys were carried out with the elderly users (with a sample of 10 people surveyed: 8 women and 2 men, all of them over 65

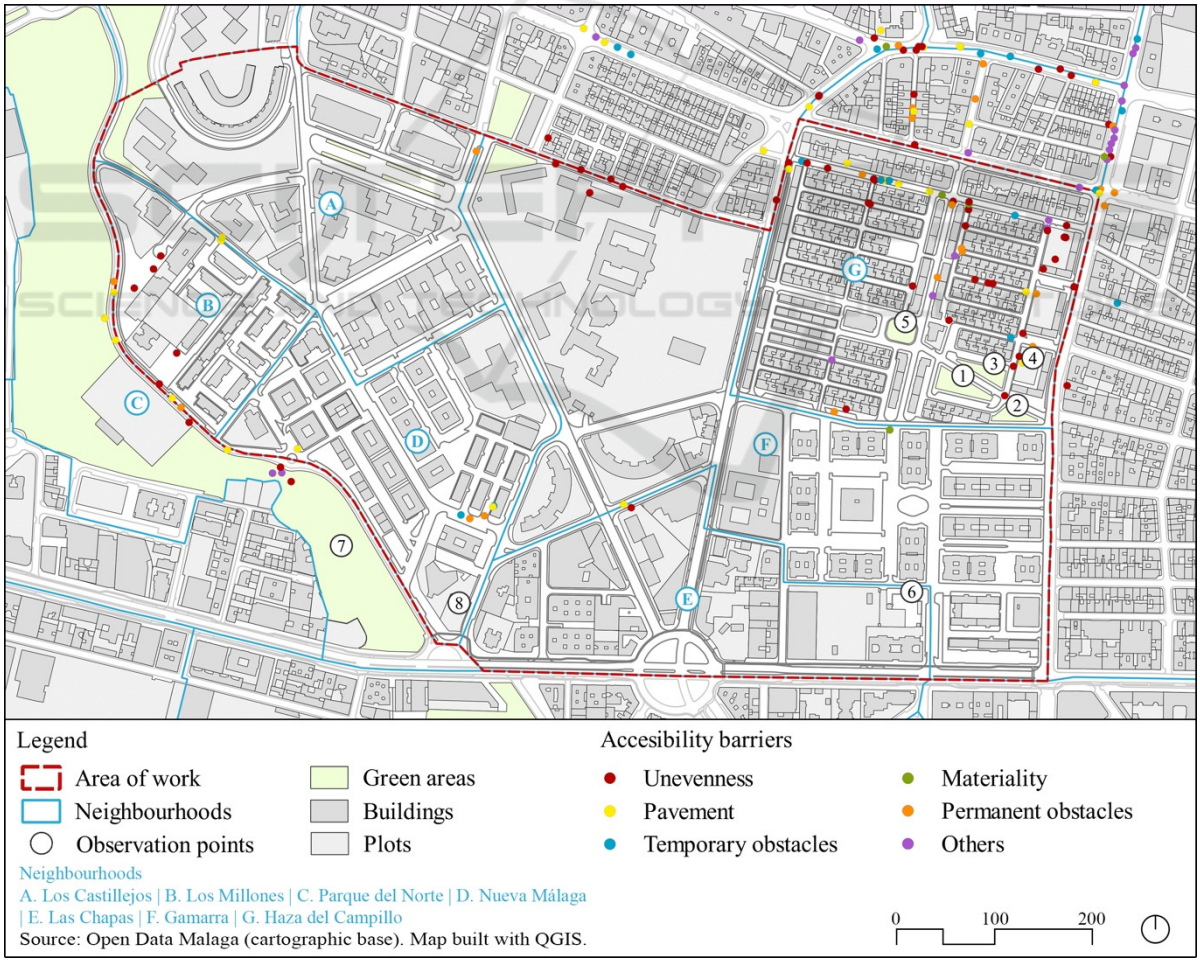
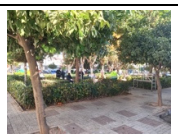
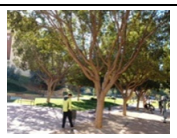


Figure 1: Map of Bailen-Miraflores with observations points (by authors) and accesibility barriers (identified and mapped by students of Architecture Degree, University of Malaga). Source: Own elaboration.

Table 1: Results of surveys in observation points. Source: Own elaboration.

					
Questions	**Point 1**	**Point 4**	**Point 6**	**Point 7**	**Point 8**
Type of space	Urban park	Petanque court	Large square	Large urban park	Garden
Time of use	Morning	Afternoon	Morning and afternoon	Morning and afternoon	Afternoon
Address	Marcelo del Olmo Street	Jorge Loring Street	María Teresa Cabreras Square	North Park	Gamarra Garden
N of surveys	4	1	2	2	2
Gender	Female (75%) Male (25%)	Female (100%)	Female (100%)	Female (50%) Male (50%)	Female (50%) Male (50%)
Frecuency of use	No (100%)	Yes (100%)	Yes (100%)	Yes (100%)	Yes (100%)
Appropiated furniture	No (100%)	Yes (100%)	Yes (100%)	Yes (100%)	Yes (100%)
Appropiated pavement	No (100%)	Yes (100%)	Yes (100%)	Yes (100%)	Yes (100%)
Accesibility	No (100%)	Yes (100%)	Yes (100%)	Yes (100%)	Yes (100%)

years of age) and 8 observations were made in the area (in which we recorded the necessary data for their characterisation).

From the surveys' results, the factor of proximity between dwellings and the urban spaces is identified as a determining factor for the practice of HPA or rest/meeting. Only 2 respondents did not live in the immediate vicinity. In most cases, older users are satisfied with the physical conditions of the environments, except in four of the parks, with complaints about their maintenance, and the type of users (in their words, "drug addicts" and "young people who come to smoke"). These four parks are located in the Haza de Campillo neighbourhood, and present the same problems due to their proximity to each other (1, 2, 3, 5). However, of all of them, park 1 is the one most used by the older population, although only in the mornings. The large square (6) lacks furniture and vegetation, while the spaces (7) and (8) have very positive comments.

Thanks to the interviews, the main routes to the rest areas have been identified, which coincide with the public spaces with the lowest concentration of accessibility barriers. On the other hand, based on the observations made by the authors, some specific problems have been identified in each of the urban spaces, such as the lack of furniture (benches), the lack of maintenance and cleanliness or the lack of shade or vegetation, among others. From all analysed urban spaces, parks 1, 2, 3 and 5 have been identified as areas with a need of intervention.

5.4 Collaborative Digital Mapping of Spaces and Activities for Active Ageing

The mapping of spaces and activities for active ageing in the city proposed by this work belongs to the group of information platforms explained in section 2, but unlike the analysed examples, one of its particularities is the incorporation of geographic information systems (GIS), which allows the visualisation and geolocation of activities and healthy habits in the city (see Figure 3). On the other hand, one of the problems of many websites and digital platforms is the need for constant updating by their creators (governmental entities, associations or others). In the case of the proposed platform, the information is or can be uploaded by the users themselves, updated in real time and in a collaborative way. Furthermore, it is not necessary to register in order to consult the activity data.

This type of platform could be implemented in initiatives such as the Global Network of Age-Friendly Cities and Communities, which is a project promoted by the WHO aimed at creating environments and services that promote and facilitate active and healthy ageing (in Spain is promoted and coordinated by the IMSERSO - www.ciudadesamigables.imserso.es).

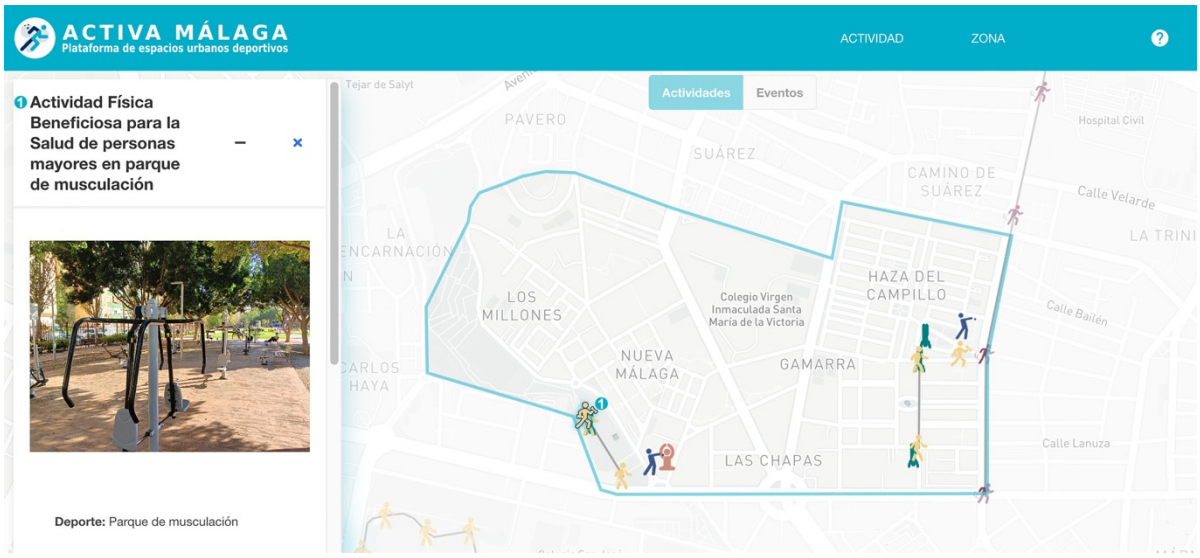


Figure 2: Physical activities carried out by older people in the Bailén-Miraflores district in Málaga, registered in the digital platform www.activamalaga.com. Source: Own elaboration.

6 CONCLUSIONS

Through a study that focuses on ageing, urban design is approached from the attention to the needs of the elderly. By thinking on elderly, we understand that it is possible to solve other problems for the benefit of all age groups. According to the conclusions of the focus groups, the elderly residents in these neighbourhoods actively use public spaces for healthy activities. Although the overall assessment of these spaces is positive, there are problems of maintenance, accessibility, lack of certain furniture. There is also a certain lack of knowledge about some of the existing facilities. The possibility of using this platform is highly valued, despite the digital gap.

The use of the platform:

- It generates information that helps to think about city spaces, their design and functions to respond to the collective needs of the elderly, creating quality spaces for the entire population and favouring an active and healthy lifestyle. In particular, it has made it possible to identify the urban spaces actually used by the older population (1, 4, 6, 7 and 8).
- It helps decision making by local administrations and technicians to favour this transformation and solve the problems demanded by their users.
- It generates information in a collaborative way among citizens to promote the use of sport in urban spaces in a self-organised way. In addition, it is a permanent digital structure for citizen participation, managed and maintained by the inhabitants. It encourages the direct participation of citizens in the process of health promotion through the possibility to get involved them in the mapping of spaces and in the annotation of their qualities or deficiencies.
- Through survey-interviews and information on needs, citizens participate in decision-making, in the design, implementation and evaluation of the actions carried out by the administrations. In this way, urban spaces respond to the new needs of a population that lives longer and wants to live in better conditions for as long as possible.

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REFERENCES

Ammar, A., Bouaziz, B., Trabelsi, K., Glenn, J. M., Zmijewski, P., Müller, P., Chtourou, H., Jmaiel, M.,

Chamari, K., Driss, T., & Hökelmann, A. (2021). Applying digital technology to promote active and healthy confinement lifestyle during pandemics in the elderly. *Biology of Sport*, *38*(3), 391–396. https://doi.org/10.5114/BIOLSPORT.2021.100149

Beacon Hill Village. (2010). *Events - Beacon Hill Village*.

Cornax-Martín, M., de Salazar, N. N.-G., Rosa-Jiménez, C., & Luque-Gil, A. (2020). Healthy cities, new technologies and sustainability: A collaborative mapping of informal sport activity in the public space of cities as an innovative tool for understanding city

sport phenomena. *Sustainability (Switzerland)*, *12*(19). https://doi.org/10.3390/su12198176

Cornax Martín, M., Nebot Gómez de Salazar, N., Luque Gil, A., & Rosa-Jiménez, C. (2018). How new tecnologies can promote an active and healthy city. Digital platform to identify area of informal sport practise in the city of Malaga. In Archive (Ed.), *International Conference on Urban Regeneration and Sustainability*. https://www.ierek.com/events/urban-regeneration-sustainability-2#publishing

ehcobutler. (2015). *ehcobutler – An open digital platform for apps that help elderly live actively and healthily*.

Galucia, N., Morrow-Howell, N., Sun, P., Meyer, T., & Li, Y. (2021). The Impact of COVID-19 on Villages: Results from a National Survey. *Journal of Gerontological Social Work*, *00*(00), 1–20. https://doi.org/10.1080/01634372.2021.1968094

Grandes Vecinos, Diputación Foral de Guipuzcoa, & Adibenrri. (2020). *Únete a Grandes Vecinos: cercanía, sencillez, intercambio.*

Jones, R. B., Ashurst, E. J., Atkey, J., & Duffy, B. (2015). Older people going online: Its value and before-After evaluation of volunteer support. *Journal of Medical Internet Research*, *17*(5), 1–12. https://doi.org/10.2196/jmir.3943

Junta de Andalucia. (2018). *Salud | En buena edad*.

Junta de Andalucía. (2021). *Andalucía Múevete*.

Mayo, X., Del Villar, F., & Jiménez, A. (2017). *Termómetro del sedentarismo en España: informe sobre la inactividad física y el sedentarismo en la población joven española*. http://espanaactiva.es/wp-content/uploads/2017/06/Informe-observatorio_web.pdf

Myers, G. (1998) Displaying opinions: topics and disagreement in focus groups. Language in Society, 27 (1), 85-111

Organización Mundial de la Salud. (2013). *Health 2020. A European policy framework and strategy for the 21st century*.

Organización Mundial de la Salud. (2021). *Obesidad y sobrepeso*. https://www.who.int/es/news-room/fact-sheets/detail/obesity-and-overweight

Procter, R., Greenhalgh, T., Wherton, J., Sugarhood, P., Rouncefield, M., & Hinder, S. (2014). The day-to-day co-production of ageing in place. *Computer Supported Cooperative Work: CSCW: An International Journal*, *23*(3), 245–267. https://doi.org/10.1007/s10606-014-9202-5

Scharlach, A., Graham, C., & Lehning, A. (2012). The 'Village' model: A consumer-driven approach for aging in place. *Gerontologist*, *52*(3), 418–427. https://doi.org/10.1093/geront/gnr083

Village to Village. (2014). *Village Map - Village to Village Network, Inc.*

Wang, S. (2023). Optimization health service management platform based on big data knowledge management. *Optik*, *273* (December 2022), 170412. https://doi.org/10.1016/j.ijleo.2022.170412

WellCO. (2018). *Descripción del proyecto – WellCO*.

World Health Organization. (2007). WHO Age-Friendly Cities Project Methodology-Vancouver Protocol. Geneva, WHO.

World Health Organization. (2020). *Guidelines on Physical Activity and Sedentary Habits*. https://apps.who.int/iris/bitstream/handle/10665/337004/9789240014817-spa.pdf

Wu, H. K., Lin, K. Y., Liu, P. H., Hung, T. W., Xiao, Z. Y., Chen, J. Y., Lai, R. X., Wang, W. X., Wang, Y. P., & Ye, Z. W. (2017). Development of an exercise management platform for the elderly. *2017 IEEE International Conference on Consumer Electronics - Taiwan, ICCE-TW 2017*, 399–400. https://doi.org/10.1109/ICCE-China.2017.7991164