



Citation for published version:

De Koning, J, Stathi, A & Fox, KR 2015, 'Similarities and differences in the determinants of trips outdoors performed by UK urban-and rural-living older adults', *Journal of Aging and Physical Activity*, vol. 23, no. 4, pp. 613-621. <https://doi.org/10.1123/japa.2014-0141>

DOI:

[10.1123/japa.2014-0141](https://doi.org/10.1123/japa.2014-0141)

Publication date:

2015

Document Version

Peer reviewed version

[Link to publication](#)

As accepted for publication

University of Bath

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

1 **Title**

2 Similarities and differences in the determinants of trips outdoors performed by UK urban- and rural-

3 living older adults.

4

1 **Abstract**

2

3 The frequency of trips outdoors is a strong indicator of older adults' physical activity levels. This
4 qualitative study compared and contrasted determinants of trips outdoors between rural- (n=13) and
5 urban-living (n=15) people aged 65 and older living in England. Interview transcripts were analysed
6 through directed and summative content analysis employing the Ecological Model framework.
7 Some personal-level determinants (age-related barriers) and environment-level factors (car
8 dependence, bus services) were shared across samples. The main differences were seen in how a
9 community-based social network instigated trips outdoors for rural participants while family ties
10 mostly led to trips outdoors for urban-living participants. Urban participants used and valued
11 recreational facilities, but rural participants did not report them as important in determining trips
12 outdoors. Strategies to improve public transport and minimize age-related barriers may translate
13 from urban to rural contexts. However, social and/or physical environment interventions could be
14 more effective if they were rural-grounded, not urban-translated.

1 **Background**

2 Physical activity has multidimensional health, well-being and economic benefits for older adults
3 (Department of Health, 2011a; Balboa-Castillo et al., 2011, Simmonds et al., 2014). The focus on
4 leisure time activities such as dancing, gardening, walking and facility-based exercise in previous
5 studies presents a limited view of physical activity for older adults in the United Kingdom (UK),
6 whose activity arises predominantly from daily tasks such as shopping and visiting friends (Davis et
7 al., 2011). A trip outdoors each day by foot or bicycle is associated with an extra 20 minutes of daily
8 walking and 13 minutes of moderate to vigorous physical activity, even after adjustment for
9 potential confounders (Davis et al., 2011). Frequent trips outdoors by older people are also related
10 to better physical function and independence (Jacobs et al., 2008). The determinants of leisure-time
11 activities may be very different from those underpinning activities that contribute to everyday trips
12 outdoors (Stathi et al., 2012). With a growing and largely inactive older UK population (Department
13 of Health, 2011a), promoting frequent trips outdoors could be an effective strategy for framing and
14 supporting activity for older people.

15 Rural populations in the UK have almost double the proportion of older adults (27%)
16 compared with urban populations (16%) (Department of Environment, Food and Rural Affairs
17 [DEFRA], 2011). Yet, evidence on the determinants of physical activity of older adults living in
18 rural areas is scarce (Burholt and Dobbs, 2012), compared with that for urban areas (Fox et al.,
19 2011; Stathi et al., 2013). The implementation of the ‘rural-proofing’ policy in UK requires the
20 evaluation of how well existing urban policies apply to rural environments (DEFRA, 2013a). It is
21 important to appraise the fit of evidence-based strategies for promoting active aging in urban areas
22 to rural contexts as done by the authors of a guide to age-friendly rural and remote communities in
23 Canada (Federal, Provincial and Territorial Ministers Responsible for Seniors [PTMRS], 2009).

24 Physical activity literature regarding rural populations and urban-rural comparisons mainly
25 features North American or Australian populations (Burholt and Dobbs, 2012). These studies

1 indicate lower levels of activity in older adults living in rural compared with urban areas and also
2 identify some different physical activity predictors (Martin et al., 2005; Shores et al., 2009; Wilcox
3 et al., 2000). In a nationally representative sample of 2,388 American older women, those living
4 rurally cited more personal and interpersonal barriers (fear of injuries, discouragement by others
5 and caregiving duties) and fewer environmental facilitators (functional pavements and street lights)
6 for leisure-time activities (Wilcox et al., 2000). In the same study, not frequently seeing others
7 exercising and lack of enjoyable scenery determined sedentary behavior only in rural-, not urban-
8 living, older women. In a survey of 3,888 Australian adults aged between 55-65 years, the perceived
9 safety and aesthetics of the environment was only a predictor for total and transport physical
10 activity for rural, not urban adults (Cleland et al., 2014). In this same study the perceived
11 supportiveness of the environment for physical activity (facilities, infrastructure and social
12 stimulus) only predicted leisure activity for urban, not rural adults. In the UK, a telephone survey of
13 363,724 adults between ages 16-85+ found rural-living people to be more recreationally active than
14 their urban-living counterparts (Rind and Jones, 2011). While not specific to older adults, this
15 contrasting result to the American and Australian study findings stresses the need for research
16 focusing specifically on rural areas in the UK, as findings may not be transferrable between
17 geographies and cultures.

18 Most urban-rural comparison studies have used self-report questionnaires developed from
19 studies with urban samples to measure levels of physical activity and physical activity determinants.
20 Although some of these measures have been used worldwide (i.e. the International Physical Activity
21 Questionnaire), most physical activity determinants questionnaires have not been validated in rural
22 contexts. Therefore, the forms of activity or the activity determinants important only in rural, not
23 urban, contexts might not be captured appropriately. In the absence of questionnaire items validated
24 for rural-dwelling older populations, an inductive, qualitative methodology is preferable as it allows
25 the emergence of unexpected and rural specific themes (Holloway and Biley, 2011).

1 In a systematic review, Van Cauwenberg et al. (2011) concluded that the relationship
2 between the physical environment and older adult physical activity was inconsistent and overall, not
3 significant. Such examination of the influence of physical environment alone on physical activity
4 does not take into account the personal, social/cultural, organizational/policy and physical
5 environmental factors that interact and influence active aging in complex ways (Giles-Corti et al.,
6 2005). This may explain equivocal results of physical activity determinants in previous studies
7 (Blacksher and Lovasi, 2012). Research taking an Ecological Model perspective may be more
8 fruitful (McGannon et al., 2013) as it is based on the assumption that behavior is affected by an
9 interaction of personal, social (inter-personal), community, cultural, environmental factors (Giles-
10 Corti et al., 2005; Sallis et al., 2006). Few studies have adopted this framework when using a
11 qualitative methodology, and those that have are based on populations from the United States of
12 America (US) (McGannon et al., 2013). The qualitative study presented here takes an ecological
13 perspective in comparing and contrasting the multi-dimensional and interacting determinants of
14 frequent trips outdoors taken by older adults living in urban and rural UK settings.

15

16 **Methods**

17 **Setting**

18 A city (population > 400,000) and a fringe village (population of 530) in South West England were
19 chosen for this study. Both fulfilled the rural/urban definition of geographical hectare squares with a
20 population <10,000 as rural (Office for National Statistics [ONS], 2004). The urban site was chosen
21 for the purposes of the observational study Older People and Active Ageing (Project OPAL; for
22 details: Fox et al., 2011; Stathi et al., 2012) which explored determinants of active living in urban-
23 living older people. The rural comparison site was chosen for its geographical proximity to the
24 urban site (to ensure similar climate and daylight) and typical village demographic make-up (high
25 percentage of older people). The first author's familiarity with the rural site facilitated trust through

1 personal referral (Penrod et al., 2003) and access to a wide range of older people, including those
2 normally hard-to-reach.

3

4 **Participants and recruitment**

5 Two separate samples were involved in which all participants were over the age of 70 and of white
6 English origin (Table 1). First, snowball sampling to recruit rural participants started with an older
7 individual known to the researcher (N=13, seven women). This allowed access to the hard-to-reach
8 people who would not allow a stranger into their home without trusted referral, for example a
9 widowed woman who was visually impaired (Penrod et al., 2003). The first two participants were
10 recruited through personal contacts of the first author with older people living locally. These
11 participants, and each participant thereafter, were asked to identify other older adults in the village
12 with a range of physical abilities, conditions and activity levels who were then approached and
13 invited to take part in this study. Secondly, 15 qualitative transcripts from interviews with urban-
14 living older adults which had not been previously analyzed or presented in any form were used
15 (Project OPAL; Fox et al., 2011). In this study 240 participants aged 70 and over had been randomly
16 recruited through 12 GP practices representing low, medium and high levels of deprivation and low
17 or high access to shops (index of multiple deprivation [IMD]). From the main sample, 46 interviews
18 had been arranged with participants purposely selected to provide maximum sample variation
19 including a range of IMD of their area of residence and low, medium or high level of accelerometer-
20 derived daily physical activity (Fox et al., 2011). The fifteen interview transcripts selected for this
21 study were chosen based on the similarity of the demographic profiles of these interviewees to those
22 of the rural participants. Ethical approval for the new rural sample was granted by Research Ethics
23 committees at the Universities of Bath and Bristol Southmead NHS (Ethics reference
24 06/Q2002/127) for the urban sample.

25

1 Table 1. Sample characteristics.

		Rural (n=13)	Urban (n=15)
Population size		530	>400,000
Sample demographics			
Age	(median, years)	77	77
	(range, years)	67-85	73-85
Female	(vs. male)	7/13	8/15
Married	(vs.	10/13	10/15
single/widowed)			
Average household income	(median)	£15,000	£15,000
	(range)	£7500 - >30,000	£7500 - >30,000
Years lived in the area	(median)	23	16
	(range)	11-53	3-52

2

3 Data collection

4 Un-analyzed interviews from project OPAL were used as secondary-data. During the first of two
5 house visits in project OPAL, participants were administered a survey including demographic
6 information, neighborhood determinants of trips and distances to local amenities (Davis et al.,
7 2011). This was used to refine interview guides for the semi-structured interviews lasting from 40 to
8 80 minutes conducted during the second visit (Table 2). New interviews were conducted with the
9 rural participants by a different researcher, using a similar protocol. A shortened version of the
10 OPAL questionnaire, including only the sections about demographics, neighborhood determinants
11 of trips and distances to local amenities was administered in the first of two visits. Questionnaire
12 responses also guided the semi-structured interview guides for the second visit. All interviews were
13 transcribed verbatim and coded ensuring anonymity and confidentiality.

14

1 Table 2. Interview guide questions and personalisation.

Interview guide questions	Personalisation
1. Could you describe the purpose of your <ul style="list-style-type: none"> • Trips outdoors in a typical week? • Trips by car on a typical week? 	Probes in relation to self-reported activities.
2. Could you give us some example of what makes a trip outdoors in your local community/neighbourhood a: <ul style="list-style-type: none"> • Positive and nice experience? • Negative experience? Could you describe some trips outdoors that were not enjoyable? 	Probes from NQLS answers (See Fox et al., 2011). i.e. If neighbourhood was reported as ‘pleasant’ or ‘unpleasant’ to walk around or traffic indicated as ‘unsafe’, participants asked to expand on what made it so, and how this impacted decisions to leave the house.
3. Could you tell us more about the hobbies/pastimes that you mostly like doing?	Probes in relation to self-reported activities and their determinants.
4. What does influence your decision to go out or stay in?	Probes in relation to self-reported activities.
5. How important is having a car for helping you carry out your weekly trips outdoors?	Probes in relation to self-reported activities and car use.

2

3 **Data analysis: Directed content analysis**

4 Directed content analysis was used to elicit themes regarding types of trips outdoors and their
 5 determinants (Hsieh and Shannon, 2005). Determinants were recognized as factors perceived as
 6 either direct facilitators of, or direct barriers to, trips outdoors. Inductively generated themes were
 7 fitted under the ‘personal’, ‘social’ and ‘environmental’ ecological domains as initial coding
 8 categories. Combined coding categories where themes indicated domain interactions (i.e. personal-
 9 environmental) were also developed to fit the data (Hsieh and Shannon, 2005). Then, performing
 10 summative analysis (Hsieh and Shannon, 2005), frequencies of determinants were counted, and
 11 words and phrases systematically judged for their impact on trips outdoors (for examples see Stathi
 12 et al., 2012). Each determinant’s impact was defined as the summative impact for the majority of
 13 participants. Similarities and differences in the highest impact barriers and facilitators between rural
 14 and urban settings were identified using cross-tabulation.

15 Confirmability was assured by the iterative development and testing of themes during data
 16 collection in the rural area (Morse et al., 2002); the urban data, having been already collected, were

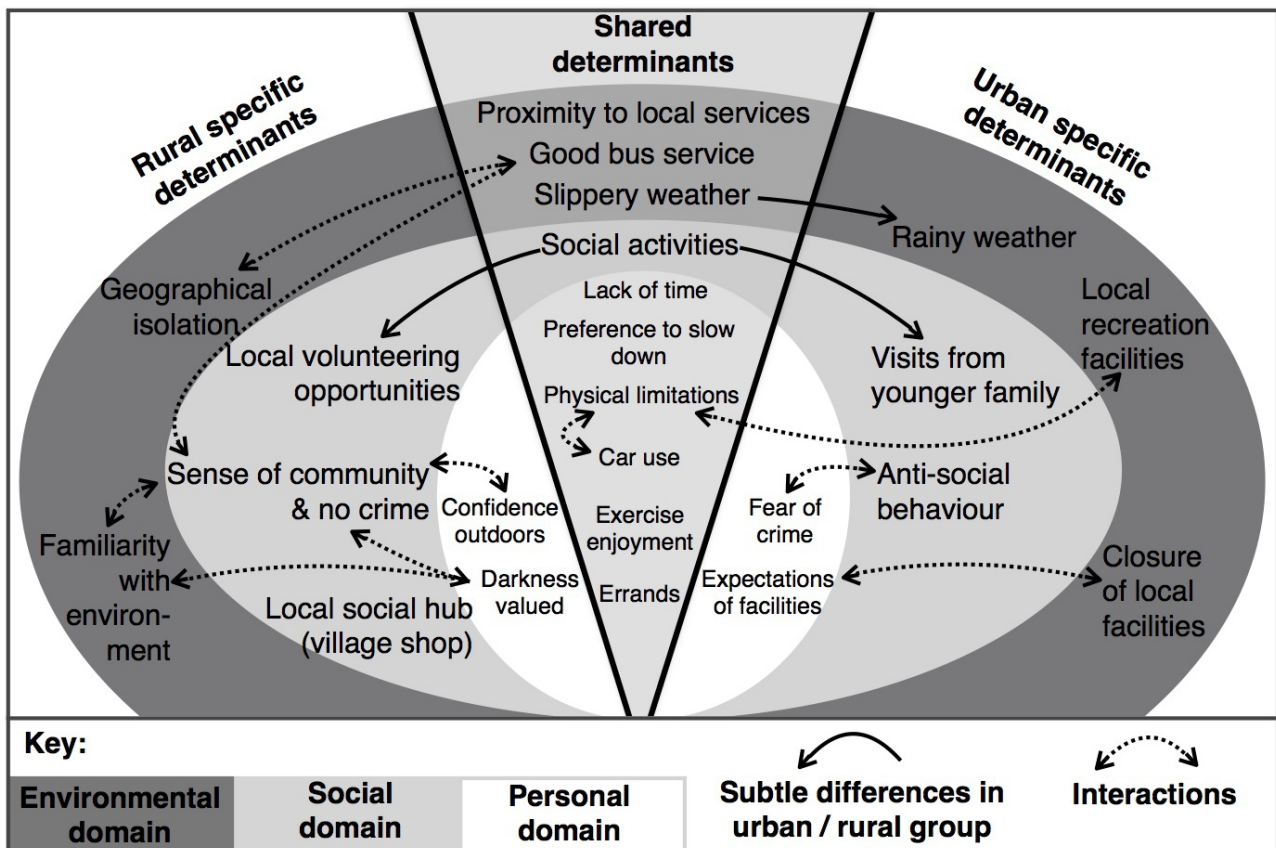
1 analyzed retrospectively. Dependability and trustworthiness were addressed through the
2 development of a detailed coding scheme and coding checking protocol. The identified themes and
3 sub-themes were reviewed by the second author, an experienced qualitative researcher, and regular
4 discussions on the interpretation and thematic analysis were organized by all three authors.

5 While the themes are presented under ecological domain headings, any interactions between
6 domains are elaborated within the text. Quotes to illustrate the themes are presented under each sub-
7 category.

8

9 **Findings**

10 Urban and rural-dwelling participants shared some personal- and environmental-domain
11 determinants, as demonstrated by the triangular wedge intersecting the Ecological Model's three
12 domains in Figure 1. The inner, middle and outer circles represent the personal, social and
13 environmental ecological domains, respectively. However, there were also several important
14 differences, mostly in the social and environmental-domains. This is demonstrated by the different
15 determinants shown in the 'rural specific' and 'urban specific' sides of the Ecological Model in
16 Figure 1. There were shared and urban/rural-specific interactions between ecological domains, as
17 demonstrated by the dotted arrows, and some subtle urban/rural differences even where
18 determinants were common between both groups, as demonstrated by the continuous arrows in
19 Figure 1. The following paragraphs describe each of the similarities and differences in more detail.



1 Figure 1. Shared and different determinants of trips outdoors between urban and rural contexts
 2 shown within the Ecological Model.

3

4 **Personal domain**

5 ***Similarities in facilitators***

6 All participants tended to be motivated to make trips outdoors by the need to run errands, such as
 7 grocery shopping: “*certainly walking to the (local) shop is a frequent one (trip)*” (**rural, M, 77**),

8 “*...we usually do the rounders thing, where we pop into places like (three popular supermarket*

9 *chains)*” (**urban, M, 74**). For a minority, markedly women, in both contexts there was also a desire

10 to engage in dedicated exercise activities stimulated by the enjoyment of the activity itself: “*I enjoy*
 11 *(badminton). I manage to still do it although I tend to rest rather than play these days (chuckles)*”

12 (**rural, F, 77**), “*Oh, I love it, I love it (swimming). ...to the gym, that is lovely, I love it!*” (**urban, F,**

13 **81**).

14

1 Car use contributed to performing errands by helping participants to cope with bad weather,
2 traveling distances, and physical function limitations and enabled day-long leisure and social trips
3 outdoors in both rural and urban settings. Car use was viewed as vital for keeping up their current
4 levels of activities, by the majority of participants, regardless of residential context: “(A car) is
5 necessary, well *if we are to sustain our activities at the current level*” (rural, M, 84), “Quite frankly
6 *I don’t know how we’d manage if we didn’t have the car.*” (urban, F, 88). This personal-level
7 facilitator interacted with the personal-level domain as it was especially crucial for participants who
8 had mobility limitations in walking and catching a bus.

9

10 ***Similarities in barriers***

11 Physical limitations decreased participation in gardening, recreational walking, sports activities and
12 social visits for many participants, regardless of context. Most participants avoided sports activities:
13 “tended to play tennis and squash, but found that as you get older you end up with muscle and joint
14 problems with those games” (rural, M, 76), “we were getting pains in the knees so we sort of
15 gradually dropped (tennis) I’m afraid” (urban, M, 78). Some participants avoided recreational
16 walking on slippery or steep surfaces due to fear of falling and injury. Some rural- and urban-living
17 participants also preferred to slow down physically as they aged, especially if their working life had
18 been regimented and busy: “you just want a bit of quality time just sort of sit back reading a
19 newspaper and catching up on that” (urban, M, 74), “You get your days completely full of
20 commitments and we’ve done that during our working life ...it’s nice to not be so regimented”
21 (rural, F, 76).

22

23 Lack of time was perceived as a barrier that reduced frequency of trips outdoors for leisure pursuits
24 by some participants from both rural and urban contexts. Housework was prioritized by some
25 participants over outdoor trips: “We tend to do what we have to do, in and around the house, and if

1 *there's any free time we go out. Um but we don't let going out take over what needs to be done in*
2 *the house” (rural, M, 76), “It's all according to how much I've got to do in the house, and how*
3 *quickly I do it” (urban, F, 75). While this presented a reason not to get out and about, such house*
4 *and garden work will have contributed to daily amounts of physical activity.*

5

6 **Social domain**

7 ***Similarities in facilitators***

8 Most participants' trips involved social activities: *“Most of my activities involve other people”*
9 *(rural, M, 82), “...obviously you meet up with friends, and it's nice to see people that you only see*
10 *at meetings” (rural, F, 69), “We seem to do most of our social things during the week” (urban, F,*
11 *76). Some of the rural and urban participants were motivated to engage in more structured physical*
12 *activity due to a social aspect: “Walking can be quite a social thing... I don't particularly like*
13 *walking on my own” (rural, F, 69), “they really do stroll (walking group). But I think it's, it's more*
14 *for the company” (urban, F, 76).*

15

16 ***Differences in facilitators***

17 The majority of rural participants reported a sense of community, describing instances where
18 collective efforts had helped maintain a safe physical environment (e.g. salting roads in the winter):
19 *“they really help each other (salting the road) because it's a very, very steep slope.” (rural, F, 67).*
20 Rural residents had more confidence outdoors in bad weather and darkness as a result of a high
21 level of faith in neighborhood help if anything dangerous were to happen to them: *“if, for instance,*
22 *I went out and had a stroke or something, I'm sure there will be help somehow or another” (rural,*
23 *M, 82). In contrast, the urban participants did not mention any such helpful community actions.*
24 Rather, the majority of the urban participants seemed to feel unsafe at night due to anti-social
25 behavior; fearing crime, drug-use issues and youth gangs and therefore they avoided trips in the
26 evening: *“I wouldn't walk down there at night. ...No way. Well I wouldn't even get out the car,*

1 *'cause the pub on the corner it's always got plenty of people round it you know" (urban, F, 75),*
2 *"This neighborhood... the bunches of kids that gets round there they... it's the drugs more than*
3 *anything else...And uh... but they muck everything up don't they" (urban, M, 76).*

4
5 The volunteer-run village shop, a feature of the rural community, was a local social hub from which
6 local social connections flourished: *"Well (the village shop) seems to be (a hub), everyone seems to*
7 *be going there these days" (rural, F, 85), "(The shop is) a main center of activity in the village"*
8 **(rural, M, 76)**. The shop further strengthened the social relationships by providing a social meeting
9 place for the older villagers: *"it's a lovely social event to go over (to the village shop) and have*
10 *coffee with the other people. ...it (drinking coffee) was a reason to stop and talk. In many ways*
11 *that's what makes the shop" (rural, F, 79).*

12
13 The strong social fabric of the village also contributed to increased number of trips for many
14 participants' trips through the availability of many local volunteering opportunities (i.e. at the
15 village shop, library, parish council or church). This reinforced the social connections and a sense of
16 belonging in the village: *"it's the feeling of belonging, and all the friends I've made through it*
17 *(volunteering for the church) you know?" (rural, F, 85)*. Such a community feeling was missing
18 from the accounts of the urban participants who seemed to have more regular contact with their
19 younger families than their rural counterparts. For almost all urban-living older adults, the most
20 frequent social activities were visits from children or grandchildren living close or further away.
21 *"It's just with the family I don't see anybody apart from that really" (urban, F, 83), "Our son lives*
22 *in (place), so we'll see the family at the weekend usually" (urban, F, 76)*. In comparison, most of
23 the rural-dwelling older people lived far away from relatives and they did not meet them frequently
24 or receive support from them: *"We don't get support from them (family) at all, they're too far*
25 *away" (rural, F, 76)*. Nevertheless, on the infrequent occasions when family did visit the rural

1 participants, this was a motive for making active trips outdoors: “*we make sure we take them*
2 *(visiting family) out and show them something in the area*” (**rural, M, 80**), “*if my family are here,*
3 *they don't know the village and they like to go for a walk*” (**rural, F, 77**).

4

5 **Environmental domain**

6 ***Similarities in facilitators***

7 For participants in both contexts living closer to amenities such as a shop, doctor's surgery or post
8 office was a facilitator to get out of the house frequently and make active journeys. Those closest to
9 local services most frequently visited these, often on foot, despite weather barriers: “*yes of course,*
10 *for the proximity*” (*reason for twice daily trips to the village shop*) (**rural, M, 77**), “*...even though*
11 *it's been raining I've walked down, 'cause I walk down the end of the road to the doctor's*” (**urban,**
12 **F, 75**).

13

14 Having a good bus service was very important for facilitating trips outdoors in both contexts, but
15 especially so for the rural-dwelling, non-driving participants who would otherwise have just a few
16 services around them, making them feel geographically isolated: “*In rural communities, we are*
17 *stuck... (if the bus service was cut) then it would be difficult.*” (**rural, F, 76**). Good bus services
18 facilitated trips outdoors to natural scenery and other cities or towns and errand trips in both
19 contexts. The free bus pass was praised by many in both contexts: “*That is one good thing about*
20 *living here, an excellent bus service... and, costs me nothing. I would say probably four times, four*
21 *days a week.*” (**urban, M, 84**). A difference between the rural and urban contexts was the unique
22 interaction between this environmental facilitator and the social domain (Figure 1.) As part of the
23 rural participants' enjoyment of taking the bus was the incidental social occasions with fellow
24 villagers also on route to the nearby city: “*Having the village bus is great... On the bus of course*
25 *it's fun, because you always meet people you know doing the same thing*” (**rural, M, 82**), “*It's a*

1 *very social bus... he only run the one bus, so we all know each other on the bus so it's quite a social*
2 *occasion.*” (**rural, F, 76**).

3

4 ***Differences in facilitators***

5 Local recreation facilities were only available in the urban context, as almost all of the urban
6 dwelling participants talked about using facilities such as swimming pools, gyms, bowling clubs
7 and shopping malls, especially on hot weather days: “*When it's really hot we stay in, or we'll go*
8 *shopping but we'll stay in*” (**urban, M, 76**). The environment of shopping malls (flat surfaces,
9 protected from rainy and hot weather, provision of electronic walking aids) strongly facilitated trips
10 outdoors especially for the urban-living older adults reporting having physical limitations. This
11 indicated an important personal-environmental domain interaction: “*That's why I like going over to*
12 *the mall or somewhere you know, you can get in there and it's nice and flat when you're over there*”
13 (**urban, F, 83**). Despite many urban-living participants reporting frequent use of leisure facilities,
14 over half of the urban group desired more accessible local inexpensive shops, leisure facilities,
15 green spaces and clean-up services in order to increase their trips outdoors. Several such facilities
16 had closed down in recent years: “*There's no cinema... the swimming pool was knocked down*
17 *about six months ago... There are no public houses in this area ...so I don't know where anybody*
18 *could go*” (**urban, M, 76**). For the urban participants the personal domain factor, their past
19 experiences of and expectations for local facilities and services, interacted with the environmental
20 domain, the availability of services, in determining the impact on trips outdoors.

21

22 None of the rural-living participants mentioned shopping malls and recreation facilities as reasons
23 for weekly outdoor trips. Although some village services had closed down (e.g. post office), the
24 village volunteer-managed shop seemed to fulfill most rural participants' expectations for local
25 facilities. “*The number of people that say 'oh this (the village shop) is the best thing that happened*
26 *in (village name), it's amazing*” (**rural, F, 79**), “*I can't think of a single thing that I feel the lack of*

1 *here*” (**rural, M, 84**). One exception was the desire expressed by two older rural women for access
2 to local organized exercise classes: *“I would like a Tai Chi class but... I think it only runs in (town*
3 *10 miles away)”* (**rural, F, 85**), *“I used to go to yoga and I enjoyed it, but then it wasn’t in the*
4 *village hall anymore, and I couldn’t get there under my own steam”* (**rural, F, 76**).

6 ***Similarities in barriers***

7 Slippery conditions in wet or icy weather discouraged trips outdoors in both contexts: *“That’s*
8 *(slippery surfaces) the only thing that would stop me. I mean if it’s raining I still go out if I’ve got to*
9 *...if I slipped and fall I’d be a nuisance to anybody else”* (**rural, F, 85**), *“...in autumn when it’s wet*
10 *and, of course, it’s alright on the slope, but on the hills, I’m not very happy, that’s the only thing*
11 *that, erm, discourages me”* (**urban, F, 76**). Nevertheless, there was a subtle difference in how the
12 personal and environmental domains interacted between the urban and rural participants. Over half
13 of the rural participants were more preoccupied with slippery surfaces, due to their fear of falling,
14 than getting wet in the rain, while over half of the urban participants seemed discouraged by the
15 prospect of getting wet: *“We wouldn’t go if it was raining!”* (**urban, F, 88**), *“Well mainly the*
16 *weather! ...if it’s bad weather what’s the good of getting wet”* (**urban, F, 75**).

18 ***Differences in barriers***

19 Another urban-rural difference was seen in how the personal, social and environmental domains
20 interacted in determining the effect of the lack of street lighting. Rural participants showed a unique
21 preference for no extensive street lighting and felt confident enough to go out at night. Darkness
22 was a part of the quiet rural atmosphere which they valued (personal domain): *“more street lights*
23 *would detract from the nature of the village”* (**rural, M, 76**), *“in fact I quite like the fact that we*
24 *don’t have lamps everywhere”* (**rural, F, 65**), the perceived absence of crime and familiarity with
25 the community allowed the vast majority of rural participants to feel safe outside at night (social
26 domain): *“it seems to be a very safe area ...you meet only local people...”* (**rural, M, 82**). Their

1 familiarity with the environment made them confident to walk in the dark using a torch (flashlight):
2 “(darkness) wouldn’t stop me from going anywhere, because I would just take a torch” (rural, F,
3 65). The urban-living participants did not express any particular thoughts about street lighting.

4

5 **Discussion**

6 This study compared and contrasted the determinants of trips outdoors, a valid proxy for the amount
7 of moderate-intensity physical activity accumulated by older adults (Davis et al., 2011), made by
8 older adults living in urban and rural UK settings. Given the currently low levels of moderate-
9 intensity physical activity in older age (Department of Health, 2011b), getting out and about could
10 be targeted as an effective physical activity promotion strategy (Stathi et al., 2014). Adopting
11 qualitative methods within the Ecological Model, we observed several commonalities within the
12 personal and environment domains between an urban and rural sample of older adults. However,
13 differences were found in the social domain and the unique interactions among domains and how
14 these influenced the decision to get out and about.

15 Across contexts, errands and social activities were the most frequently reported reasons for
16 making trips outdoors. The contribution of errands as a main reason for frequent trips outdoors for
17 urban contexts supports previously published studies (Davis et al., 2011; Thompson et al., 2011).
18 While a local, volunteer-led shop and an adequate bus service served as key facilitators for errands
19 in this particular rural setting, these are not available in all rural communities, especially those more
20 geographically isolated (Department for Transport, 2012). Such facilitators therefore point to
21 possible ways to increase the ease of completing errands and therefore making frequent trips in
22 other, less well-served, rural communities.

23 The importance of participation in social groups such as committees (e.g. Women’s
24 Institute), special interests (e.g. historical society), sports (e.g. skittles) and faith groups reported as
25 motives for regular trips outdoors for both groups is consistent with findings from several other

1 studies of rural and urban populations (Leavy and Aberg, 2010; McGannon et al., 2013; Perry et al.,
2 2008). Although the types of activities identified in this study were typical of white, English older
3 adults, social contact has been identified as an important motive to get out and about by several
4 ethnically diverse groups (Aranda, 2008). In this study, local volunteering provided rural-living
5 older adults with a meaningful reason to get out and about. Longitudinal and experimental studies
6 also demonstrate how volunteering contributes to older adults' physical activity, including those
7 from deprived neighborhoods (Morrow-Howell, 2010).

8 Family contact is related to a lower incidence of loneliness in English older people
9 (Demakakos et al., 2006) and greater chances of receiving informal help with activities of daily
10 living (Grundy and Read, 2012). Nevertheless, while urban-living participants reported regular
11 contact with their families, this was paired with less local social interaction. In contrast, the rural
12 participants reported low levels of family contact but enjoyed more community-based social
13 interaction. Having social contacts in the community may lead to a larger overall social network
14 than if an older person relies only on family contact alone. The supportive nature of friendships in
15 the community for frequent trips outdoors, despite isolation from family, identified in our study
16 supports a recently published three-wave study of 4,014 older Americans, which identified that
17 having more than five close contacts increased the odds of attaining at least moderate physical
18 activity in the last 30 days (OR=1.17, 95% CI 1.06 to 1.28) (Watt et al., 2014).

19 The rural-living older adults may have a stronger need to engage more with their neighbors
20 and community as a consequence of younger family members migrating to urban areas in the UK
21 for better education and/or employment (Wenger and Burholt, 2001). This may be a UK-specific
22 aspect of rural living as McGannon et al. (2013) pointed that the family did have an important
23 positive influence on physical activity levels for older men and women living in rural South West
24 America. Older Canadians living in rural areas reported both a higher number of close relatives and

1 friends in their local community and a greater sense of community-belonging compared with their
2 urban counterparts (Carpiano and Hystad, 2011).

3 In older age, a lower level of loneliness is more strongly correlated with increased social
4 support from friends than from family (Utz et al., 2014). A peer and neighborhood based social
5 network has been associated with better health and well-being, less depressive symptoms, higher
6 morale and positive health behaviors (e.g. less drinking and visiting the dentist) in a wide range of
7 older adults (Gardner, 2011; Manthorpe et al., 2008; Watt et al., 2014; Widener et al., 2012). Thus,
8 having social contacts in the community may not only have facilitated trips outdoors but may have
9 also stimulated other health behaviors and helped to prevent/alleviate loneliness for the rural
10 participants in this study.

11 The strong social cohesion experienced in the rural community might explain why fear of
12 crime was not a barrier to the older residents' trips outdoors. Although crime rates are indeed higher
13 in urban settings (DEFRA, 2013b) the sense of collective confidence held by the rural participants
14 might have contributed to their subjective evaluation of neighborhood safety. This highlights an
15 interaction between the social and environmental ecological domains in their influence on
16 individuals' perceptions and behavior (Giles-Corti et al., 2005). While the urban interviewees did
17 not discuss the street lighting, their fear of anti-social behavior outside pubs and by youth-gangs in
18 their neighborhoods at night, could have decreased their confidence in getting out after dark. This is
19 supported by objective physical activity data indicating that very few trips occur in the evenings
20 (Davis et al., 2011).

21 The most pertinent personal (physical limitations, lack of time, car use) and environmental
22 (proximity to local services, good bus services slippery conditions) determinants to trips outdoors
23 were common in both contexts. This is consistent with other literature where physical limitations,
24 facility proximity, weather/seasonal factors and available private and public transport have been
25 highlighted as important physical activity determinants for older people in both urban (Dogra et al.,

1 2011; Mathews et al., 2010; Plouffe and Alezandre, 2010) and rural locations (FPTMRS, 2009;
2 Manthorpe et al., 2008; McGannon et al., 2013; Shergold et al., 2012; Shores et al., 2009). Lack of
3 time due to house and garden work commitments was a common barrier against getting out and
4 about for some urban and rural participants, however, these activities could contribute to an increase
5 in total volume of daily physical activity (van de Berg et al., 2010).

6 While car use was a strong facilitator for trips outdoors in both contexts, promoting it has
7 been criticized for decreasing the likelihood of alternative transport uptake and even contributing to
8 public transport services becoming unsustainable and being withdrawn (Shergold et al., 2012). The
9 current findings show that car use provides older individuals with opportunities to get to places and
10 stay active for as long as they can drive. However, this facilitator could become a barrier to trips
11 once older people lose the physical ability to drive (Stathi et al., 2012). The importance of access to
12 bus services for getting out has been consistently highlighted in studies in both urban (Stathi et al.,
13 2012) and rural settings (Shergold et al., 2012). The regular bus service reported by this study's
14 rural-living participants is not present in other, more isolated rural dwellings in the UK (Department
15 for Transport, 2012; Shergold et al., 2012), and this would limit many rural-dwelling, non-driving
16 older adults' in their ability to get out and about.

17 Recognizing the impact of regular trips outdoors on health and wellbeing, regardless of type
18 of activity, is a relatively new approach to promoting physical activity (Davis et al., 2011). Much
19 research has addressed the benefits of walking (Scherder et al., 2013) and facility-based exercise
20 programs (Birdle et al., 2012; Snowdon et al., 2011). Taking a continuity perspective of aging
21 (Atchley, 1989), promoting everyday activities which older adults have performed throughout their
22 lives might have a greater potential to be adhered to than leisure or structured exercise programs
23 introduced later in life. Nevertheless, in the present study a minority of older women in both rural
24 and urban samples did enjoy regularly playing a sport or exercise (Figure 1), so the potential of
25 these activities should not be discounted. Well-planned, structured group exercise classes, tailored

1 to an older clientele and integrating social elements have previously been well attended and shown
2 to increase objectively-measured physical activity and quality of life in urban-living older adults
3 (Fox et al., 2007, Stathi et al., 2011). Promoting trips outdoors and providing opportunities for
4 structured exercise are complementary approaches, both deserving attention from community
5 service providers.

6

7 ***Strengths and limitations***

8 The adoption of the Ecological model allowed the identification of complex determinants of trips
9 outdoors born out of ecological domain interactions (Giles-Corti et al., 2005). Sampling through GP
10 patient lists provided an urban sample with diverse demographic and socio-economic
11 characteristics. Using personal referral through snowball sampling to recruit the rural participants
12 helped in attaining a diverse sample of rural participants, including those with lower incomes,
13 functional limitations and people who were widowed. However, using two different sampling
14 techniques may have influenced the findings. For instance, the snowball sampling method may have
15 led to the selection of the most socially-connected individuals from the same network of friends for
16 the rural group. The sample in this study consisted of all white, English older adults, which limits its
17 generalizability to other older, ethnically diverse adults living in urban and rural areas. Future
18 studies could examine the practices and determinants of other ethnic groups which keep closely to
19 particular social traditions and may be less socially integrated.

20 While generalizing findings across other rural contexts and projecting these into future older
21 cohorts was not the purpose of this study, the rural setting in this study does present a positive case
22 for high community cohesion and adequate public transport access which may inform further
23 research into rural-grounded interventions and identify the creation of stronger community ties as a
24 promising strategy for promotion of active aging in urban contexts.

25

26 **Implications for practice**

1 The findings of this study show that physical activity promotion initiatives which focus on assuring
2 the availability of close-by facilities for errand activities, facilitating social activities and increasing
3 access to public transport could transfer from urban to rural contexts. Policies and strategies to
4 increase public transport provision and use may be especially important to rural settings, given the
5 high car-reliance and the current governmental policy of decreasing rural public transport
6 provisions (Department for Transport, 2012). However, initiatives relating to the social context and
7 physical environment in rural contexts should be grounded on rural-based research. The rural
8 participants' lack of desire for built recreational facilities, lack of fear of going out after dark and
9 the greater distance from family means that environmental interventions looking to facilitate active
10 aging in rural contexts should differ from those based on the desires and preferences held by urban
11 older people (i.e. fear of crime, desire for street lights, desire for leisure facilities).

12 This study's rural case provides ideas for facilitating physical activity in other, less well-
13 served rural areas. A resident-run local shop with café facilities is a strategy which could increase
14 errand-related and social trips in other rural areas, especially as rural neighborhoods in England are
15 experiencing a decline in local economic outlets such as shops and post offices (Age UK, 2013;
16 Shergold et al., 2012). Setting up a resident-run local shop would require a participative approach
17 using the knowledge and views of older residents, existing shop owners and local council members.

18

19 ***Research recommendations***

20 Large-scale observational studies of determinants of physical activity and trips outdoors in a range
21 of rural settings will provide important information about aging in the English countryside.

22 Secondary analysis of existing longitudinal datasets, e.g. the Health Survey for England

23 (Department of Health, 2011b) and English Longitudinal Study of Ageing (ELSA) (Banks et al.,

24 2011) would allow a greater understanding of how diverse ecological determinants change over

25 time and influence rural-living older people's behaviors, health and well-being. Finally,

26 participative projects involving older residents and community stakeholders in the research process

1 will be important in developing contextually-tailored community programs (Burholt and Dobbs,
2 2012).

3

4 **Conclusions**

5 It is important that older adults continue to make frequent trips outdoors in order to attain enough
6 moderate-intensity physical activity to maintain physical health and function (Davis et al., 2011;
7 Department of Health, 2011a; Simmonds et al, 2014). The few important commonalities between
8 the urban and rural contexts, such as the high car-dependence, the importance of public transport
9 and age-related barriers demonstrate that policies and actions aimed at these factors are
10 transferrable from the urban to rural context. However, the way of life for rural adults regarding
11 their social environment and its interaction with the physical environment is not comparable to that
12 of older people living in a city, and therefore any actions which aim to influence these determinants
13 need to be rural-grounded.

14

15 **Acknowledgements**

16 We would like to thank the participants for giving their time and enthusiasm to this study.
17 Project OPAL provided the baseline data and was funded by Phase 1 of the National
18 Prevention Research Initiative (<http://www.npri.org.uk>; grant No. G0501312) that was supported by
19 the British Heart Foundation, Cancer Research UK, Department of Health, Diabetes UK, Economic
20 and Social Research Council, Medical Research Council, Research and Development Office for the
21 Northern Ireland Health and Social Services, Chief Scientist Office, Scottish Executive Health
22 Department, Welsh Assembly Government, and World Cancer Research Fund.

23

24 **References**

25 AGE UK (2013). Later life in rural England. AGE UK charity, London. Available from:
26 <http://www.ageuk.org.uk/health-wellbeing/rural/>. Accessed July 20 2013.

- 1 Atchley, R.C., 1989. A continuity theory of normal aging. *The Gerontological Society of America*,
2 29 (2), 183-190.
- 3 Balboa-Castillo, T., León-Muñoz, L.M., Graciani, A., Rodríguez-Artalejo, F. & Guallar-
4 Castellón, P. (2011). Longitudinal association of physical activity and sedentary behavior during
5 leisure time with health-related quality of life in community-dwelling older adults. *Health and*
6 *Quality of Life Outcomes*, 9(47), available from: <http://www.hqlo.com/content/9/1/47>. Accessed
7 January 25 2013.
- 8 Banks, J., Batty, D., Blake, M., Clemens, S., Marmot, M., Nazroo, J. et al. (2011). Insight
9 into a maturing population. Available from: <http://www.ifs.org.uk/ELSA>. Accessed January 20
10 2013.
- 11 Blacksher, A. & Lovasi, B.S. (2012). Place-focused physical activity research, human
12 agency, and social justice in public health: Taking agency seriously in studies of the built
13 environment. *Health & Place*, 18, 172-179. doi:10.1016/j.healthplace.2011.08.019.
- 14 Burholt, V. & Dobbs, C. (2012). Research on rural ageing: Where have we got to and where
15 are we going in Europe? *Journal of Rural Studies*, 28, 432-446. doi: 10.1016/j.jrurstud.2012.01.009.
- 16 Cleland, V., Sodergren, M., Otahal, P., Timperio, A., Ball, K., Crawford, D. et al. (2014-in
17 press). Associations between the perceived environment and physical activity among adults aged
18 55-65 years: Does urban- rural area of residence matter? *Journal of Aging and Physical Activity*,
19 doi: <http://dx.doi.org/10.1123/japa.2012-0271>.
- 20 Davis, M.G., Fox, K.R., Hillsdon, M., Coulson, J.C., Sharp, D.J., Stathi, A. et al. (2011).
21 Getting out and about in older adults: the nature of daily trips and their association with objectively
22 assessed physical activity. *International Journal of Behavioral Nutrition and Physical Activity*
23 [online], 8(116), available from: <http://www.ijbnpa.org/content/pdf/1479-5868-8-116.pdf>.
- 24 Demakakos, P., Nunn, S. & Nazroo, J. (2006). Loneliness, relative deprivation and life

1 satisfaction. In: J. Banks, E. Breeze, C. Lessof, C. and J. Nazroo (Eds.), 2006. Retirement, health
2 and relationships of older populations in England: The 2004 English Longitudinal Study of Ageing
3 (Wave 2). London: The Institute of Fiscal Studies.

4 Department for Environment, Food and Rural Affairs [DEFRA] (2011). Rural Communities.
5 Available from: <http://www.defra.gov.uk/rural/communities/>. Accessed December 1 2011.

6 DEFRA (2013a). Rural proofing guidance. Available from: [http://www.defra.gov.uk/rural-
7 proofing-guidance](http://www.defra.gov.uk/rural-
7 proofing-guidance). Accessed June 6 2014.

8 DEFRA (2013b). Home Office, British Crime Survey. Available from:
9 [https://www.gov.uk/government/policies/making-sure-government-policies-and-programmes-
10 benefit-rural-businesses-and-communities/activity](https://www.gov.uk/government/policies/making-sure-government-policies-and-programmes-
10 benefit-rural-businesses-and-communities/activity). Accessed July 25 2013.

11 Department of Health (2011a). Start Active, Stay Active: A report on physical activity from
12 the four home countries' Chief Medical Officers. Available from: [http://www.dh.gov.uk/
13 prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_128210.pdf](http://www.dh.gov.uk/
13 prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_128210.pdf). Accessed January
14 20 2013.

15 Department of Health (2011b). Health Survey for England. Available from:
16 [http://webarchive.nationalarchives.gov.uk/20120503130153/http://www.dh.gov.uk/en/Publicationsa
17 ndstatistics/PublishedSurvey/HealthSurveyForEngland/index.htm](http://webarchive.nationalarchives.gov.uk/20120503130153/http://www.dh.gov.uk/en/Publicationsa
17 ndstatistics/PublishedSurvey/HealthSurveyForEngland/index.htm). Accessed November 20 2012.

18 Department for Transport (2013). Transport connectivity and accessibility of key services
19 statistics. Available from: [https://www.gov.uk/government/collections/transport-connectivity-and-
20 accessibility-of-key-services-statistics](https://www.gov.uk/government/collections/transport-connectivity-and-
20 accessibility-of-key-services-statistics). Accessed December 4 2012.

21 Dogra, S. (2011). Better self-perceived health is associated with lower odds of physical
22 inactivity in older adults with chronic disease. *Journal of Aging and Physical Activity*, 19, 322-335.

23 Federal, Provincial and Territorial Ministers Responsible for Seniors [FPTMRS] (2009). Age
24 friendly rural and remote communities guide. Available from: [http://www.phac-aspc.gc.ca/seniors-
25 aines/pubs/age_friendly_rural/pdf/AFRRC_en.pdf](http://www.phac-aspc.gc.ca/seniors-
25 aines/pubs/age_friendly_rural/pdf/AFRRC_en.pdf). Accessed June 5 2014.

1 Fox, K.R., Stathi, A. & McKenna, J. (2007). Physical activity and mental well-being in older
2 people participating in the Better Ageing Project. *European Journal of Applied Physiology*, 100,
3 591-602. doi: 10.1007/s00421-007-0392-0.

4 Fox, K.R., Hillsdon, M., Sharp, D., Cooper, A.R., Coulson, J.C., Davis, M. et al. (2011).
5 Neighbourhood deprivation and physical activity in UK older adults. *Health & Place*, 17, 633-640.
6 doi: 10.1016/j.healthplace.2011.01.002.

7 Gardner, P.J. (2011). Natural neighborhood networks - Important social networks in the lives
8 of older adults aging in place. *Journal of Aging Studies*, 25, 263-271. doi:
9 10.1016/j.jaging.2011.03.007.

10 Giles-Corti, B., Timperio, A., Bull, F. & Pikora, T. (2005). Understanding physical activity
11 environmental correlates: Increased specificity for ecological models. *Exercise and Sport Sciences*
12 *Reviews*, 33(4), 175-181. doi: 10.1080/00330120802577640.

13 Grundy, E. & Read, S. (2012). Social contacts and receipt of help among older people in
14 England: are there benefits of having more children? *Journals of Gerontology Series B:*
15 *Psychological Sciences and Social Sciences*, 67(6), 742-754, doi:10.1093/geronb/gbs082.

16 Holloway, I. & Biley, F.C. (2011). Being a qualitative researcher. *Qualitative Health*
17 *Research*, 21(7), 968-975. doi: 10.1177/1049732310395607.

18 Holt-Lunstad, J, Smith, T.B. & Layton, J.B. (2010). Social relationships and mortality risk: A
19 meta-analytic review. *PLoS Med*, 7(7). doi:10.1371/ journal.pmed.1000316.

20 Hsieh, H.F. & Shannon, S.E. (2005). Three approaches to qualitative content analysis.
21 *Qualitative Health Research*, 15(9), 1277-1288. doi: 10.1177/1049732305276687.

22 Jacobs, J.M., Cohen, A., Hammerman-Rozenberg, R., Azoulay, D., Maaravi, Y. & Stessman,
23 J. (2008). Going outdoors daily predicts long-term functional and health benefits among ambulatory
24 older people. *Journal of Aging and Health*, 20(3), 259-272. doi: 10.1177/0898264308315427.

25 Manthorpe, J., Iliffe, S., Clough, R., Cornes, M., Bright, L. & Moriarty, J. (2008). Elderly

1 people's perspectives on health and well-being in rural communities in England: findings from the
2 evaluation of the National Service Framework for Older People. *Health and Social Care in the*
3 *Community*, 16(5), 460-468. doi: 10.1111/j.1365-2524.2007.00755.x.

4 Martin, S.L., Kirkner, G.J., Mayo, K., Matthews, C.E., Durstine, J.L. & Hebert, J.R. (2005).
5 Urban, rural, and regional variations in physical activity. *Journal of Rural Health*, 21(3), 239-244.

6 Mathews, A.E., Laditka, S.B., Laditka, J.N., Wilcox, S., Corwin, S.J., Liu, R., et al. (2010).
7 Older adults' perceived physical activity enablers and barriers: A multicultural perspective. *Journal*
8 *of Aging and Physical Activity*, 18, 119-140.

9 McGannon, K.R., Busanich, R., Witcher, C.S.G. & Schinke, R.J. (2013). A social ecological
10 exploration of physical activity influences among rural men and women across life stages.
11 *Qualitative Research in Sport, Exercise and Health*, doi: 10.1080/2159676X.2013.819374.

12 Morrow-Howell, N. (2010). Volunteering in later life: research frontiers. *Journal of*
13 *Gerontology: Social Sciences*, 65B(4), 461-469. doi: 10.1093/geronb/gbq024.

14 Morse, J.M., Barrett, M., Mayan, M., Olson, K. & Spiers, J. (2002). Verification strategies
15 for establishing reliability and validity in qualitative research. *International Journal of Qualitative*
16 *Methods*, 1(2), 13-22.

17 ONS (2004). A Review of urban and rural area definitions: project report. Available from:
18 <http://www.statistics.gov.uk>. Accessed October 29 2011.

19 Penrod, J., Preston, D.B., Cain, R.E. & Starks, M.T. (2003). A discussion of chain referral as
20 a method of sampling hard-to-reach populations. *Journal of Transcultural Nursing*, 14(2), 100-107.
21 doi: 10.1177/1043659602250614.

22 Perry, C.K., Rosenfeld, A.G. & Kendall, J. (2008). Rural women walking for health.
23 *Western Journal of Nursing Research*, 30(3), 295-316. doi: 10.1177/0193945907303036.

24 Plouffe, L. & Alezandre, K. (2010). Towards global age-friendly cities: determining urban
25 features that promote active aging. *Journal of Urban Health: Bulletin of the New York Academy of*

1 *Medicine*, 87(5), 733-739. doi: 10.1007/s11524-010-9466-0.

2 Rind, E. & Jones, A.P. (2011). The geography of recreational physical activity in England.

3 *Health & Place*, 17, 157-165. doi: 10.1016/j.healthplace.2010.09.009.

4 Shergold, I., Parkhurst, G. & Musselwhite, C. (2012). Rural car dependence: an emerging

5 barrier to community activity for older people. *Transportation Planning and Technology*, 35(1), 69-

6 85. doi: 10.1080/03081060.2012.635417.

7 Shores, K.A., West, S.T., Theriault, D.S. & Davison, E.A. (2009). Extra-individual correlates

8 of physical activity attainment in rural older adults. *The Journal of Rural Health*, 25(2), 211-218.

9 Sallis, J.F., Cervero, R.B., Ascher, W., Karla, H.A., Kraft, M.K. & Kerr, J. (2006). An

10 ecological approach to creating active living communities. *Annual Reviews of Public Health*, 27,

11 297-322. doi: 10.1146/annurev.publhealth.27.021405.102100.

12 Scherder, E., Scherder, R., Verburgh, L., Königs, M., Blom, M., Kramer, A. F. et al. (2013).

13 Executive functions of sedentary elderly may benefit from walking: A systematic review and meta-

14 analysis. *The American Journal of Geriatric Psychiatry*, doi: 10.1016/j.jagp.2012.12.026.

15 Simmonds, B., Fox, K., Davis, M., Ku, P.W., Gray, S., Hillsdon, M., et al. (2014).

16 Objectively assessed physical activity and subsequent health service use of UK adults aged 70 and

17 over: A four to five year follow up study. *PloS one*, 9(5), e97676.

18 doi:10.1371/journal.pone.0097676.

19 Stathi, A., Fox, K.R., Withall, J., Bentley, G. & Thompson, J.L. (2014). Promoting physical

20 activity in older adults: A guide for local decision makers. Bath: University of Bath. Available from:

21 [http://ageactionalliance.org/wordpress/wp-content/uploads/2014/03/AVONet-report-2014-](http://ageactionalliance.org/wordpress/wp-content/uploads/2014/03/AVONet-report-2014-March.pdf)

22 [March.pdf](http://ageactionalliance.org/wordpress/wp-content/uploads/2014/03/AVONet-report-2014-March.pdf). Accessed March 1 2014.

23 Stathi, A., Gilbert, H., Fox, K., Coulson, J., Davis, M. & Thompson, J.L. (2012).

24 Determinants of neighborhood activity of adults age 70 and over: a mixed-methods study. *Journal*

25 *of Aging and Physical Activity*, 20, 148-170.

1 Thompson, J.L., Bentley, G., Davis, M., Coulson, J., Stathi, A. & Fox, K.R. (2011). Food
2 shopping habits, physical activity and health-related indicators among adults aged ≥ 70 years.
3 *Public Health Nutrition*, 14, 1640-1649.

4 Utz, R.L., Swenson, K.L., Caserta, M., Lund, D. & DeVries, B. (2014). Feeling lonely
5 versus being alone: loneliness and social support among recently bereaved persons. *Journals of*
6 *Gerontology, Series B: Psychological Sciences and Social Sciences*, 69(1), 85–94.
7 doi:10.1093/geronb/gbt075.

8 Van Cauwenberg, J., De Bourdeaudhuij, I., De Meester, F., Van Dyck, D., Salmon, J.,
9 Clarys, P. et al. (2011). Relationship between the physical environment and physical activity in
10 older adults: A systematic review. *Health & Place*, 17, 458-469. doi:
11 10.1016/j.healthplace.2010.11.010.

12 Watt, R.G., Heilmann, A., Sabbah, W., Newton, T., Chandola, T., Aida, J. et al. (2014).
13 Social relationships and health related behaviors among older US adults. *BMC Public Health*,
14 14(533). Available from: <http://www.biomedcentral.com/1471-2458/14/533>.

15 Wenger, G.C. & Burholt, V. (2001). Differences over time in older people's relationships
16 with children, grandchildren, nieces and nephews in rural North Wales. *Ageing and Society*, 21(5),
17 567-590. doi: 10.1017/S0144686X01008406.

18 Widener, M.J., Metcalf, S.S., Northridge, M.E., Chakraborty, B., Marshall, S.M. et al.
19 (2012). Exploring the role of peer density in the self-reported oral health outcomes of older adults:
20 A kernel density based approach. *Health & Place*, 18, 782-788. doi:
21 10.1016/j.healthplace.2012.04.004.

22 Wilcox, R.A., Castro, C., King, A.C., Housemann, R. & Brownson, R.C. (2000).
23 Determinants of leisure time physical activity in rural compared with urban older and ethnically
24 diverse women in the United States. *Journal of Epidemiology and Community Health*, 54(9), 667-
25 672.