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Determinants of Neighborhood Activity of Adults Age 70 and Over: A Mixed-Methods Study

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Background: This mixed-methods study investigated personal, interpersonal, and environmental factors salient to decisions about being active in neighborhoods of different levels of deprivation. **Methods:** Twenty-five participants age 70 years and older (10 women) with diverse physical activity levels provided data on their weekly activity patterns (using accelerometry) and their perceived barriers to exercise (questionnaire). They also participated in semistructured individual interviews exploring the barriers and facilitators influencing neighborhood activity.

Results: Functional limitations, lack of intrinsic motivation, and not having an activity companion were the highest impact barriers. Walkable access to amenities, positive physical activity perceptions, and existing habit of being active were the highest impact facilitators. **Conclusions:** The perceived quality and accessibility of the built and natural environments influence neighborhood activity in older adults. However, this relationship might be altered through the influence of personal and interpersonal determinants such as maintenance of good health and functional ability and supportive social networks.

Keywords: barriers, facilitators, qualitative

The number of people age 60 and over, as a proportion of the global population, is projected to double from 11% in 2006 to 22% by 2050 (World Health Organization, 2006). By then, there will be more older people than children (age 0–14 years) in the population (United Nations, 2009). Although the average life expectancy has increased, this may not necessarily be accompanied by decreases in morbidity and improved quality of life with older age. In the United Kingdom, the aging of the population is expected to contribute to a 33% increase in cancer cases between 2001 and 2020 (Møller et al., 2007), a 20% increase in health costs related to osteoporotic fractures between 2000 and 2020 (Burge, Worley, Johansen, Bhattacharya, & Bose, 2001), and 20% more diagnosed cases of Type 2 diabetes by 2030 (Bagust, Hopkinson, Maslove, & Currie, 2002). Dementia costs the U.K.

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economy £23 billion per year. This is more than cancer (£12 billion/year) and heart disease (£8 billion/year) combined (Luengo-Fernandez, Leal, & Gray, 2010).

A physically active lifestyle contributes to the compression of disease and disability into fewer years at the end of life and the maintenance of good physical and mental health in later life (Department of Health, 2004; Hamer & Chida, 2009; Nelson et al., 2007; Pahor et al., 2006; Rovio et al., 2005; Strawbridge, Deleger, Roberts, & Kaplan, 2002; U.S. Department of Health and Human Services, 2008). However, worldwide, the physical activity levels of older people are very low. For example, in the United States, older adults are the least physically active age group (American College of Sports Medicine et al., 2009). In the United Kingdom, less than 30% of 65- to 74-year-olds and less than 15% of adults age 75 and over reported participating in any exercise or sport lasting at least 10 min in duration during the prior 4 weeks (Craig, Mindell, & Hirani, 2009).

Of particular interest are the lifestyle choices of adults over the age of 70, because many such people are still very involved in home-based and community-centered activities and lead independent lives (Fortuijn et al., 2006). However, even these adults are not involved in sufficient physical activity, and this may limit sustainability of their independence. Data from the Health Survey for England (Craig et al., 2009) and the English Longitudinal Study of Aging (Banks, Breeze, Lessof, & Nazroo, 2006) showed that decline in functional ability is steeper in the older age groups. Because life after the age of 70 is considered a major transitional phase from independence to functional loss and subsequent frailty, there is need for a better understanding of the factors that influence lifestyle choices of this age group and identification of effective strategies to promote physical activity.

There are multiple levels of influence on how people make behavioral choices, including personal, interpersonal, and environmental (Stokols, Allen, & Bellingham, 1996). However, most interventions aiming to influence activity behaviors continue to target a range of psychosocial variables at the personal and interpersonal levels only. Although many interventions have been effective in the short term, sustaining an active lifestyle remains a major challenge. Few studies have addressed environmental determinants of physical activity participation in later life (King, Satariano, Marti, & Zhu, 2008). These gaps in the literature stress the need for multilevel approaches that will enable us to draw more complete pictures of how physical activity is facilitated, constrained, and embedded in older adults' lives (Sallis et al., 2006).

Several qualitative and quantitative studies have provided a comprehensive account of activity barriers and facilitators in later life (Buman, Yasova, & Giacobbi, 2010; Cohen-Mansfield, Marx, & Guralnik, 2003; Mathews et al., 2010). What still remains unclear is how specific activity purposes (e.g., recreation, transport) are influenced by different barriers and facilitators. Kaczynski (2010) stressed the need for specificity of behavioral outcome measures and for definitions of the types of activity we investigate. Similarly, Giles-Corti, Timperio, Bull, and Pikora (2005) stressed that this careful match is needed to improve capacity for promoting physical activity.

The neighborhood may be a particularly important context for older adults, given their generally reduced geographical range of activity because of limited income, poor mobility, and health decrements (King, 2001; Li, Fisher, & Brownson, 2005; World Health Organization, 2006). A cross-sectional study with 270 older

adults (65+ years) in Great Britain (Sugiyama & Thompson, 2007) reported that older people living in an environment that makes it easy and enjoyable to go outdoors were more likely to be physically active, healthier, and more satisfied with life. An important contributor to this body of knowledge could be the in-depth exploration of the perceptions of older adults regarding the factors influencing their activity in their own neighborhoods. This knowledge could contribute to our understanding of what these factors are, how diverse they are, if and how they interact, and what their individual impact might be on the decision to get out and about. This depth of understanding would be necessary to design more effective community physical activity interventions.

The purpose of this study was to investigate the personal, interpersonal, and environmental factors salient to decisions about being locally active in a group of people age 70 and older living in neighborhoods of different levels of deprivation. A mixed-methods approach was employed to explore the frequency and impact of perceived facilitators and barriers (qualitative data), combined with an examination of how these qualitative data compare with quantitative questionnaire data on the impact of barriers on physical activity.

Methods

Study Design

This is a substudy of the Older People and Active Living (OPAL) project, a community-based descriptive observational study that provided data on physical activity patterns and their determinants in a sample of 240 adults over the age of 70 from neighborhoods differing in level of deprivation and availability of local amenities in Bristol, UK (Davis, Fox, Hillsdon, Sharp, et al., 2011; Fox et al., 2011). Ethics approval was granted by the Bristol Southmead NHS research ethics committee (Reference 06/Q2002/127).

This work is informed by the principles of social constructionism according to which all knowledge, and therefore all meaningful reality, is the outcome of the interaction between humans and their world. This reality is developed and transmitted in a social context (Crotty, 1998). Through the chosen research design, we tried to enrich the investigation of “how things are” with information on “the sense that people make out of things.” Therefore, we chose a sequential explanatory design (Creswell, Plano Clark, Gutmann, & Hanson, 2003) whose purpose is to use qualitative results to help interpret the findings of a primarily quantitative study. In this study, the first stage of data collection used ActiGraph accelerometers, ActiGraph and purpose-of-journey logs, and questionnaires with the whole OPAL sample to give predominantly quantitative data on “how things are.” The second stage involved semistructured individual interviews with a sample of purposively selected participants. This stage allowed participants to expand on their responses to questionnaires and respond to questions regarding their accelerometry-generated physical activity profiles. Furthermore, this stage enabled them to provide more meaning and detail on how the perceived barriers and facilitators influenced their daily activity level and choices. This article presents data from both stages.

Sampling and Recruitment

OPAL participants were recruited through general medical practices in the city of Bristol, United Kingdom. Practices were stratified by high and low amenity access (the proximity of the nearest shop) and by tertiles of index of multiple deprivation of the practice they attended. Participants 70 years or older were randomly selected from patient lists, using pseudo-random-number generators (see Davis, Fox, Hillsdon, Sharp, et al., 2011, for detailed sampling information). Fifty-one participants from the main OPAL study provided one-on-one interviews. For the purpose of the current study, 25 were purposively sampled (Patton, 2002) to achieve maximum diversity in physical activity levels (accelerometry/step counts) and environmental characteristics (level of multiple deprivation and amenity access in the neighborhood). Low- and high-active cases were prioritized on account of the sample profile of relatively low absolute levels of physical activity. Finally, researcher field notes were consulted for participant suitability. Subjectively defined good case studies included individuals of a particular lifestyle type, illustrative physical activity profiles, or interesting neighborhood accounts. Participants consented to an interview lasting up to 1 hour and were assured of confidentiality through their name being replaced with a pseudonym.

Data Collection

Data were collected for each participant during 2007–2008 over two visits (usually 1 week apart) that were carried out in participants' own homes. Demographic information was gathered on age, gender, income, marital status, education, current disease treatment, and car ownership. The importance of barriers was assessed with 14 questionnaire items—11 personal, 1 interpersonal, and 2 environmental barriers—selected from the Barriers to Physical Activity questionnaire (Cederberg, 2007) and the barriers measure used in the pan-EU survey on consumer attitudes toward physical activity, body weight, and health (European Commission, 1999). Physical activity (steps/day) was assessed by accelerometry and described in detail in Davis, Fox, Hillsdon, Sharp, et al. (2011). Briefly, participants wore ActiGraph GT1M monitors on a belt during their waking hours for 7 days and kept a daily log of frequency, transport mode, and purposes of daily journeys. GT1Ms were programmed to record activity in 10-s (s) epochs, producing both activity counts and pedometer data. Physical function was assessed using the Short Physical Performance Battery (Guralnik et al. 1994), which measures lower extremity functioning in older adults. Height and weight were measured using a Leicester stadiometer and Seca portable scale, respectively; body-mass index (BMI, kg/m²) was calculated from measured height and weight.

Two researchers conducted the interviews in the participants' homes. The interviews were semistructured, so guidance notes were given to ensure that certain topics were covered, but researchers and interviewees were allowed to explore areas in more depth. All interview recordings were transcribed verbatim and rendered anonymous with pseudonyms. Both researchers listened to the recordings and checked transcripts for accuracy.

Interview Guide

Five pilot interviews were conducted to refine and finalize the semistructured-interview guide. The opening question asked participants to describe their daily routines over a typical week. The interviewers used specific probes based on the 1-week accelerometry activity profiles available for each interviewee. The main elements of the interview focused on barriers and facilitators to neighborhood activity. The term *activity* was used throughout the interviews to reflect the broad range of activities in which individuals participate, which could include but are not restricted to physical activities. Specific questions about how walkable people perceived their neighborhood to be and how they would change their neighborhood to make it a better place to walk were included. These questions were followed by an open-ended question that explored the influences on participants' decisions to "get out and about." This question used a point-of-decision format and explored the reasons that participants would stay in instead of going out, use public transport instead of driving, participate in group instead of individual activities, and choose a specific walking route instead of an alternative.

Data Analysis

Quantitative Data. All statistical analyses were performed using SPSS version 16.0 (SPSS Inc., Chicago, IL). Descriptive statistics (M , SD) were generated for all demographic and barrier-questionnaire variables. Accelerometry data were analyzed according to the ActiGraph protocol (Davis, Fox, Hillsdon, Sharp, et al., 2011).

Qualitative Data. Different research purposes require different content-analysis techniques (Hsieh & Shannon, 2005). A combination of directed and summative content analysis was used. The goal of the directed approach was to validate or conceptually extend the ecological model used to determine the initial coding scheme and the relationships between codes. Consistent with the principles of directed content analysis (Hsieh & Shannon, 2005), transcripts were first read line by line and marked with codes that described the content of the responses. Three main themes (personal, interpersonal, and environmental) were predefined and used as the basis for coding the transcripts. Codes were entered as free nodes into an NVivo database (Version 2.01, QSR, Southport, UK), and matrices of codes were developed by a third investigator. Hierarchical codes that included lower order nodes were subsequently produced. Transcript analysis was concluded when data reached saturation and there were no new barrier or facilitator entries.

Individual tables were prepared based on how frequently the reported barrier and facilitator nodes and the subsequent lower order themes were mentioned by each interviewee. The individual tables were merged to report the total frequency scores for all interviewees. Frequency-value tertiles were then used to classify lower order themes by high, medium, and low frequency. This process was repeated for all lower order themes within the three main themes (environmental, interpersonal, and personal). The classification of the lower order themes' frequency was then presented in a matrix with themes by frequency tertile.

Next, following the principles of summative content analysis, the transcripts were reanalyzed focusing on the particular words that participants used when talk-

ing about barriers and facilitators. A summative approach to qualitative content analysis goes beyond mere word counts to include a latent content analysis that is the process of interpretation of content (Hsieh & Shannon, 2005). The analysis began with searches for occurrences of a preselected list of keywords and phrases that was expanded after initial reading of all transcripts. The types of descriptors (keywords and phrases) and the context in which they were used by the interviewees to describe how different barriers and facilitators influenced their physical activity directed the categorization of these factors as high, medium, or low impact. Following are some example of keywords and phrases that were classified as high, medium, and low impact: “I *rely* on my daughter to take me out in the car” (facilitators, significant others, high); “*Some* buses are *getting more* modern but *some* are rickety and shaky” (barriers, poor-quality buses, low); “I have been active *all my life*, having done the exercise *for so long*, it is a routine and you are used doing it” (facilitator, past activity, high); “I *could go out more*, but I do not know that *there is any reason to go out* really” (barrier, no reason to go out, medium). Where high-impact words and phrases were used at least once by 1 participant to describe a barrier or facilitator, the overall impact of that factor was classified as high. If both high and medium words were used to describe a barrier or facilitator, the factor was also classified as high impact. Quotes (sentences including the keywords or phrases regarding the described barrier or facilitator) were collated, and separate tables for each participant were prepared. These tables were checked, and, when necessary, the whole transcripts were reexamined to further clarify the impact of certain factors. These tables were used to show whether the textual evidence was consistent with the interpretation (Weber, 1990), ensuring account credibility.

The impact values for barrier and facilitator nodes were summed across all participants to give an overall impact for each lower order theme. This process was repeated for all lower order themes within the three higher order themes (environmental, interpersonal, and personal). This classification was then presented in a matrix with themes by impact. Finally, the impact matrix was superimposed onto the frequency matrix to allow for direct comparison among the environmental, interpersonal, and personal barrier and facilitator themes.

Trustworthiness

The sample in this study was chosen to obtain maximum variability. The context, setting, and participants are described in detail to maximize opportunities for transferability to similar contexts (urban or suburban environments) and participants (people over the age of 70). The audit trail of this study including methods choice, protocol, and data-collection and -analysis procedures enables the replication of the study in future research (Denscombe, 2003).

Recording interviews and transcribing them verbatim provided a complete account of the interviews for analysis. Member checking was used to enable participants to review their transcripts and confirm that the accounts were accurate. Twenty participants were sent their transcripts and asked to confirm their accuracy. Participants were also asked to add, correct, or delete information as appropriate. Eleven participants returned the transcripts (6 suggested no changes, 3 deleted some information, and 2 provided some corrections).

The use of quantitative and qualitative methods strengthened the credibility of the analysis. Findings were examined for internal cohesion. Our main focus was

to examine whether the triangulation among complementary methods and data sources produced generally converging conclusions. The sequential explanatory design meant that participants' accelerometry and questionnaire data were available ahead of the interviews. This in turn enabled the interviewers to identify areas of particular interest (e.g., unexpected findings such as markedly different activity patterns on one particular day or high accelerometry-derived activity levels and report of multiple barriers by the same participant) that arose from the quantitative data analysis. These were areas that interviewers explored through careful probing during the interviews. Furthermore, the interview's semistructured approach allowed participants to comment on their responses to the barriers questionnaire but also to report and discuss the impact of barriers not included in the questionnaire.

Findings

Two hundred forty adults over the age of 70 with activity levels ranging from 184 to 16,427 steps/day (see Davis, Fox, Hillsdon, Sharp, et al., 2011, for whole-sample characteristics) provided quantitative (accelerometry and questionnaire) data. A subsample of 25 participants with activity levels ranging from 390 to 11,647 steps/day (Table 1) provided qualitative data regarding personal, interpersonal, and environmental factors salient to decisions about being active in their neighborhood. The following sections present the frequency and impact of perceived facilitators (qualitative data) and the frequency and impact of perceived barriers (qualitative data) and how these data compare with questionnaire data on the importance of barriers (qualitative and quantitative data). All facilitators and barriers are presented in italics.

Frequency and Perceived Impact of Facilitators This section provides information on the identified facilitators ($n = 35$; Table 2) and presents the frequency and the impact of the lower order themes (Table 3) of the three hypothesized main themes: environmental, interpersonal, and personal.

Participants suggested a range of environmental facilitators. Provision of a wide variety of local amenities (including *post offices*, *newsagents*, and *food stores*) was the only facilitator with perceived high impact on being active in their neighborhood:

Whenever you go up the top [of the high street] there's always somebody stopping, you have a few words and chat and things. They'll say, "Oh have you seen the price of that?"

You got a hardware shop, and you got bakers, greengrocers shop, hairdressers, you got dentist, you got a library, so there's lots of, there's fish and chip shops, a lot of take-away shops all up there. It's all in one; you could go up there and get everything what you wanted, really. (Participant 21, 81 years)

Access to a car, living close to a bus stop, and having a regular bus service were reported as having a medium impact on traveling beyond the local community. All participants were car owners and reported heavy reliance on cars. "I think that the car should be at the center of most people's lives. It can get you to places so you can go to a garden center and go via the Mendips [a popular area of hills in the southwest of England] (Participant 22, 71 years).

Table 1 Participant Characteristics

| Participant | Age | Gender | BMI | SPPB | Steps/day | MVPA/day | Sedentary (min/week) | Number of trips/week | Number of reported barriers | Number of reported facilitators | Distance to nearest store, miles |
|-------------|-----|--------|-----|------|-----------|----------|----------------------|----------------------|-----------------------------|---------------------------------|----------------------------------|
| 1 | 71 | male | 25 | 12 | 9,189.6 | 69.7 | 681.6 | 20.0 | 6 | 8 | 1.98 |
| 2 | 88 | male | 26 | 6 | 1,360.1 | 2.2 | 792.4 | 5.0 | 8 | 5 | 0.63 |
| 3 | 81 | male | 26 | 2 | 955.7 | 0.7 | 692.2 | 1.2 | 3 | 2 | 0.49 |
| 4 | 79 | male | 22 | 11 | 6,690.7 | 39.3 | 377.6 | 17.0 | 7 | 7 | 0.49 |
| 5 | 77 | female | 33 | 8 | 2,220.1 | 3.6 | 680.5 | 11.0 | 8 | 8 | 0.27 |
| 6 | 71 | female | 38 | 11 | 5,593.6 | 18.4 | 723.4 | 13.0 | 12 | 7 | 0.45 |
| 7 | 71 | male | 27 | 12 | 7,061.4 | 36.5 | 627.0 | 9.0 | 4 | 10 | 0.91 |
| 8 | 82 | female | 25 | 7 | 1,519.9 | 2.3 | 747.7 | 6.0 | 3 | 6 | 3.51 |
| 9 | 86 | male | 32 | 4 | 389.9 | 0.0 | 758.7 | 0.0 | 10 | 2 | 0.63 |
| 10 | 76 | male | 25 | 12 | 7,469.0 | 46.8 | 688.1 | 21.0 | 5 | 11 | 1.15 |
| 11 | 81 | male | 26 | 12 | 2,799.7 | 1.1 | 658.9 | 6.0 | 7 | 1 | 1.02 |
| 12 | 73 | male | 30 | 7 | 3,334.4 | 18.5 | 655.6 | 4.0 | 7 | 7 | 0.72 |
| 13 | 71 | female | 34 | 10 | 7,171.9 | 26.6 | 608.2 | 8.0 | 13 | 8 | 1.55 |
| 14 | 81 | female | 25 | 10 | 3,356.3 | 13.0 | 635.1 | 7.0 | 7 | 5 | 1.88 |
| 15 | 82 | female | 25 | 11 | 5,446.7 | 14.5 | 452.4 | 11.7 | 11 | 10 | 0.94 |
| 16 | 92 | male | 25 | 9 | 1,160.3 | 2.0 | 741.9 | 2.0 | 8 | 4 | 1.89 |
| 17 | 84 | male | 27 | 10 | 6,878.2 | 34.0 | 623.6 | 7.0 | 3 | 11 | 0.38 |
| 18 | 73 | female | 27 | 9 | 2,896.6 | 5.0 | 643.5 | 7.0 | 14 | 4 | 0.61 |
| 19 | 87 | female | 29 | 4 | 274.1 | 1.0 | 807.2 | 7.0 | 7 | 3 | 2.16 |
| 20 | 83 | male | 25 | 11 | 6,931.4 | 36.0 | 668.9 | 10.0 | 14 | 8 | 0.51 |
| 21 | 81 | female | 33 | 9 | 3,030.7 | 12.5 | 673.8 | 8.0 | 6 | 10 | 0.63 |
| 22 | 71 | male | 33 | 12 | NA | 42.6 | 655.1 | 14.0 | 5 | 9 | 0.49 |
| 23 | 75 | male | 22 | 12 | 4,398.9 | 22.4 | 757.5 | 7.0 | 2 | 7 | 0.27 |
| 24 | 72 | female | 30 | 9 | 2,518.6 | 8.2 | 684.3 | 8.0 | 12 | 7 | 1.33 |
| 25 | 73 | male | 22 | 12 | 11,646.3 | 74.0 | 599.4 | 15.0 | 9 | 8 | 1.33 |

Note. BMI = body-mass index; SPPB = Short Physical Performance Battery (Guralnik et al., 1994); MVPA = minutes of moderate to vigorous physical activity.

Table 2 Facilitators of Neighborhood Activity

| Theme | Higher order theme | Nodes |
|---------------|--|---|
| Environmental | Favorable local environment for walking | Seating along walking routes, wide pavements, attractive local environment, quiet area, friendly neighbors |
| | Walkable amenities | Nearby shops, wide variety of local shops |
| | Accessible locations for exercising | Access to walking routes, physical activity facilities for older people, nearby physical activity facilities, accessible green space |
| | Having access to a car or good bus service | Free bus pass, good bus service, close bus stop, car ownership |
| Interpersonal | Support from others to be active | Encouragement to be active, physical assistance getting out, physician's advice, having active family |
| | Incentive of social interaction | Visiting friends, social activity groups, meeting friends when shopping, having others to exercise with, enjoyment of competition, not wanting to let others down |
| Intrapersonal | Positive perceptions of physical activity | Active interests, positive attitude toward physical activity, perceived physical benefits, perceived psychological benefits |
| | Positive self-perceptions | Self-efficacy to be physically active, belief one can help others, determination to maintain independence |
| | Established active habits | Maintenance of active occupation, established routine, past active habits |

Table 3 Frequency and Impact of Facilitators of Neighborhood Activity

| Higher order theme | Lower order theme | Frequency | Impact |
|--------------------|--|-----------|--------|
| Environmental | Favorable local environment for walking | low | low |
| | Walkable amenities | high | medium |
| | Accessible locations for exercising | low | medium |
| | Having access to a car or good bus service | medium | medium |
| Interpersonal | Support from others to be active | low | low |
| | Incentive of social interaction | low | high |
| Intrapersonal | Positive perceptions of physical activity | high | high |
| | Positive self-perceptions | medium | low |
| | Established active habits | medium | medium |

Eleven participants commented on the value of using buses, with 7 stressing the importance of their free bus pass as an incentive to use the bus to go shopping, on day trips, to visit friends, and to get to areas suitable for leisure walks. Participants commented that the importance of the bus service might increase in the future when they could not drive.

Fridays it is supermarket day. Which I go down and meet my friends. Sometimes we'll meet in Broadmead [local shopping area in Bristol city center], or when the weather's been nice we've been meeting in Broadmead and 'cause we can catch the bus anywhere now . . . go down Weston [a town 11 miles from Bristol] for a few hours, or last week we went to Street [a town 32 miles from Bristol]. (Participant 21, 81 years)

Facilitators of neighborhood walking included *benches along walking routes*, *wide sidewalks*, *aesthetically pleasing*, and *friendly neighborhoods*.

I'd probably put up a seat or two to sit on the way. . . . I mean even going along, there's a post box along on the main road and I cut through—um—the social club, but I nearly always sit down in the bus shelter on the way. (Participant 8, 82 years)

Sixteen people reported that accessing areas of green space, including urban parks and the countryside, could act as a facilitator for leisure walks: "There's plenty of greenery around here and it's quite nice to take a walk up 'round" (Participant 21, 81 years).

We can go walking through the woods there and there's a jolly good hour's walk around through the woods up to the top onto the park and down the road and back again. . . . That's quite a good run. (Participant 20, 83 years)

One participant mentioned that as people grow older, local parks become more important because people are less comfortable traveling long distances. Accessible exercise facilities were reported as both a low-impact facilitator and a low-impact barrier. Very few participants in this study saw themselves as "exercisers" or reported visiting exercise facilities. This might have been because of the perceived lack of provision of such facilities by interviewees. They also stressed the facilitating role that community centers, if available and suitable, could play in activity promotion in the local community.

Advice from physicians, *verbal encouragement*, and *belonging to social networks where an active lifestyle is the norm* were reported as facilitators with low impact. However, in two cases in which mobility was severely inhibited, the assistance of family members had a high impact on activity maintenance, demonstrating that supportive networks become very important when there is actual need for help and support. "I rely on my daughter to take me out in the car and then I can walk a little bit, you know" (Participant 3, 81 years)

Social interaction was very frequently reported as contributing to being active in the neighborhood. Socializing and the enjoyment of spending time with friends was an indirect way of being more active through more opportunities to be "out and about."

Having *positive physical activity perceptions* was the only high-frequency, high-impact personal facilitator. Participants perceived physical-activity-related interests such as gardening and leisure walks as having a positive effect on perceptions of improved cardiovascular health, weight management, and reduced stress levels and stiffness. The *maintenance of active habits and established routines* was considered an important facilitator, together with *maintaining functional ability and independence*, to enable participation in preferred activities and avoid reliance on others. *The habit of exercise* was reported as a medium-frequency, medium-impact facilitator. An “exerciser” identity (lasting for over 30 years for some participants) was a strong motive for maintaining physical activity levels.

I’ve been physically involved for 50 years running all the time, so my physique must be, as good as, probably as good as it can be, or as equal to other people, and I know that I am not fitter than other people by any means. But it’s not like the doctor saying, “Oh you must do some exercise, so you start going down to the gym.” (Participant 22, 71 years)

I was running before I had my breakdown [referring to a self-reported mental breakdown] but I give into it a bit, but I thought “No you’re not; you take up running again.” ’Cause it was the period while I didn’t run. But I got to run to keep my sanity really, I think! (Participant 7, 71 years)

Frequency and Perceived Impact of Barriers. This section provides information on the identified barriers ($n = 45$; Table 4) and presents the frequency and impact of the lower order themes of the three hypothesized main themes: environmental, interpersonal, and personal (Table 5). It also presents the barriers-questionnaire analysis (quantitative data; Table 6) and compares the findings of both sources of data.

The environmental barriers, being reported on 222 separate occasions, provided participants with a wide range of challenges. *Weather*, particularly rain, wind, and cold temperatures, was one of the most frequently mentioned barriers, together with *darkness*, which was linked with fears for personal safety: “I used to go out for a walk down here back and forward, just for exercise. . . . I don’t do that now. Since we had the wet, cold weather I’ve stopped” (Participant 9, 86 years). Some participants reported that poor weather would prevent them from venturing out of their homes, while others were coping by choosing indoor activities such as mall shopping.

I mean you wouldn’t want to walk about and get wet would you? But that’s the trouble as you’re getting older you feel the cold more. . . . I mean when you’re young you can stride it out and get on with it, but when you’re getting older you slow! (Participant 24, 79 years)

Uneven sidewalks, slippery or uneven surfaces, hills, cars parked on sidewalks, poorly maintained gardens, cleanliness, traffic noise, and air pollution were frequently mentioned barriers of features that made a neighborhood unsuitable for walking. Sixteen of the 25 interviewees perceived hills as a low-impact barrier that they were able to overcome by avoiding hills altogether, driving to destinations without hills, or using the bus to travel to shops and flatter areas for leisure walks. “Well, again as you say, going in people’s houses now, they all tell me to go and

Table 4 Barriers to Neighborhood Activity

| Theme | Higher order theme | Nodes |
|---------------|---|--|
| Environmental | Concerns for personal safety | Fear of crime, cyclists on sidewalks, speeding traffic, vulnerability as an older adult |
| | Poor bus service | Distance to bus stop, getting on and off public transport, inconvenient buses |
| | Seasonal influences | Darkness, weather |
| | Unfavorable local environment for walking | Uneven sidewalks, hills, cars parked on sidewalks, poorly maintained gardens, lack of cleanliness, traffic noise and air pollution, lack of neighborliness |
| | No accessible facilities to exercise | No local exercise classes, lack of local activity groups, cost of activity classes, lack of awareness of facilities |
| | Unsuitable local amenities | No shops within walking distance, poor variety of local shops, no local pub, shops unsuitable for those who are less mobile, price of local shops, poor quality of amenities |
| Interpersonal | Activity of others | Not having an activity partner, inactive friends, reduced mobility of partner |
| | Negative views of others | Conflicting health advice, concerns about other people's views |
| Intrapersonal | Health problems | Fatigue, muscle deterioration, functional limitations |
| | Negative self-perceptions | Perceptions of decline with aging, perceived low level of fitness, low self-efficacy, low-self confidence, fear of falling, fear of going out alone |
| | No motive to be active | Lack of interest, lack of physical activity enjoyment, no reason to go out, no past exercise experience |

see them, 'Why don't you come?' I said 'No you come up here'; I don't like to go because it's hilly" (Participant 15, 82 years).

Changes in the social makeup of some neighborhoods led to loss of neighborliness, resulting in a not so activity-friendly neighborhood environment. Increased population mobility with young adults moving often in and out of neighborhoods contrasted with the lifestyle of interviewees. The mean length of residency at current address for interviewees was 27.6 years (± 18.06). Reasons interviewees provided that suggested a lack of strong social networks in their neighborhood were having fewer older residents, neighborhoods being empty during the daytime when the working neighbors were away, and few people walking around at any time. *Concern for personal safety* was a medium-impact and -frequency barrier. Darkness, fear of crime, and intimidating groups of youths made some participants anxious about

Table 5 Frequency and Impact of Barriers to Neighborhood Activity

| Higher order theme | Lower order theme | Frequency | Impact |
|--------------------|---|-----------|--------|
| Environmental | Concerns for personal safety | medium | medium |
| | Poor bus service | medium | medium |
| | Seasonal influences | medium | high |
| | Unfavorable local environment for walking | low | high |
| | No accessible facilities to exercise | low | medium |
| | No walkable amenities | low | low |
| | Inadequate local amenities | low | low |
| Interpersonal | Activity of others | high | low |
| | Negative views of others | medium | low |
| Intrapersonal | Health problems | high | high |
| | Negative self-perceptions | low | low |
| | No motive to be active | high | medium |

walking in their neighborhood. This anxiety was not confined to the nighttime; fear also prevented some participants from going outdoors or encouraged them to drive to their destination during the daytime. Two participants specifically commented that older adults were particularly vulnerable to crime, and 4 stated that they felt there was a lack of police presence in their area.

I don't like going through the passageway [a narrow street between buildings] on my own. . . . I'm not very keen on going through there because there's like high fencing, and there's nobody about, and well . . . I mean, it's not a walk for a really elderly person to do on their own. . . . I mean we've got a lovely valley down through there, but the trouble is you're afraid to go down there on your own. (Participant 13, 71 years)

Poor bus service was another medium-impact and -frequency barrier. Four people considered their buses unreliable, whereas others felt that routes were limited or their nearest bus stop was too far away to walk to. As 1 participant stressed, "If I had a bus stop outside my house I'd be on it quite a lot" (Participant 9, 86 years). Two more participants stressed, "The bus doesn't come along here as you know, and when you've got to carry heavy shopping it's quite a long way from the bus stop" (Participant 13, 71 years). "You don't need a car but it's surely handy to have one. Because you've got a 10-minute walk down to the bus . . . and the buses are not terribly reliable as you probably read in the paper" (Participant 20, 83 years).

Participants presented several examples of *unsuitable amenities* as many local services did not provide the quality they required or they were more expensive than larger supermarkets. Individuals mentioned that their local area lacked a post office, food store, or newsagents, causing them to travel outside their community by car or bus to cope with the lack of such facilities: "It's a nice area to live, but there's

Table 6 Importance of Barriers (Questionnaire Data) for the OPAL Cohort and for the Subsample of 15 Male and 10 Female Interviewees

| Barrier | OPAL Participants | | | | | | Interviewees | | | | | |
|---------------------------|--------------------------|------|--|--------------------------|------|--|--------------------------|------|--|--------------------------|------|--|
| | Men | | | Women | | | Men | | | Women | | |
| | M (SD) | Rank | | M (SD) | Rank | | M (SD) | Rank | | M (SD) | Rank | |
| Health isn't good enough. | 3.93 (3.36) ^a | 1 | | 4.77 (3.39) ^b | 1 | | 3.20 (3.23) ^e | 1 | | 4.40 (3.72) ^d | 3 | |
| I haven't got the energy. | 3.69 (3.19) ^a | 2 | | 4.08 (3.07) ^b | 2 | | 2.90 (2.81) ^e | 2 | | 4.20 (3.16) ^d | 4 | |
| Pain when I exercise. | 3.22 (2.84) ^e | 3 | | 3.73 (3.20) ^b | 5 | | 2.80 (2.97) ^e | 3 | | 1.70 (1.64) ^d | 7 | |
| Too old. | 3.02 (2.84) ^a | 4 | | 3.00 (2.96) ^b | 8 | | 2.70 (2.98) ^e | 4 | | 2.50 (2.95) ^d | 6 | |
| Not the sporty type. | 2.87 (2.95) ^a | 5 | | 3.77 (3.03) ^b | 4 | | 2.80 (3.36) ^e | 3 | | 5.00 (3.92) ^d | 2 | |
| Fear of injury. | 2.48 (2.52) ^e | 6 | | 3.65 (3.15) ^b | 6 | | 3.20 (3.16) ^e | 1 | | 5.40 (3.60) ^d | 1 | |
| No one to do it with. | 2.46 (2.45) ^e | 7 | | 3.89 (3.37) ^b | 3 | | 1.80 (1.32) ^e | 8 | | 3.60 (4.20) ^d | 5 | |
| Lack of time. | 2.26 (2.12) ^f | 8 | | 2.74 (2.41) ^b | 9 | | 2.60 (1.51) ^e | 5 | | 2.50 (2.01) ^d | 6 | |

Note. OPAL = Older People and Active Living project.

^an = 111; ^bn = 100; ^cn = 15; ^dn = 10; ^en = 110; ^fn = 112.

no real center to it. It is not like living in a village, for instance, when everything's around you" (Participant 20, 83 years).

Participants reported *accessibility of exercise facilities* as a medium-frequency, low-impact barrier. *Lack of local exercise classes or activity groups* and *lack of awareness of provision* in their local community might have contributed to the low perceived impact of this barrier.

Themes related to the immediate social environment, such as family and friends, were clustered as interpersonal factors. As opposed to the range of reported environmental barriers, the interpersonal barriers included only two themes, *negative views of significant others* and *activity levels of others*, which, although not mentioned frequently (26 times), were perceived as having a medium and high impact, respectively.

Negative views of significant others were mentioned only three times, but the perceived impact was medium in all cases. In one case, the individual's family was encouraging him to do less activity because they felt it was detrimental to his health. Conflicting health advice was also the experience of 1 participant:

My brother keeps phoning up and he says "Take things quiet," he says. "You're not a young man anymore." I've just been up to see my doctor now and he said "Try and walk a little bit," because the furthest I've walked since the operation is about 500 yards. . . . That's the furthest I've walked. And he said "Try and walk a little bit further each day." (Participant 4, 79 years)

Some individuals stressed that they would like to have an exercise companion because most of their friends were inactive or they felt they would be safer if they had someone to walk with. Four widowed women specifically reported lacking someone to be active with.

But you need to go out, you need to get exercise and you need the company to do it with. Well, of course, the people who've got a dog—they walk the dog. I don't want to have a dog, and that stops you. . . . Say I had a neighbor who always wanted to go for a walk, and said "Let's walk down to so and so and back"—I'd probably say, "Yes okay, let's do that." (Participant 18, 73 years)

I've got friends, but none of them are really *active*, you know what I mean? They just don't want to do any exercise. I mean I've a friend that goes swimming, but then that's all she does. If I said to them "Let's go for a walk" then they don't want to do it. If I said to them "Come and have a cup of tea and a cake" then they're all here! (Participant 13, 74 years)

In another four cases, participants were restricted by their spouse's limited mobility, which had a negative impact on the amount or pace of their walking, either leisure or utilitarian: "We used to go there [the supermarket] more frequently, but now she can't walk so much, we don't walk down, we take the car down. I know it's stupid for about 400 yards" (Participant 11, 81 years).

Intrapersonal factors were mentioned on 120 separate occasions, with *physical health problems* being reported 73 times and classified as having high impact. *Musculoskeletal problems*, *feeling fatigued or breathless*, and *cardiovascular disorders* were limiting mobility and functional capabilities either temporarily (e.g., after operations) or permanently. Participants mentioned *loss of muscular*

strength as a particularly high-impact barrier because it was causing problems in daily living activities such as carrying shopping bags, especially when the shops were far away or the route was hilly. “I mean I go up the stairs [at the shop] when I go shopping, you know. And I go on the bus somewhere, but not anything else. Because I get out of breath” (Participant 15, 81 years).

Lack of motivation to be active was reported as a high-impact barrier. This was the result of either no prior exercise experience or lack of enjoyment of or interest in exercising. Some participants mentioned not being able to find reasons to go out in their local neighborhood: “I could go out more . . . but, I don’t know that there’s any reason to go out, really” (Participant 9, 86 years).

Explaining this, 3 individuals reported that the lack of local amenities resulted in having nowhere to go out locally, limiting any opportunities for purposive walking: “There’s nothing to go out for now, unless you go downtown. There’s nothing here, up here now. There’s no cinema; there was, but that’s finished” (Participant 16, 92 years).

Negative perceptions of personal capabilities, including low self-confidence and self-efficacy, fear of falling or going out alone, perceived low fitness levels, and negative attitudes toward aging, were not reported as having a high impact. However, when combined with environmental barriers such as poor weather or slippery or uneven surfaces, participants reported a sharp decrease in perceptions of confidence and personal capabilities: “I mean I don’t like going out when it is icy or snowy because I wouldn’t want to fall down or anything like that” (Participant 21, 81 years).

Relationship of Questionnaire and Qualitative Data on Importance of Barriers

The 14-item questionnaire included 11 personal, 1 interpersonal, and 2 environmental barriers that measured importance but not frequency of barriers (see Table 6 for the five most important barriers). Personal barriers were ranked as the most important for the OPAL cohort and also the interviewees. From these barriers, *health problems* was reported as the most important for the OPAL cohort ($n = 211$) and the male interviewees ($n = 15$). *Fear of injury* was ranked as the most important barrier for the female interviewees ($n = 10$). This finding supports the qualitative findings, in which *physical health problems* was reported as a high-impact personal barrier. The questionnaire data stress the significance of *lack of energy*, which was ranked as the second most important barrier for the OPAL cohort and the male interviewees and the fourth most important barrier for the female interviewees. This finding supports the qualitative findings, in which *fatigue* was a component of the *physical health* barrier perceived to be of high impact.

The only interpersonal barrier listed in this questionnaire (*no one to do it with*) was ranked differently by men and women. The women of the OPAL cohort and the female interviewees reported this barrier as the third and sixth most important, respectively. This barrier was reported as the seventh-highest-impact factor by men of the OPAL cohort and as ninth by male interviewees. Listed as one of the nodes of the *activity of others* theme in the interview data (see Table 4), *not having an activity companion* was consistently reported by interviewees as a major constraint for physical activity.

The environmental barrier *lack of facilities* was the 10th most important barrier for men of the OPAL cohort and the 7th most important barrier for women of the OPAL cohort and both male and female interviewees. Similarly, in the interview data, lack of facilities, although frequently mentioned, was perceived as a low-impact barrier. The only other environmental barrier included in the questionnaire, *lack of transport*, was ranked as the least important (14th) barrier for men of the OPAL cohort and the 5th, 11th, and 8th most important for male interviewees, women of the OPAL cohort, and female interviewees, respectively. *Poor bus service* was reported as a medium-impact barrier by interviewees.

Discussion

This study investigated the determinants of neighborhood activity in a group of people age 70 and older. Walking, the most common physical activity for older adults, could be the main form of neighborhood activity for recreation and as part of everyday activity (Eyler, Brownson, Bacak, & Housemann, 2003; Tudor-Locke, Jones, Myers, Paterson, & Ecclestone, 2002). Small amounts of walking can be protective against mobility loss (Simonsick, Guralnik, Volpato, Balfour, & Fried, 2005). Even a small increase in walking has been associated with significant health benefits in older adults (Diehr & Hirsch, 2010). Environmental factors can influence walkability of a neighborhood and in turn affect frequency and time spent walking (Sugiyama & Thompson, 2007). In this study, weather, darkness, characteristics of the built environment, availability and accessibility of services, and concerns about personal safety were frequently mentioned environmental barriers, revealing the wide range of environmental characteristics that might influence individuals' decisions to walk in their local neighborhoods (Dawson, Hillsdon, Boller, & Foster, 2007; Saelens & Handy, 2008; Satariano et al., 2010). This finding further supports the increasing research interest in environmental correlates and determinants of physical activity (Giles-Corti & Donovan, 2002; Giles-Corti et al., 2005; King, 2001). Interviewees frequently mentioned the lack or unsuitability of local amenities within walking distance. This was also raised recently by Frank, Kerr, Rosenberg, and King (2010), who recommended policies to bring older adults closer to shops, services, and healthy food outlets as a means of encouraging regular walking in the neighborhood.

The interviewees also reported heavy reliance on cars (predominantly men as drivers and women as passengers), and this was supported by our purposes-of-journey daily logs (Davis, Fox, Hillsdon, Coulson, et al., 2011). It might explain why although several environmental barriers were frequently mentioned, their reported impact was not necessarily perceived as high. This is in line with the lack of a relationship between the physical environment and the physical activity in older adults reported in a recent systematic review (Van Cauwenberg et al., 2011). It seems that people manage to overcome environmental barriers by traveling away from their neighborhoods for shopping and other purposeful activities. This is feasible as long as these people maintain their functional ability to drive and raises the issue of how they are going to perform these activities when they are no longer physically able to travel by car away from the neighborhood. Because men are the sole drivers in most households, loss in their functional ability will have

a negative impact on their wives' opportunities to get out and about. Functional mobility therefore emerges as an important personal barrier.

This is further supported in that participants reported personal barriers as those with the highest impact. Both quantitative and qualitative data demonstrated that health problems (functional limitations, decrease in strength, and loss of energy) were perceived as the barriers with the highest impact on both men's and women's decision to get out and about. Of particular interest is the fear of injury, which appears to be an important barrier only for women. de Melo, Menec, Porter, and Ready (2010) also reported that walking behavior was more related to physical function and personal reasons than the perceived environment. Lack of motivation to be more active was the other high-impact barrier, amplified by two further barriers. First, these participants report absence of incentive to participate in organized physical activities (lack of community centers, lack of appropriate activity programs, not being an exerciser). Second, they do not have reasons to walk in their neighborhood for their personal business (because of inadequate amenities, unreliable bus service, traffic noise, hills, uneven sidewalks, poorly maintained gardens, safety issues, and reliance on cars). These factors reduce the opportunity for incidental activity.

In a recent study conducted in the United States, Kaczynski (2010) found that only one third of reported physical activity episodes occurred in older participants' neighborhoods. Kaczynski stressed the need for specificity of behavioral outcome measures and for definition of the types of activity being investigated in relation to environmental correlates. Our study further supports the need for research to define and monitor the reasons for getting out and about in older adults. Furthermore, there is a need to monitor and evaluate the activity associated with these trips. This will help us understand how, and the extent to which, different environmental characteristics might affect older people's decisions to be more active in their own neighborhoods.

Examining the processes for adherence to organized exercise programs, Stathi, McKenna, and Fox (2010) found that maintaining physical activity is challenging even after adhering to a 12-month organized program. They stressed that exercise engagement could be facilitated with the provision of programs that run locally and provide opportunities for socializing. Giving people reasons to get out and about and accumulate incidental activity—described as a “get out the door!” strategy (Simonsick et al., 2005)—could be further supported by provision of appropriate physical activity programs and facilities. However, the interplay of barriers and facilitators shows that the “build it and they will come” approach is not sufficient. The findings of this study show that older people need good functional ability, good social support, and a facilitating environment to alter their behaviors and become more active in their own communities.

Many older people have spent much of their lives in the same community (World Health Organization, 2006). In our study, participants had been living in the same neighborhood for at least 10 years, and they reported several neighborhood changes over time that resulted in a decreasing sense of neighborliness. King et al. (2008) stressed that understanding behaviors such as daily walking requires consideration of the interplay between people and places over time. Our study supports the importance of duration of residency, because people noted that neighborhoods became less supportive, less older-people-friendly, and increasingly populated by

young working adults who move house quite often. These factors seem to influence “getting out and about” because they limit social interaction. Older people seem to be the only constant in an ever-changing neighborhood that slowly fails to meet their increasing needs as their physical abilities decrease with time. Therefore, the impact of barriers in the current interaction of person–place circumstances should be regularly reexamined and proactive measures put in place.

A recent U.K. policy document introduced the concept of “lifetime neighborhoods” that are accessible and inclusive and offer a strong local identity and sense of place (Harding, 2007). The findings of this study indicate that these characteristics could act as important enablers for more neighborhood activity for older adults. However, careful evaluation of such schemes will be needed.

Both interview and questionnaire data demonstrated the importance of personal and interpersonal barriers with the limitation of having only one such item in the 14-item barriers questionnaire. However, the impact of that barrier (“no one to do it with”) seems to be higher for female participants, who placed it in the five most important barriers. On the contrary, men did not seem to perceive lack of company as a significant barrier to their neighborhood activity. Further studies should address the gender differences in perceptions of barriers and facilitators. That knowledge would translate to appropriate activity-promotion strategies tailored to the needs of male and female older adults. The qualitative data identified 45 barriers, which stresses the need for careful use of more comprehensive barriers questionnaires in future studies that should include a range of personal, interpersonal, and environmental barriers. In addition, we should note here that the questionnaire asked the importance of the listed barriers to physical activity and exercise participation, whereas the qualitative data incorporated the evaluation of participants of the barriers to daily activity in their local communities that incorporate but are not limited to physical activity or exercise.

It is not surprising that frequency of reporting a barrier, or a facilitator, was not necessarily related to the perceived impact of that factor. The notion that barriers vary in their degree of salience or impact is supported and plausible. In addition, older people might recognize barriers but find ways to overcome them. Questionnaire assessment of impact of barriers and facilitators is therefore warranted. Future studies will need to use questionnaires that measure both barriers and facilitators because they are based on different factors. Furthermore, the content of existing questionnaires needs to be carefully evaluated to ensure the inclusion of items that fully cover environmental, interpersonal, and personal barriers and facilitators.

A limitation of this study is the reliance on cross-sectional quantitative data, which does not allow claims for causality. This was partially overcome by the collection of qualitative data that provided some temporal context. In addition, our participants lived in and around one city in the southwest of England, which may limit the generalizability of the results to other geographic regions in the United Kingdom and other countries. Studies are needed that employ longitudinal designs wherein the interaction of people and places is monitored for longer periods of time to allow researchers to better understand how environments shape behaviors and how personal characteristics can shape or overcome negative environments.

Conclusion

This study demonstrated that being active in the neighborhood is influenced by a wide range of environmental, interpersonal, and personal factors. The perceived quality and accessibility of both the built and the natural environment are important in promoting physical activity with older people. In addition, maintaining good health, functional ability, and independence and supportive social networks influence older people's physical activity and might reduce the perceived impact of environmental barriers. We need to further explore the interaction between barriers to and facilitators of physical activity, because certain barriers and facilitators will weigh differently in older people's decisions to "get out and about." To optimize levels of physical activity in later life, in addition to creating supportive environments we need to take into account this variation and be prepared to put in place specific setting and target-group programs and policies.

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