1. Title: Which interventions maintain and/or increase physical activity in older people?

2. Version/date: Final version 24-4-2015

3. Project team

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4. Steering group

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5. Background

Transition points, such as retirement, represent critical public health opportunities for delivery of targeted interventions to maximise health and wellbeing, and reduce inequalities in older populations. Changing patterns of work, the abolition of the compulsory retirement age, and increases in part-time employment blur the boundaries between working life and retirement. Socioeconomic status may moderate the impact of retirement on physical activity levels (with only higher social class associated with increases in physical activity at retirement) [1,2]. Thus there is the potential for appropriately targeted interventions to encourage physical activity, and to ensure that inequalities in health and wellbeing are not widened as a result of behaviour change at retirement. Increasing inequalities in income and wealth at retirement reflect income inequalities during employment and inequalities in access to occupational pension benefits. It is important to ensure inequalities in health and wellbeing are not exacerbated by the different consequences that may result from redundancy or retirement. This is particularly true for where retirement is a positive choice (for those with more resources and/or better health) compared to an enforced and negative change in employment and financial status (for those with fewer resources and/or poorer health).

In 2001 the National Service Framework for Older People (2001) [1] stated that a large proportion of people aged over 50 are sedentary (take less than half an hour of moderate intensity physical activity a week), and few take levels of activity recommended for improving health (30 minutes of moderate physical activity at least five times a week, e.g. brisk walking, household chores, or social activities like dancing). Little has changed in the past decade [3].

Physical activity has a wide range of health benefits and the potential to reduce the risk of cardiovascular disease, diabetes, some cancers, disability, and falls [4-8] and improve overall quality of life in older people [9,10]; so the generally low levels of such activity are in this population are a concern [11,12]. The transition to retirement represents an significant opportunity to encourage people to become more active as it can represent a major life change which will potentially be associated with disruption of an individual's daily routines and self-perception, allowing individuals to make changes that are much more difficult to sustain when their circumstances or environment remain the same. However with some groups, interventions are often required to create the opportunities and motivation to do so.

Recent systematic reviews of evidence from observational studies suggest that, without intervention, physical activity levels after retirement tend to increase in older people from higher socioeconomic groups, but decrease in those in lower socioeconomic groups [2,13]. Therefore, the point of retirement appears to present a risk for widening health inequalities across different socioeconomic classes. Particular barriers among those from low

socioeconomic backgrounds include a lack of time due to increased family responsibilities and attaching low personal value to recreational physical activity [2].

The number of people aged 65 and over is projected to rise by nearly 50% (48.7%) in the next 20 years to over 16 million worldwide [14]. It is therefore increasingly important to maintain a healthy older population with individuals who are able to contribute successfully to society (e.g. as volunteers). Thus there is a need to examine interventions aimed at increasing or maintaining physical activity in older people during and shortly after the transition to retirement to identify how positive changes in activity levels at this key transition point can be effectively (and cost-effectively) encouraged without exacerbating health inequalities in later life.

6. Objectives and research questions

We propose to conduct systematic reviews and a meta-synthesis of UK and international evidence (quantitative and qualitative) to inform the development and delivery of interventions to promote physical activity in the transition from paid work to retirement. We will legitimise our findings and ensure they can be translated into relevant guidance through scoping and validation workshops with key stakeholders, which will also assist in developing searches and identification of literature sources. The overall aims will be met through the following specific research objectives:

(1) To systematically identify, appraise and synthesise UK and international evidence concerned with interventions to maintain or increase physical activity in older people during and immediately after the transition to retirement.

(2) To determine how applicable this evidence might be to the UK context including identifying how the perceptions of both older people and service deliverers may act as facilitators or obstacles to successful outcomes following intervention.

(3) To understand how physical activity after retirement might contribute to reducing health inequalities.

(4) To generate a critical meta-synthesis of the evidence suitable to inform policy decisions and disseminate to relevant audiences.

We intend to meet our research objectives as follows:

(1) identify the most effective interventions to maintain and/or increase physical activity in older people during and shortly after the transition to retirement by conducting thorough searches for published and unpublished effectiveness evidence (including grey literature);

(2) determine the best practice principles for effective physical activity interventions in this population by considering the qualitative evidence to provide context and allow us to examine the social and cultural issues surrounding intervention effectiveness and acceptability. We will search specifically for qualitative papers but also consider qualitative discussions presented in effectiveness papers;

(3) understand the potential for retirement to increase health inequalities and how physical activity interventions can contribute to reducing these by considering the potential impact of interventions in different populations and settings. Where the evidence allows we will consider the impact of behaviour change mechanisms here;

(4) generate a critical meta-synthesis of the evidence to inform policy decisions and disseminate to relevant audiences through a comprehensive and considered dissemination strategy which may include national and international conferences, and seminar series within the university, and within local and national physical activity and/or older people's networks. We will submit the work as at least one peer reviewed journal article. We will also produce a video/audio abstract for each publication arising in order to reach less academic audiences, and publicise this and related publications through social networks such as Twitter, which would allow for wide dissemination.

7. Methods

7.1. Inclusion/exclusion criteria

We will include studies that have involved people during and shortly after the transition to retirement. However, we will also consider studies of other populations for which we may be able to make an association with the recently retired population. For example, these may include people who have been made redundant or have given up work to become a carer. We will include studies from developed countries published in English and will also consider translation of pertinent papers written in other languages (where abstracts are available in English).

We will not limit the setting in which interventions are conducted. We will examine physical activity interventions delivered in any setting that are targeted at, or have the potential to affect older people in the transition to retirement. These may include for example, health settings, community settings and residential/supported care settings and community/ voluntary sector groups. We will not pose any limitations on the cultural setting of research we consider.

Inclusion criteria will be as follows:

Interventions: We will include studies of any intervention aiming to increase and/or maintain levels of physical activity in older people, which could be applied to those in the transition to retirement. We will also include interventions conducted in similar populations that have the potential to be effective in this population. For example, physical activity interventions conducted with older people who have been made redundant would be eligible for inclusion, but may be analysed separately.

Where systematic reviews of relevant interventions have been conducted we will examine the included primary studies for relevance. The interventions will include those that measure physical activity directly using a validated scale and also those which report indirect measures related to physical activity such as hours of gardening or participating in walking groups. Where other relevant outcomes related to health and/or wellbeing (for example) are reported in the absence of a physical activity measure, we will consider the study for inclusion where the intervention is directly relevant to increasing physical activity. Again these may be reported separately as a subgroup if considered appropriate.

We will include interventions that consider social, psychological, behavioural and environmental factors in increasing and/or maintaining physical activity in older people. We will not place any limitations on who delivers the intervention in the studies we include in our synthesis.

Population: older people, not in paid employment (part or full time), and those about to leave paid employment. We will be flexible in our definition of “older people” as there is no clear and universally accepted definition. However, as a preliminary approach, we will use an inclusive definition of “older” as 50 years and over (thus ensuring that retirement in different professionals (e.g. the police force) are included); and give consideration to how appropriate that definition is as the study progresses. We will then use the primary data identified through preliminary searching to determine whether to impose more specific age restrictions on included study populations i.e. by considering the variability of age ranges considered by the studies identified.

Comparators: all comparator conditions will be considered as well as interventions with no concurrent comparator. We will not place any limitations on comparator conditions in the studies we include in our synthesis. It is likely that most studies using a control group will compare with no intervention or “usual care” but no restrictions will be imposed. In order to evaluate the broadest range of literature and to fully answer the two main research questions, we will also include studies with no concurrent comparator (e.g. non-controlled before and after studies), which are both qualitative and quantitative in design. We will thoroughly consider the potential biases in each study including the risks from not including a control group.

Outcomes: Primary: physical activity (directly measured using validated scales and also indirect measures such as hours of gardening or participating in walking groups), wellbeing, measures of physical health. Secondary: all reported outcomes related to physical health, social, psychological, behavioural and environmental factors.

Definitions of health and wellbeing are many and varied. For the scope of this work we intend to be entirely inclusive of our inclusion of papers pertaining to measure wellbeing and will not exclude any paper which states that its aim is to measure wellbeing, irrespective of the definition an author has used (or where a definition is absent). We will however ensure that we are specific about where definitions differ and where there are individual or groups of studies which stand out from the majority in how their authors define wellbeing, in order to understand whether they are measuring something very different to the majority, and whether this has implications for our evidence synthesis. For the purpose of providing a definition to give a general scope to this work, we would most readily support the definition by Marks et al., 2005 [33], which gives a broad and inclusive definition of wellbeing within a context of overall health (and updates the previous WHO definition, taking account of criticism): “Health is a state of well-being with physical, cultural, psychosocial, economic and spiritual attributes, not simply the absence of illness.”

Study design: With the increasing recognition in the literature that a broad range of evidence is needed to inform the depth and applicability of review findings, both experimental and observational studies will be included in the review. It is envisaged that much of the effectiveness literature may report studies with no concurrent comparator (e.g. non-controlled before and after studies). Therefore in order to achieve a comprehensive examination of the literature both experimental and observational designs will be considered. The review will include designs which may be termed randomised controlled trials, randomised cross-over trials, cluster randomised trials, quasi experimental studies, non-randomised trials, cohort studies, before and after/longitudinal studies, and case control

studies. In addition to these, the review questions concerning the perceptions of both older people and service deliverers and how physical activity after retirement might contribute to reducing health inequalities will be addressed by also examining qualitative studies reporting patient or provider views and perceptions, survey data and evaluation reports.

Other inclusion/exclusion criteria: We will include studies from any OECD country that are published in English. In addition we will also consider translation of pertinent papers written in other languages (where title and/or abstracts are available in English). In order to maximise relevance we will include grey literature from the United Kingdom. The review will include work published since 1900.

7.2. Search strategy (incl. Grey literature)

Public health questions are typically broad and the literature is often dispersed across many disciplines and different data sources. There is no single public health database and language use can be difficult in the identification of public health evidence as terms are not always used consistently. As free terms are context specific it can be particularly challenging to retrieve relevant papers. Also there are fewer medical subject headings and CINAHL headings which fully encapsulate concepts like lifestyle changes as they are complex concepts unlike, for example, a surgical or drug intervention when it is easier to identify papers due to their being specific headings (for example "Diazepam" or "Bariatric Surgery"). These types of challenges can be ameliorated by the use of adjacency and not operators [21] and by lateral thinking to tackle each challenge as it arises. Therefore, due to the broad nature of public health review questions, a single, overarching search approach is often not appropriate.

An emergent and iterative approach [22, 23] to identifying evidence to address public health review questions has been the most consistently effective approach employed by ScHARR teams for public health evidence reviews. This starts with an initial capture of evidence and, following the examination of the retrieved evidence, a new search is created (and so on) in order to fully explore the topic. The searches continue as the project develops with the evidence informing further searches both in terms of areas to explore and specific search terms to employ.

A search protocol will be developed detailing the overall search approach, data sources to be searched, initial search strategy and potential supplementary techniques that can be used to search for specific types of evidence, or where critical evidence gaps remain after

initial searches are completed. Following the iterative approach, an initial search strategy of keywords and subject headings will be developed by the information specialist working closely with the rest of the multidisciplinary team. The search strategy will be informed by the scoping search and will incorporate suggestions for terms and concepts from the project team and through consultation in stakeholder workshops. Due to the dispersed nature of public health evidence a variety of electronic databases will be searched to cover medicine and health e.g. MEDLINE and CINAHL, social science e.g. ASSIA and Social Policy and Practice (which also indexes a lot of Grey literature), and specialist sources such as SPORTDiscus.

“Supplementary” searching techniques such as citation searching, hand searching specific journals and reference tracking are extremely important in reviews of this nature [24, 25]. It is intended to undertake these techniques as necessary beginning with citation and reference searches, but exact use of these techniques cannot be predicted at the outset of the project. Where sources allow, searches will be limited to English language (title and/or abstract) and from 1990 to current. Key papers where title, or title and abstract only are available in English will be considered for translation.

7.3. Study selection

Citations will be uploaded to Reference Manager and title and abstracts (where available) of papers will be independently screened by two reviewers and disputes resolved by consulting other team members. Full paper copies of potentially relevant articles will be retrieved for systematic screening. The screening process will identify papers which are of relevance to each of the three initial review questions. During the screening process papers meeting the inclusion criteria will be allocated to each review question according to their content. We will use PRISMA guidelines [28] to produce a flow diagram illustrating the paper selection process.

A data extraction form will be developed using the previous expertise of the review team, and will be trialled using a small number of papers, and refined as necessary. To ensure quality assurance for the extraction process, each extraction will be checked for accuracy and omission by a second reviewer to ensure consistency in our extracted data. Any inconsistencies will be discussed with the team and resolved by consensus. Where these inconsistencies arise due to inaccuracies in the published articles this will be noted.

Extracted data will include (where relevant to the study design): study quality, study population, comparator, baseline characteristics of the population and service provision, details of the intervention, outcome measures, findings, and study strengths/limitations. Title and abstracts of papers will be independently screened by two reviewers and disputes resolved by a third. Full paper copies of potentially relevant articles will be retrieved for systematic screening. Data will be synthesised initially by sub-question (using narrative synthesis, thematic analysis, and meta-analysis of quantitative data as appropriate).

Subsequently a meta-synthesis will be generated by combining the analysis of effectiveness data with an analysis of the barriers and facilitators reported by older people and service providers, and consider the effect of this combined data on health inequalities. The meta-synthesis will aim to shed light on positive or negative results, consider issues of implementation and assist in the interpretation of significance and applicability for practitioners and service planners [29]. All aspects of our meta-synthesis method will be discussed as a team as the synthesis progresses.

7.4. Quality assessment

Quality assessment is a key aspect of systematic reviews to ensure that poorly designed studies are not given too much weight so as to not bias the conclusions of a review. As the work will be including a wide range of study designs an appropriate screening form for each study design will be used to critically appraise studies. The screening form used for the qualitative elements will be taken from the Critical Assessment Skills Programme [30]. Studies of other designs will be assessed using the Cochrane Criteria for judging risk of bias [31]. While the review will include a broad range of studies, the hierarchy of evidence and likelihood of bias within studies will be fully outlined in reporting of the study findings and conclusions.

7.5. Synthesis

Data will be synthesised in a form appropriate to the data type and relationships between studies and outcomes will be scrutinised. Where possible and appropriate, the findings from the intervention studies will be combined in a meta-analysis calculating summary statistics if heterogeneity permits, with use of graphs, frequency distributions and forest plots. Sub-groups including, for example, age of participants, intervention content, and delivery agent will be examined if numbers permit. Where meta-analysis is not possible review findings will

be reported using narrative synthesis methods including a report of characteristics of the included studies, and the examination of outcomes by typologies such as intervention method, agency delivering the intervention, target population, or outcomes measured. We will tabulate characteristics of studies and outcomes and provide a descriptive summary by characteristics such as type of intervention, target population, or context. Qualitative data will be synthesised using thematic synthesis methods [32] to develop an overview of recurring perceptions of potential obstacles to successfully increasing physical activity within the data.

Subsequently, we will conduct a meta-synthesis combining our quantitative intervention effectiveness data with the qualitative findings to generate key messages. The meta-synthesis will aim to shed light on positive or negative results, consider issues of implementation and assist in the interpretation of significance and applicability for practitioners and service planners. Combining the analysis of effectiveness data with an analysis of the barriers and facilitators reported by older people and service providers will also allow us to further consider the effect of this combined data on health inequalities.

We will validate the finding of our meta-synthesis by consulting with our steering group and by holding additional validation workshops with older people (including the recently retired), service providers and funders, and experts in the field.

7.6. Research outputs

The first output with be a data synthesised in a form appropriate to the data type and relationships between studies and outcomes will be scrutinised. Where possible and appropriate, the findings from the intervention studies will then be combined in a meta-analysis calculating summary statistics if heterogeneity permits, with use of graphs, frequency distributions and forest plots. Sub-groups including, for example, age of participants, intervention content, and delivery agent will be examined if numbers permit.

Where meta-analysis is not possible review findings will be reported using narrative synthesis methods including a report of characteristics of the included studies, and the examination of outcomes by typologies such as intervention method, agency delivering the intervention, target population, or outcomes measured.

Subsequently, we will conduct a meta-synthesis combining our quantitative intervention effectiveness data with the qualitative findings to generate key messages. The meta-synthesis will aim to shed light on positive or negative results, consider issues of implementation and assist in the interpretation of significance and applicability for

practitioners and service planners. Combining the analysis of effectiveness data with an analysis of the barriers and facilitators reported by older people and service providers will also allow us to further consider the effect of this combined data on health inequalities.

8. Service users/public involvement

We will use the principles for funding patient and public involvement (PPI) in research developed for the NHS by INVOLVE (www.invo.org.uk) [34]. PPI representatives will have the opportunity to contribute to the research from an early stage and costs have been allocated for this purpose. This involvement may include: review of proposed PPI plans to mutually agree involvement; developing the scope and protocol for the study; influencing search strategies and suggesting literature sources; interpreting review findings; contributing to validation workshops; advising how to disseminate to reach appropriate lay people and organisations; and advising on/writing lay summaries of key findings.

Following the PPI guidance set out by Boote et al. (2011) [35], who suggest that the first contribution the public can make to the systematic review process is in refining the scope of the review, we have already informally consulted with a number of recently retired individuals (primarily through the University Retired Staff Association). As a result of this informal consultation we have received comments and suggestions about this proposal. These include how lay members might assist in defining the scope of the review and also helping to scrutinise the potential for inclusion of interventions originally designed for other populations. A number of the individuals consulted to date have expressed interest in further supporting the work (if successful) through becoming steering group members.

We will validate our findings by consulting with our steering group and by holding additional workshops with older people (including the recently retired), service providers and funders, and experts in the field. We have established research links with patient representative and advocate groups, which have been used to recruit suitable patient representatives for previous and ongoing work. We will seek to recruit public representatives who have experience relevant to this research (e.g. those from older age groups and those recently retired) and have already secured PPI interest, and comments on this proposal from members of the University Retired Staff Association.

9. Dissemination

The work will be disseminated through submitting abstracts for presentation (oral and/or poster) at national and international conferences. We will also submit the work as at least one peer reviewed journal article. Additional opportunities to present the work will also be sought including seminar series within the university, and within local and national physical activity and/or older people's networks. In addition we have ongoing relationships with a number of relevant charity and not for profit organisations including Age UK, who have provided volunteers for the "Putting Life in Years" (PLINY) trial in ScHARR(funded by the PHR Board), and the KT-EQUAL Consortium (www.equal.ac.uk) which is engaged in transfer of knowledge out of research to benefit older and disabled people. Opportunities to disseminate our findings through these organisations will be sought as well as advice on dissemination opportunities. We will also produce a video/audio abstract for each publication arising in order to reach less academic audiences, and publicise this and related publications through social networks such as Twitter, allowing for wide dissemination to practitioners, policy makers, local/national government, older people's organisations.

Our validation workshops with key stakeholders will also provide an opportunity to disseminate our findings to older people, service providers, policy developers and experts in the field. Key findings and insights from the workshops will be published.

Appendix 1: Timetable

We propose the following milestones for the project as highlighted in the timeline below:

1. Undertake scoping workshops @ month 2.
2. Interim report to funders @ month 7
3. Complete meta-synthesis @ month 12
4. Complete validation workshops @ month 14
5. Final report to funders @ month 15

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Establish steering group															
Steering group meetings															
Scoping workshops															
Ethics application (chairs approval for workshops)															
Protocol development															
Searching (iterative process)															
Data extraction															
First stage data synthesis and quality appraisal															
Interim report to funders															
Meta-synthesis															
Validation workshops and synthesis															
Final report to funders															
Dissemination															

Appendix 2: draft search strategy

This search strategy will form the basis of the preliminary search to be undertaken and was modelled in the Medline database. The search process will be iterative throughout the project. This search is not designed to be the only attempt to identify evidence for this project, but to provide an initial capture of evidence to address the research questions; therefore it does not contain an exhaustive list of terms.

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1 (retirement or retired or redundant).ti. (5571)

2 *Retirement/ (4416)

3 *Professional Role/px [Psychology] (144)

4 *Unemployment/px [Psychology] (390)

5 empty nest$.mp. (80)

6 post-parental.mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (6)

7 (role adj5 loss).mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (2445)

8 ((mature or older or non-traditional) adj5 (learner$ or student$)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (1028)

9 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 (11510)

10 (physical$ activ$ or exercise or walking or swimming).ti. (97655)

11 *Exercise/ (40786)

12 10 or 11 (108537)

13 9 and 12 (111)

Appendix 3: draft extraction form

RM number	Study details	Population and setting	Methods	Findings	Notes
	First Author (year): **Setting**: **Study design:** **Length of follow up:** **Aim**: **Recruitment:** **Funding**: **Quality**:	**Number of participants:** **Age**: **Gender:** **Education**: **Ethnicity**: **Other inclusion/exclusion criteria:** **Service setting:**	**Intervention aims and content if applicable**: **Control condition if applicable:** **Data collection methods**: **Outcome measures:** **Response and/or attrition rate:** **Data Analysis**:	**Main results relevant to research question (author analysis)**:	**Strengths/limitations identified by author**: **Strengths/limitations identified by the reviewer:** **Evidence gaps/ recommendations for future research**: **UK applicability:**

Appendix 4: Management strategy

Day to day management of the project will be undertaken by the PI (Lindsay Blank) which will be overseen by the senior management team (Liddy Goyder and Nick Payne). Co-ordination and booking of meetings will be undertaken by the administrator (Viv Walker).

The ScHARR team will formally meet once a fortnight throughout the duration of the project, but also with much greater frequency on an informal basis as and when needed.

The project steering group will meet formally four times throughout the project as set out in the project timeline. Each steering group member will be invited to attend the meetings in person or by telephone/video conference where this is not possible.