# Perspectives in Public Health

RSPH

# Editorial

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Welcome to the March edition of *Perspectives in Public Health*.

In my new position as deputy editor, I am fortunate to review a fascinating and diverse assortment of peer-reviewed and front matter materials. This unthemed issue certainly meets expectations, and I hope you enjoy reading the assorted mix of topics, ranging from climate change, sexual and reproductive health, and data governance to men's transition to fatherhood and investigation of bedbug infestations.

Climate change poses a major threat to public health in several ways, some of which may not be immediately apparent to everyone. Legatt et al. draw our attention to the significant risk of heat-related illness during heatwaves for people experiencing rough sleeping, worryingly noting that 'it is not clear what interventions work to protect their health during extreme heat'. Bhatta et al. also highlight heat-related morbidity and mortality among the numerous direct or indirect consequences of climate change on health in Nepal. Notwithstanding existing policies, the authors outline five key gaps and ways forward for climate health actions.

In this issue's third current topics and opinions piece, Powell and a group of sociologists, who have collaborated closely with public health practitioners, raise two thought-provoking questions. First, why is it that sociology and public health do not collaborate more? Second, what might sociologists do to enhance their contributions to public health? Drawing from insights gained during a 2022 workshop, the authors outline the contributions of sociologists to public health knowledge and propose four strategies to advance this collaboration.

This issue's peer-reviewed material includes two reviews: Soloman et al. examine the methods and definitions that have been used to measure unmet need within sexual and reproductive health, while Bert et al. examine the evidence and data concerning COVID-19 spread and transmission within the high-risk indoor setting of places of worship. Baldwin et al. emphasise the significant role fathers play in the childbearing process. However, they note that perinatal health services often prioritise the needs of the mother and child, with little enquiry about fathers' mental health needs during routine perinatal assessments. Consequently, they conducted a process evaluation to investigate health visitors' perspectives on using Promotional Guides with fathers, including the level of engagement with and acceptability of the intervention, fidelity of delivery, and reported impact on first-time fathers' mental health and wellbeing.

Sheppard et al. explore the lived experience of coping with and managing bedbug infestations, examining the perspectives of low-income older adults residing in social housing in Toronto, Canada. They shed light on the challenges faced by elderly tenants in preparing their units and receiving treatment, as well as how bedbug infestations impact their access to in-home health and social services.

Also featured is an in-practice piece by Mwanga et al., which outlines how Africa's rapidly evolving digital landscape presents numerous challenges in managing, storing, and ethically sharing data while safeguarding individual human rights concerning data privacy. Following this, the authors provide insights and recommendations derived from a two-day workshop.

Finally, Solera-Sanchez et al. remind us of the crucial role of physical activity in children's wellbeing. Their research demonstrating both the cross-sectional and longitudinal associations between children's cardiorespiratory fitness and their health-related quality of life, while also highlighting the importance of physical activity self-efficacy and enjoyment.

# Heatwaves and homelessness

*The article highlights the deficit of evidence to understand the impact on people sleeping rough during periods of high temperature, as well as the lack of research regarding the actions that should be taken to protect them and promote their health. This dearth of evidence will become more concerning as heatwaves become more severe and more frequent due to human-induced climate change.*

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Climate change is increasing the frequency, duration, and severity of extreme heatwaves across the globe.[1] In 2022, heatwave records were broken worldwide, and 2023 has been even hotter, making the last decade the hottest on record.[2] The impact of this on population health is clear: over 70,000 additional deaths occurred in Europe during the heatwaves of 2003,[3] and in 2022, there were 2985 heat-related deaths in England and Wales alone.[4] These deaths disproportionately occur in groups with pre-existing vulnerabilities,[5] yet for individuals sleeping rough – who count among the most vulnerable and marginalised in our societies – it is not clear what interventions work to protect their health during extreme heat.

**Over 70,000 additional deaths occurred in Europe during the heatwaves of 2003, and in 2022, there were 2985 heat-related deaths in England and Wales alone**

Rough sleeping or street homelessness is the act of sleeping outside or in places that are not designed for people to live in, most often due to lacking access to adequate shelter.[6] This lack of shelter increases the exposure of people experiencing rough sleeping to adverse weather, putting them at significant risk of heat-related illness during heatwaves. For example, people experiencing rough sleeping may sit or sleep in direct sunlight or on hot surfaces such as tarmac and have limited access to air-conditioned spaces. They also tend to be concentrated in urban settings and are therefore exposed to the urban heat island effect. There are also high rates of physical and mental health conditions in the rough sleeping population that increase their vulnerability to heat-related illness. For example, it is estimated that between a quarter and half of all people experiencing rough sleeping in London were affected by physical health conditions in 2022/2023 (*personal communication: R Young, 2023, unpublished data from 2022/23 CHAIN survey*), including a significant burden of respiratory conditions that may be exacerbated due to heat-induced increases in ground-level ozone and airborne organic small particulate matter.[7,8] Moreover, 50% of people experiencing rough sleeping have mental health needs that may be exacerbated by the heat[9] – with a particular increase in suicide risk noted during hot weather.[10] Many of the drugs prescribed to manage these conditions (antipsychotics, antidepressants, etc.) can also inhibit the sweating mechanism and reduce cognitive alertness, increasing the risk of heat-related illness.[11] Similarly, high rates of substance use in this population increase risk,[9] as recreational drugs can reduce one's ability to adapt behaviour in response to heat, and alter physiological response mechanisms.[5,11] People experiencing rough sleeping are also three times more likely to experience social isolation than the general population,[12] increasing vulnerability to heat-related illness not only because symptoms may be identified late, but also because this lack of social support may impair access to healthcare.[5]

**People experiencing rough sleeping are three times more likely to experience social isolation than the general population**

The above evidence demonstrates that people experiencing rough sleeping are at significantly higher risk of heat-related morbidity and mortality than the general population due to distinct patterns of heat exposure and pre-existing vulnerabilities. This contributes to the significantly elevated risk of hospitalisation associated with even moderately high temperatures in this




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population group relative to the general population.[13] This suggests that national heat-preparedness plans should provide specific guidance on how to protect the health and wellbeing of the rough sleeping community. In recognition of this, the United Kingdom Health Security Agency (UKHSA) recently released 'Supporting vulnerable people before and during hot weather' guidance,[14] that includes advice for those with responsibilities for the over 3000 people experiencing rough sleeping each night across England.[15] In the development of this guidance, however, a lack of relevant peer-reviewed evidence regarding both the impact of adverse hot weather on those experiencing homelessness and the optimal interventions to reduce risk was identified. For example, while the guidance draws on protocols implemented to protect the rough sleeping population in cities around the globe, the efficacy and effectiveness of such protocols has not been thoroughly evaluated to our knowledge. In addition, evidence from interventions to protect the general population was used pragmatically, but such interventions must be tailored to the particular context of street homelessness – ideally being co-developed with users – in order to be most effective for the rough sleeping population. Limited evaluations have highlighted some nuanced considerations, such as the importance of allowing people experiencing rough sleeping to safely store their belongings and bring their pets into respite spaces to facilitate their use of these interventions.[16] However, the range of factors required to ensure suitability of provision for people experiencing rough sleeping has not been established definitively, limiting the development of evidence-based guidance.

Accordingly, robust research is needed to establish: when to activate a response; how to reach and productively engage the rough sleeping population during adverse heat periods; how to identify and protect particularly vulnerable individuals; and what provisions (such as cooling centres, enhanced outreach, and overnight accommodation) are most effective for this population. We therefore urge the international research community to investigate the interplay between climate change impacts, vulnerability, and public health in this context as, without it, the health and wellbeing of those sleeping rough will be increasingly adversely impacted by heatwaves.

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# Sociologists in public health: marginal observers or mainstream collaborators?

*This article considers why sociology and public health do not collaborate more frequently and what sociologists might need to do to enhance their contributions to public health. It highlights a group of sociologists who have worked alongside public health practitioners that suggest ways to enhance sociology's accessibility and use within public health, deriving from a workshop conducted in 2022.*

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## INTRODUCTION

At first glance, sociology and public health should make for good partners. Both disciplines address the social, environmental, and community contexts of embodiment and well-being. Both are concerned with social inequality, social justice, and the politics of policy-making. Both are staffed by committed professionals who engage with the public, community leaders, and stakeholders to make a difference to people's lives.

However, the marginal influence of sociology within UK public health became apparent during the pandemic[1] in its role in UK Government scientific advisory groups. Sociological insights were missing, for instance, in responses to class, ethnic, and gender variations in infection and care-seeking.[2] The congruity of the disciplines has been recognised in recent UK public health guidance[3–5] which identifies a need to enhance public health's collaborative work with sociologists. So why is it that sociology and public health do not collaborate more? And what might sociologists do to enhance their contributions to public health? Here, a group of sociologists suggest some solutions, deriving from a workshop conducted in 2022.

## BARRIERS TO COLLABORATION BETWEEN PUBLIC HEALTH AND SOCIOLOGY

Much of the failure of sociology to contribute more substantively to public health policy and practice derives from disciplinary boundaries.[6,7] First, unlike psychologists and economists, 'sociologists' are predominantly employed within academic centres;

physically distant from public health practitioners, activists, and policy-makers; and driven (by university managerial metrics) to target outputs in often inaccessible academic journals. Second, the evidence-based model of healthcare replicated in public health[8] has devalued sociological knowledge often generated through qualitative methods and theoretical frameworks, prioritising instead meta-analysis of randomised controlled trials. A sociological perspective requires alternatives to established experimental methods for evaluating the impact of planned interventions in collective terms.

Finally, the disciplines can sometimes diverge in their worldviews, despite a focus on inequality. Public health models of social determinants of health[9,10] can reify 'the social' as *contextual* risk factors for individual health outcomes[11] overlooking diversities in what constitutes a 'healthy life' and the unequal distribution of power within societies. Social theories of power, however, are multiple and contested within the discipline[12] and can seem abstract and inaccessible to public health practitioners and policy-makers concerned with the immediate practical challenges of health and social inequalities.




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The move of public health into local government in the UK has opened more opportunities for collaboration, and from experience, we recognise that sociological concepts (such as 'intersectionality') and methods (such as focus groups) are frequently applied within public health without acknowledging their disciplinary origins. In the spirit of breaking down barriers, the rest of this commentary considers how sociologists have contributed to public health knowledge, before outlining four proposals to move this collaboration forward.

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## APPROACHES THAT CAN HARNESS SOCIOLOGY'S CONTRIBUTION TO POLICY AND PRACTICE

Sociologists need to interrogate their conventional model of research. As Karvonen et al.[13] suggest,

> *This requires new forms of data production and more intense interaction with end users and stakeholders . . . This means stepping out of the traditional superiority position . . . into a position that is accountable and dialogical with the 'publics', whether lay people or other professionals.*

Where sociologists have made a difference, often they have found ways to locate themselves physically or embed themselves and their research activities within practice communities. In the UK, the University of Huddersfield has seconded sociologists to work at Kirklees District Council to develop tools to assess health inequalities and re-purpose impact assessments to enhance practice.[14] Blake[15] describes how a research assistant was embedded within a community organisation in a former UK coal mining community, deploying social theory to explore opportunities to improve food security. Beyond the UK, sociologists have worked with public health professionals and communities on community development issues. A multidisciplinary team of US academics and students from Purdue University worked with citizen groups in Hartford, Indiana, to generate evidence of heavy metal pollution and subsequently engaged with environmental regulators and local government to address this.[16] Sociologists in Trondheim, Norway, established a sociology clinic in the shopping area of the city to offer sociological solutions to citizens' issues. This in turn led to projects working with urban planners, commercial endeavours, and community bodies and citizens.[17]

## FOUR PROPOSALS TO SUPPORT PUBLIC HEALTH/SOCIOLOGY COLLABORATIONS

We suggest four interventions as ways to enhance sociology's accessibility and use within public health.

It is essential to research the practical needs and priorities for people in both disciplines, and to document current examples of collaboration. The outreach projects described above pose major funding and human relations questions. An increasing emphasis on impact by research funders is influencing work in multidisciplinary teams that include a range of publics, but questions remain. What financial and governance models for embedding sociologists in non-academic settings might be developed? How are these sociologists to be mentored and supported if they are physically and culturally distanced from the scholarly community of sociologists? What is the career structure and what are the opportunities for advancement exist for sociologists working in non-academic settings or devoting their efforts to applied projects that may not generate scholarly outputs? In the US and some other nations, applied sociologists have been professionalised, with the development of graduate programmes and professional accreditation bodies such as the *Association for Applied and Clinical Sociology*. Evaluation of previous collaborations could reveal important enablers.

A second action is to explore in more detail how existing sociological concepts, tools, and methods are used in practice, and how these may be adapted or developed to meet the particular needs of public health. Co-development and piloting of toolkits could be facilitated by bodies such as the *Association of Directors of Public Health* and the British Sociological Association's *Applied Sociology Group*.

The third intervention looks at how to raise the profile of sociology within public health and build alliances. A more robust, visible, and accessible public engagement is necessary to show how sociological approaches influence diverse public health projects, both through traditional academic dissemination and 'public sociology' initiatives such as blogs and podcasts. This can be enabled by collaborations between our professions to collate evidence-based case studies, public engagement projects, and impact studies.

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Finally, work is needed to ensure that the next generations of both sociologists and public health professionals acknowledge the value of each other's perspectives through both formal

educational programmes and continuing professional development. This could include enhancing sociological input within public health degree courses; supporting undergraduate sociology curricula to include modules on applied research; using a range of public health case studies and creating placements in public health; and providing health practitioners with opportunities to co-work with sociologists during their training.

We offer this commentary as a first step and invite our public health and sociological colleagues to share our different competences, to improve the health of the public.

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# How do we measure unmet need within sexual and reproductive health? A systematic review

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## Keywords
sexual health; rep; health inequalities

## Abstract

**Background:** Addressing health inequality with sexual and reproductive health requires an understanding of unmet need within a range of populations. This review examined the methods and definitions that have been used to measure unmet need, and the populations most frequently assessed.

**Methods:** Five databases (PubMed, Web of Science, Scopus, The Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Health Management and Policy Database (HMIC)) were searched for studies that described quantitative measurement of unmet need within sexual and/or reproductive health between 2010 and 2021. A narrative synthesis was then undertaken to ascertain themes within the literature.

**Results:** The database search yielded 19,747 papers; 216 papers were included after screening. 190 studies assessed unmet reproductive health need, of which 137 were analyses of trends among people living in low/lower-middle income countries; 181 used cross-sectional data, with only nine analyses being longitudinal. Eighteen studies analysed unmet sexual health need, of which 12 focused on high and upper-middle income populations. 16 papers used cross-sectional analyses. The remaining 10 studies examined unmet need for a combination of sexual and reproductive health services, eight among populations from upper-middle or high income countries. All were cross-sectional analyses. 165 studies used the Demographic and Health Surveys (DHS) definition of unmet need; no other standardised definition was used among the remaining papers.

**Discussion:** There is a significant focus on unmet need for contraception among women in low income countries within the published literature, leaving considerable evidence gaps in relation to unmet need within sexual health generally and among men in particular, and unmet reproductive health need in high income settings. In addition, using an increased range of data collection methods, analyses and definitions of unmet need would enable better understanding of health inequality in this area.

## INTRODUCTION

There is a large burden of sexual and reproductive morbidity across the globe, a burden that disproportionately affects some of the world's most vulnerable groups.[1] This pattern of illness and inequality is likely to be attributable, at least in part, to a combination of unmet needs.[2] It is, however, difficult to define, characterise or measure unmet need within healthcare,[3] and there are currently very few systems in place that identify needs within sexual and reproductive health, and monitor whether those needs are being met.

Although unmet need for contraception has been measured repeatedly across a range of populations,[4] there is much less discourse within the published literature regarding unmet need within reproductive health more broadly, or unmet need within sexual health. In addition, there has been little analysis of the methods that are being used to identify unmet need, and whether these methods are appropriately identifying the needs of the populations most at risk.

This review is a systematic investigation of the trends within the published literature surrounding




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unmet need in sexual and reproductive health (SRH) over the past 11 years. In particular, this review will examine the methods that have been used to characterise and measure unmet need, the populations in which unmet need within reproductive and sexual health has been most frequently measured, and the definitions of unmet need that have been used within these analyses.

## METHODS

### Search strategy

This review was undertaken according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. To ensure a thorough review of the literature, a search of five databases was undertaken: PubMed, Web of Science, Scopus, The Cumulative Index to Nursing and Allied Health Literature (CINAHL) and the Health Management and Policy Database (HMIC). Studies that described a quantitative method to elucidate levels of unmet need within sexual and/or reproductive health in a specific population were included in the literature review. Exclusion criteria were studies that were not in English, systematic reviews and studies that used entirely qualitative methods (although mixed-methods studies were included). Maternity care was excluded from the definition of reproductive health for the purposes of this review. The search period was 2010 to 2021–in part for ease of analysis, due to the broad search strategy, and in part because methods described prior to 2010 were likely to be out of date, particularly if they had not been used again in subsequent, more recent, studies.

### Study selection

Three stages of study selection were used to identify papers for inclusion within this literature review. Two reviewers (DS and MC) used Covidence software to assign 20% of titles identified during the database search for inclusion or exclusion. Any discrepancies were discussed between reviewers until there was 100% concordance, and DS then assigned the remaining titles. This process was repeated for the abstracts of the papers that had been flagged for inclusion during the title round. Once all abstracts had been screened, DS screened the full text of the papers that had been flagged for inclusion, and selected the papers that would proceed to data extraction.

### Data extraction

A data extraction form was created in Microsoft Excel, and this was used to record relevant data from the remaining studies. The data extraction process captured whether the study concerned sexual or reproductive health, the sub-topic of interest, the country of data collection, the geographical level of analysis (multinational, national or regional), the income status of the setting (high, upper-middle, lower-middle or low income), the population of interest, the type of study, the methods used, the definition of unmet need and the source of this definition. The nature of the research question (ascertaining trends in the measurement of unmet need within sexual and reproductive health), and the heterogeneity of the included studies, meant that meta-analysis was an inappropriate methodology for analysis of the extracted data. A narrative synthesis of the themes within the literature was therefore carried out in accordance with the Synthesis without meta-analysis (SWiM) PRISMA extension guidance.[5]

## RESULTS

The database search yielded 19,747 papers (Figure 1), and one paper was added after a search of the grey literature. 17,184 remained after removal of duplicates, and 377 remained after screening of abstracts and titles. The full text of these articles was subsequently screened; 91 were removed due to outcomes that did not relate to unmet need or SRH, 40 were removed due to study design (i.e. studies that did not attempt to calculate unmet need), 25 were removed as the methods were not described in enough detail, and five were removed as they were not in English. Data were subsequently extracted from the remaining 216 papers. The entire list of papers can be found summarised in Supplemental Appendices 1, 2 and 3.

### Reproductive health

The majority of the studies found during this literature review (190 out of 216) were analyses of unmet need within reproductive health (Box 1).

#### *Methods*

The most commonly used method of data collection was the utilisation of questionnaire data. Nearly all of the studies collected information using questionnaires (179 out of 190) – seven studies reviewed medical records, two used modelling analyses, one used focus groups, and one used spatial epidemiology techniques.[6] Almost all of the analyses ($n = 181$) were cross-sectional, with the other nine being longitudinal. The high prevalence of certain methodologies was at least partially due to the fact that a large proportion of the papers were secondary analyses of similar datasets. Fifty-one of the 190 papers that focused on reproductive health used secondary analyses of data from the Demographic and Health Surveys (DHS) – a series of nationally representative household surveys that are conducted once every five years in 90 low and middle income countries – while another 23 used data from other national health surveys that use similar methodology to the DHS.

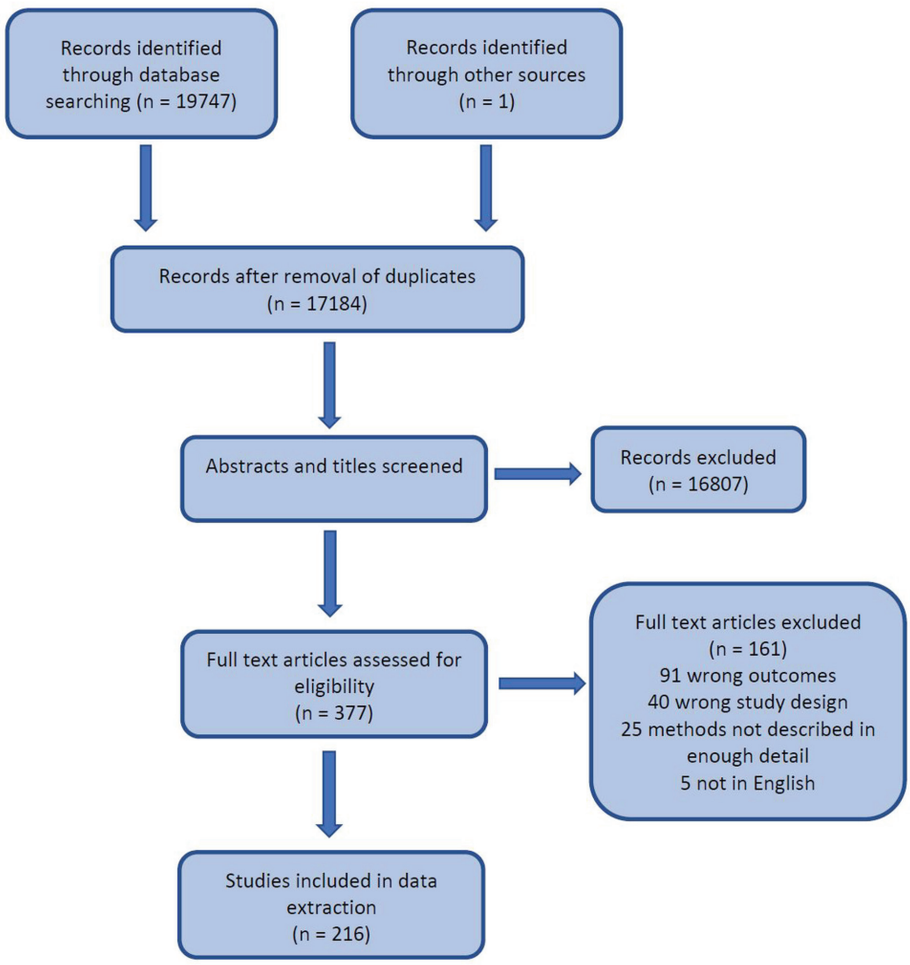
#### *Population*

Most of the studies were analyses of trends among populations living in low or lower-middle income countries; these comprised 137 papers, compared to 51 that were based on populations from upper-middle and high income countries, and two papers that aimed to perform global comparisons. Half of the papers ($n = 95$) drew conclusions at the national or multinational level, with the other half concentrating on regional analyses.

Only six papers considered the contraceptive needs of men. The remaining 184 papers focused solely on unmet need among women, with 89 limiting their analyses to women of reproductive age (usually defined as 15–45 years); 50 of these papers only analysed trends among women of this age group who were married or in-union.

Figure 1.

**PRISMA flow diagram.**




Box 1

**Summary box 1: reproductive health**

- **Literature predominantly focused on unmet need for contraception among women in low and lower-middle income countries.**
- **Most common definition of unmet need: Westoff and Bradley definition used in the Demographic and Health Surveys.**
- **Data most commonly collected using questionnaires.**
- **Analyses were predominantly cross-sectional secondary analyses of routinely collected data.**

*Definition of unmet need*

Among the 190 analyses of unmet need for contraception, 165 used the same definition of unmet need – the Westoff and Bradley indicator that is used as part of the DHS (or a slightly modified version). According to this definition, women are considered to have unmet need if they report being fecund and sexually active, would like to stop or postpone childbearing, and are not currently using a modern contraceptive method.[7]

Outside of these papers, definitions of unmet need were diverse. Only one study – a household questionnaire study analysing unmet need for contraception among married women in Mali and Benin[8] – utilised a measure of perception. Women were defined as having perceived met need (compared to real met need) if they were using an ineffective method of contraception. Five other questionnaire-based studies

Box 2

**Summary box 2: sexual health**

- **Literature predominantly focused on unmet need among women in higher and upper-middle countries.**
- **Range of definitions of unmet need.**
- **Data most commonly collected using questionnaires.**
- **Analyses were predominantly cross-sectional analyses of primary data.**

defined unmet need for contraception as a discordance between desired method or source of contraceptives and the actual method that was currently being used.[9–13] Two papers used disparity between underserved groups and a defined baseline to define unmet need; a UK-based study compared contraceptive use and abortion rates between women suffering from opioid addiction and the general population,[14] and a Dutch study analysed the disparity between contraceptive counselling and prescription among refugee women, other migrant women and native Dutch women. Two studies (one in Australia,[15] one in Ethiopia)[16] defined unmet need as lack of postpartum contraception planning. The outcomes used to measure unmet reproductive need outside of the need for contraception were equally varied. The three papers that analysed unmet need for cervical screening measured lack of uptake of routine cervical screening[17–19] and similarly, the analysis of unmet need for HPV vaccination measured women in the appropriate age group who had not received the vaccine during the Australian catch-up programme.[20] A cross-sectional analysis of unmet need for abortion services in Ghana defined any woman who reported an abortion outside of a facility as having unmet need.[21] Two studies analysed unmet need for abortion at the facility level, one defining unmet need as the inability of a health service to provide appropriate abortion services to women seeking treatment[22] and one using the treatment rate for complications of induced abortion as a marker of unmet need.[23] A study in Ireland investigated unmet need for abortion by comparing demand for services pre- and postlegalisation.[24] An analysis of unmet need in India defined women as having an unmet need if they had suffered from a reproductive morbidity and either sought care from a qualified medical practitioner but did not complete treatment; sought treatment from an unqualified practitioner; engaged in home remedy or did not seek any treatment.[25] Three studies used geographical techniques to measure unmet need: one measuring the correlation between driving distance from an abortion service and the geographical abortion rate,[26] one defining women who had travelled across country borders to access abortion as having unmet need[27] and one mapping 'contraception deserts' (areas with no affordable family planning clinic within a reasonable driving distance) within the US.[6]

## Sexual health

Compared to those focusing on reproductive health, significantly fewer studies within this review analysed unmet need within sexual health ($n = 18$) (Box 2).

### *Methods*

Methods of analysing unmet need within sexual health followed a similar pattern to analyses of unmet need within reproductive health; 13 of the 18 papers used questionnaire data, and 16 analyses were cross-sectional. The five papers that did not use questionnaire data used a diverse range of methods – three papers used medical records review, one used modelling techniques to estimate unmet need and one compared demand for sexual health services before and after an intervention. Unlike the analyses of unmet need within reproductive health, no papers used secondary data analyses to estimate unmet need for sexual health; 17 papers used primary data collection, and one used routinely collected data from national data sets.

### *Population*

Compared to analyses of unmet need within reproductive health, papers that examined unmet need within sexual health analysed a range of populations. Twelve papers focused on high and upper-middle income populations, and six looked at populations from low and lower-middle income countries. The majority ($n = 13$) drew conclusions at the regional level, with four being national analyses and one being a multinational analysis. Only one used a nationally representative cohort, with the other papers concentrating on defined subgroups: people attending genitourinary medicine (GUM) clinics, female sex workers (FSW), men who have sex with men (MSM), incarcerated women, adolescent psychiatric patients, foreign-born HIV patients, men and women under the age of 25, university students and people seeking care for gynaecological cancers.

### *Definition of unmet need*

The definitions of unmet need used within these analyses were equally diverse. Five analyses[28–32] defined unmet need as non-utilisation of sexual health services despite STI symptoms or history of unsafe sex. Another UK analysis measured unmet need by asking attendees at one of seven GUM clinics whether they had been previously turned away,[33] while two analyses of similar UK populations measured both provider delay (the gap between first contact with a health service and access to treatment) and patient delay (the gap between start of symptoms and seeking care).[34,35] The two analyses of access to sexual health services outside of the GUM setting (in an adolescent psychiatric unit[36] and a gynaecological oncology unit)[37] used lack of sexual health counselling within medical

Box 3

**Summary box 3: sexual and reproductive health**

- **Literature predominantly focused on unmet need among women in higher and upper-middle countries.**
- **Range of definitions of unmet need.**
- **Data most commonly collected using questionnaires.**
- **Analyses were predominantly cross-sectional analyses of primary data.**

notes as an indicator of unmet need, and an analysis of foreign-born Europeans used a negative HIV test in the years prior to an HIV diagnosis as an indicator of unmet need for HIV prevention services.[38] A Canadian study used the change in demand for STI services after the implementation of a women's healthcare centre within a prison as an indicator of unmet need,[39] and an Australian analysis of routinely collected data defined unmet need as the gap between estimated chlamydia incidence and actual chlamydia diagnoses.[40] A study in Papua New Guinea defined individuals who had fallen through gaps in the 90-90-90 cascade as having unmet need for HIV prevention or treatment.[41] The four studies investigating unmet need for PrEP all used different definitions: non-use of PrEP despite eligibility,[42] disparity between regional PrEP use and regional STI prevalence,[43] new HIV infection while waiting for inclusion in a PrEP trial,[44] and increased PrEP demand after reduction in the cost of PrEP.[45]

### Sexual and reproductive health

Ten of the studies found during this literature review examined unmet need for a combination of sexual and reproductive health services within a certain population (Box 3).

#### *Methods*

All 10 studies investigating unmet need in sexual and reproductive health used questionnaire data: eight studies analysed primary data and two were secondary analyses of data from larger national studies. All 10 analyses were cross-sectional.

#### *Population*

Eight of the studies that examined unmet need in sexual and reproductive health were undertaken among populations from upper-middle or high income countries. Seven drew conclusions at the regional (rather than national or multinational) level. There was, once again, a focus on population subgroups, with only one study (a South African household study) collecting data from all eligible people over the age of 15.

#### *Definition of unmet need*

The definitions of unmet need for sexual and reproductive health care varied between papers. Two studies used a range of definitions: both used the Westoff and Bradley definition of unmet need for contraception, never having had a Pap smear and symptoms consistent with STIs that had remained untreated as indicators of unmet need.[46,47] A cross-sectional household questionnaire study conducted in China measured unmet need among older women by asking about untreated STI symptoms and intrauterine device (IUD) retention after the menopause.[48] One analysis compared SRH service use between women who reported similar sexual activity but differing levels of religious participation.[49] One study examined the disparity in SRH demand between areas that provided youth-friendly services and those that did not.[50] Three studies included measures of perceived need,[51–53] and two measured unmet need by asking participants if they had received the SRH services that they felt they needed.[50,54]

## DISCUSSION

This literature review outlined 216 studies published over the past 11 years that examined unmet need in a range of populations using a variety of methods. Despite this heterogeneity, a number of patterns emerged on closer analysis that gave some insight into the way that unmet need within sexual and reproductive health is conceptualised, and revealed numerous gaps in the literature.

### Topic

Most of the studies within this literature review were on the subject of unmet need within reproductive health, and within these, the majority focused on unmet need for contraception. Some of the reasons for this are likely historical; widespread discourse surrounding the concept of unmet need within sexual and reproductive health largely began in the 1960s within the 'family planning' space,[4] meaning that the definitions and methodology used in this area have shaped the way that unmet need is conceptualised within both theoretical and implementation science, to the point where 'unmet need for family planning' is used as a key indicator by the United Nations without much discussion of unmet need in other areas of sexual and reproductive health.[55] Another reason for the prevalence of studies that measure unmet need for contraception is likely to be feasibility. Unmet need for contraception is easier to define and measure due to the presence of a defined endpoint – unplanned pregnancy – that has few other causes. Measuring unmet need in sexual health is far more challenging. Tying a specific need to an outcome within sexual health is made difficult by the lack of data from those who are not receiving care, and causal links between needs and outcomes are less clearly defined. There remains, however, a large and under-treated global burden of morbidity within sexual health,[56] indicating that the conceptualisation and measurement of unmet need within sexual health should also be a research priority.

### Population

The majority of the studies within this review aimed to measure unmet need among cisgender women – this trend that was particularly apparent among studies that were on the topic of unmet need within reproductive health. Although the reproductive needs of women are often more immediately apparent, there was a paucity of discourse within the literature about the role of unmet need for contraception among cisgender men with regards to unplanned pregnancy; something that is likely to become increasingly relevant as efforts to expand the range of male contraceptives continue.[57] There was also very little discussion of the needs of gender-diverse populations, and the needs of transgender women were often grouped together with the needs of MSM. Given the recognised morbidities and barriers to care faced by gender-diverse populations,[58] this is a significant gap in the literature exploring unmet need within sexual and reproductive health.

A large proportion of studies concentrated on the needs of women of reproductive age (usually defined as 15–45 years), and among these papers, a significant majority limited analysis to women who were married or in a union similar to marriage. This was in part due to the high prevalence of data from household studies, particularly those carried out via the DHS, that often specifically ask questions regarding reproductive health to women within this age group. Most studies that limited analyses to married or in-union women explained this as a method of confirming that respondents are sexually active. This assumption, however, may be somewhat archaic – as marriage rates decrease[59] and the age of first marriage increases globally[60] while age of sexual debut remains relatively steady,[61] the needs of an increasing number of women are not being measured. In addition, these methods overlook the needs of groups such as sex workers and those who have same-sex partners, who are likely to have unmet sexual and reproductive needs that lie outside of the bounds of a monogamous heterosexual relationship.[62] In addition, the focus on women of childbearing age leaves a gap in the understanding of the sexual and reproductive health needs of those who are younger than 15 years or older than 45 years, two groups who have been demonstrated to experience unique patterns of sexual and reproductive morbidity.[63,64]

Among studies that analysed unmet need within reproductive health, the majority investigated populations within low and lower-middle income areas. This trend was reversed among papers that investigated sexual health and SRH, the majority of which analysed populations within upper-middle and high income countries. There appear to be two resultant gaps in the literature. There is little investigation of unmet need within reproductive health in high income countries, despite the inequalities in reproductive outcomes that have been identified in these settings.[65,66] Similarly, there is little investigation of unmet need within sexual health in low income countries, despite the recognised lack of appropriate sexual health services in many such settings.[67]

### Methods

Questionnaire studies were particularly prevalent within this literature review, and were used to examine unmet need within both reproductive and sexual health. Although such methods are often useful, the fact that questionnaires are the primary method used for the assessment of unmet need within sexual and reproductive health inherently leaves some areas of enquiry neglected. Questionnaires, particularly those centred around potentially sensitive topics, are susceptible to both recall bias – in which one group is systematically more likely to remember certain events, and social desirability bias – in which respondents are systematically more likely to report behaviours or opinions that they think will be viewed favourably.[68] In addition, the interpretation of a concept as complex as unmet need can be dependent on the perspective of the researcher. A 2017 mixed-methods study found that the perceptions of stakeholders did not at all mirror the responses of the local population when both were asked about the drivers of unmet need for contraception.[69] Despite this, very few studies directly asked respondents about their perception of need, or about demand.

A large proportion of the studies in this review were secondary analyses of large household studies. Only one of these studies – the National Survey of Sexual Attitudes and Lifestyles – was specifically designed to investigate sexual and reproductive health at the population level. The other surveys are focused on health more generally, and therefore may not be the most useful tools for investigating unmet need within sexual and reproductive health. In addition, the DHS is designed for monitoring and evaluation of national programme goals,[4] and the fact that it is one of the main sources of information regarding global unmet need within reproductive health means that there is little understanding within the published literature of the drivers of unmet need or the differences between regions or subgroups.

## STRENGTHS AND LIMITATIONS

It is important to acknowledge the limitations of this review. The inclusion criteria for this review did not include qualitative analyses, which limits the discourse within this article to quantitative measures of unmet need. The role of qualitative and mixed-methods work within this area is a topic that would benefit from exploration in the future. The literature search was also limited to papers that were in English, which may have resulted in the omission of relevant literature. We believe, however, that the breadth of the search is likely to have captured the majority of the papers within this area.

This article also has multiple strengths. This is, to our knowledge, the first systematic review to examine the methodology being used to calculate unmet need within sexual and reproductive health across the published literature. The breadth and international scope of this review have allowed the authors to conduct an in depth analysis of the measurement of unmet need in a range of settings, allowing for a broader understanding of a concept that is vital within public health.

## CONCLUSIONS

This review revealed multiple gaps in our understanding of unmet need within sexual and reproductive health. The vast majority focus on unmet need for contraception among in-union women in low income countries, leaving a significant need for investigation of unmet need within sexual health, unmet reproductive health need in high income settings and unmet need among women who are not of reproductive age. In addition, there is a need for data collected using a range of methods that can reflect regional patterns and sub-group trends and begin to elicit the causes of unmet need. If these gaps are not addressed, we run the risk of repeatedly measuring unmet need within sexual and reproductive health but not collecting the data that will allow us to make significant and sustainable change.

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## AUTHOR CONTRIBUTIONS

DS conceived of the study and led on the paper. DS designed the protocol, and DS and MC carried out the search, screened search results and extracted data. All authors contributed to the interpretation and commented on the paper.

## CONFLICT OF INTEREST

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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## SUPPLEMENTAL MATERIAL

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# A process evaluation of Promotional Guides used by health visitors to support men's transition to fatherhood: a qualitative study


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## Background

Health visitors in England, who are specialist public health nurses, are responsible for leading and delivering the national Healthy Child Programme (HCP) (PHE, 2021). They work with families from late in the antenatal period and following birth until the child reaches five years of age. This means that every family with a child under the age of five will have routine access to a health visitor. Through the delivery of the HCP health visitors play a crucial role in ensuring that every child has the 'best start in life', which is viewed as a fundamental to improve health and reduce health inequalities (NHS, 2021). The HCP includes a minimum of five contacts with every new family: antenatal health promoting visit, new baby review, six to eight week assessment, one year assessment, and two to two-and-a-half-year review (PHE, 2021). Through these contacts, health visitors can support new parents in their transition to parenthood, promote child development, improve child health outcomes and ensure families at risk are identified at the earliest opportunity (PHE, 2018). The first three of the five contacts provide opportunities to conduct comprehensive and holistic assessments of the expectant/ new mother's and father's needs. The Department of Health for England stated that the six to eight week health visitor visit "is crucial for assessing the baby's growth and wellbeing alongside the health of the parent, particularly looking for signs of postnatal depression" (DH, 2015, p-17). Health visitors are therefore in an ideal position to identify and address fathers' mental health and wellbeing needs as well as mothers.

Many health visiting services use the Promotional Guide system with both parents during their routine antenatal and postnatal six to eight week assessment. The

Promotional Guide system originated from the European Early Promotion Project (EEPP) in 2000 which was a primary health promotion and prevention programme provided by health visitors and other community health nurses across five European countries - the United Kingdom, Finland, Greece, Serbia and Cyprus (Puura et al., 2002). The Promotional Guide system is underpinned by the Family Partnership Model (FPM) (Davis and Day, 2010), which was designed to support parents' transition to parenthood and comprises Antenatal and Postnatal Guides to be used with parents by health visitors who have undergone relevant training (Day et al, 2014). The guides aim to support parental health and wellbeing; promote early fetal and infant development; and inform accurate, well-informed decisions about family needs, health behaviours and early intervention (Barlow and Day, 2016). The Promotional Guide system is a licensed programme that requires the professionals administering the guides to be appropriately trained and in receipt of regular supervision. The theoretical framework underlying the FPM emphasises the need for highly skilled professional communication. Training and supervision are essential for the effective and consistent delivery of this programme, as well as a face-to-face contact between the health professional and parents. The key components of this intervention are summarised in Figure - 1.

**Figure 1: Key Intervention Components of the Promotional Guide System (Day et al., 2014)**

| Intervention Components |
| --- |
| **Staff training (skills) & supervision (quality)** |
| **Antenatal and Postnatal face-to-face contacts with mother and father** |
| **Antenatal and Postnatal Promotional Guides** |
| **Antenatal and Postnatal Topic Cards** |
| **Strengths and Needs Assessment** |
| **Partnership approach between parents and professionals** |

Although during the time of this study (June 2018 – June 2019), eighty-five NHS trusts across England were reported to use the Promotional Guides, little was known about health visitors' views of the use of these, how they were used in practice or barriers to effective implementation with fathers.

The feasibility of using the Promotional Guide system with fathers, including their engagement with, and acceptability of the intervention, and impact on their mental health and wellbeing was explored as part of the New Dad Study (NEST) which is reported elsewhere (Baldwin et al, 2021, under peer review). This paper reports the process evaluation undertaken, which explored health visitors' views of using Promotional Guides with fathers. Data collated included exploration of their level of engagement with and acceptability of the intervention, fidelity of delivery and reported impact on first-time fathers' mental health and wellbeing. Barriers and facilitators to delivery of the intervention are also discussed.

## Aims & Objectives

The study aimed to explore:

1) health visitors' use of Promotional Guides with fathers

2) health visitors' assessment of father's mental health and wellbeing

3) facilitators and barriers to using Promotional Guides in practice

## Method

A process evaluation, informed by the Medical Research Council guidance (Moore et al., 2015) was chosen to provide a logical approach to evaluating the intervention, providing a better undertaking on the context. Data capture using interviews and observation of practice enabled a better understanding of how Promotional Guides were used in practice. Interviews with health visitors provided in-depth perceptions of their use of Promotional Guides and undertaking observations enabled the researcher to understand what happened in practice with their use, providing a range of perspectives and better understanding of implementation of this complex intervention (Bowling, 2002; Ritchie et al., 2014). Verbal consent was obtained from parents, permitting the researcher to be present during their consultation with the health visitor and written consent obtained from all fathers and health visitors for interviews.

Questions were developed to inform each stage of the evaluation process to ensure appropriate, in-depth data capture to meet study aims (Table - 1).

**Table 1: Questions relating to the process evaluation of the Promotional Guide system, based on guidance from Moore et al. (2015).**

| Process Evaluation Steps | Possible questions | Context |
|---|---|---|
| **1. Fidelity** | - To what extent was the intervention implemented consistently with the underlying theory and philosophy? | - Was it consistent with the principles of the Family Partnership Model – did the health visitors use partnership, strength based, parent-led approaches? |
| **2. Dose delivered** | - Were all intervention components delivered?<br><br>- To what extent were all of the intended components of the intervention provided to the participants?<br><br>- To what extent were all materials designed for use in the intervention used?<br><br>- To what extent was all of the intended content covered?<br><br>- To what extent were all of the intended methods, strategies, and/or activities used?<br><br>- Was the intervention materials and advice well received by the providers? | - Were both the antenatal and postnatal Promotional Guides delivered?<br><br>- Were all five core themes of the Promotional Guides covered in the discussions?<br><br>- Did health visitors use the Promotional Guide topic cards to generate discussion?<br><br>- Was there sufficient time to cover the required content?<br><br>- Did health visitors allow parents to choose the topic guides for discussion? Did they use the family strengths/ needs framework?<br><br>- What are health visitors' views of the Promotional Guides? Do they find it useful and acceptable? |
| **3. Dose received** | - To what extent were fathers present at intervention activities? | - Were all fathers present at this intervention, in line with the universal family offer in the UK? |

| | | |
|---|---|---|
| | - To what extent were fathers engaged in the activities?<br><br>- How did participants perceive the intervention?<br><br>- To what extent did participants engage in follow-up?<br><br>- To what extent did participants engage in recommended follow-up behaviour?<br><br>- Was the intervention materials and advice well received by the participants? | - Where fathers were present with their partners, how engaged or involved did they feel?<br><br>- Was it inclusive of fathers? Did they feel it addressed their needs?<br><br>- Did fathers participate in both the antenatal and postnatal Promotional Guide contact?<br><br>- Did fathers act on/ make any changes following the discussions taken place/ advice given during the Promotional Guide visits?<br><br>- Did fathers find the Promotional Guides to be useful and acceptable? |
| **4. Reach** | - What proportion of the priority target fathers attended each session? How many participated in at least one session? | - This is a universal offer and therefore the target should be 100% attendance |
| **5. Recruitment** | - What procedures were used to invite/ attract fathers to participate in the intervention?<br><br>- What were the barriers to involving fathers in the Promotional Guide contacts?<br><br>- What planned and actual procedures were used to encourage continued involvement of fathers in the antenatal and postnatal Promotional Guide contact? | - Were fathers exclusively invited to take part in the Promotional Guide contacts – antenatally and postnatally?<br><br>- Were fathers informed by the health visitors that the Promotional Guides were aimed at fathers as well as mothers?<br><br>- Are health visitors guided by organisational policies to involve fathers in the Promotional Guide contacts? |

| | | |
|---|---|---|
| | - What were the barriers to maintaining father involvement? | - Did health visitors face any barriers to maintaining engagement with fathers from the antenatal Promotional Guide contact through to the postnatal Promotional Guide contact? |
| **6. Context** | - What other barriers and facilitators influenced delivery of the Promotional Guide System to fathers? | - What factors in the organization, community, social/political context, or other situational issues could potentially affect either intervention implementation or the intervention outcome? |

**Study setting**

Four London boroughs/administrative districts (two inner and two outer cities) whose population healthcare needs are served by two National Health Service (NHS) organisations were selected as study sites to support the recruitment of a diverse group of participants. Each site served a diverse socio-economic and cultural population, with minority ethnic groups representing 44%–69% of the overall total population of the borough selected (ONS, 2011).

**Recruitment**

Health visitors were recruited from the participating NHS sites. The researcher liaised with the managers of the health visiting teams at both organisations and asked them to disseminate information about the study amongst their teams. Participation was on a voluntary basis and those interested in participating were given a participant information sheet and asked to sign a consent form. Only qualified health visitors who were trained and experienced in use of the Promotional Guides were included.

## Data Collection

A purposive sample of 11 health visitors across both study sites, who had the relevant experience, were interviewed to assess their perceptions of delivering this intervention to fathers. Participants were offered the option of face-to-face or telephone interviews. Of the 11, six were telephone interviews and five face-to-face. An interview topic guide (Appendix – A) was developed based on the process evaluation questions in Table 1 and piloted during the first two interviews. A fidelity checklist (Appendix – B) was also used for all interviews to ascertain whether the intervention was implemented consistently with the underlying theory and philosophy of the Promotional Guide system. The interviews were audio-recorded and transcribed using an approved transcription service. Participants were offered an opportunity to check their interview transcript for accuracy prior to analysis. The duration of the interviews varied between 11 and 32 minutes, with the average being 21 minutes. After completing eight interviews, the researcher noted that no new themes or codes were emerging from the interviews, however a further three interviews were carried out which confirmed that the content domain of the construct had been adequately populated. This ensured that data saturation was reached, which according to Guest et al (2020) can typically happen after 6–7 interviews in a homogenous sample. Field notes were written after each interview to record aspects of the interview not captured on the recording such as environment, context, general observations and thoughts.

Seven additional health visitors were observed using the Promotional Guides in practice. It was decided not to observe the same health visitors who were interviewed, to obtain a wider perspective on Promotional Guide use across the sites. The observations were informed by a checklist, also based on the process evaluation questions in Table 1 and the fidelity checklist (Appendix – C). The researcher (SB) attended Promotional Guide visits with the participating health visitors for which parental consent was obtained (by the health visitor) prior to each visit by telephone. Following introductions and a brief explanation of the study, the researcher positioned herself out of the health visitor and parents' eyeline to maintain a non-participant stance. In addition to the observation checklist, detailed fieldnotes were taken by the researcher at each interview, including descriptions of the setting, interactions and people present, as well as the researcher's own understanding and interpretation of what was happening. Although the researcher was a health visitor by background, she did not take an active part in any of the discussions between the health visitor and the parents.

The initial plan was to conduct five qualitative interviews and five observations at each site. This was achieved in one site, however at the other site six interviews and only two observations were completed due to the lack of Promotional Guide use during antenatal and postnatal contacts. This is considered further in the findings and discussion sections of this paper.

**Data Analysis**

Data were analysed by the first author (SB) using framework analysis and the five steps of data management for thematic analysis as described by Ritchie et al. (2014) to include familiarisation; constructing an initial thematic framework; indexing and sorting;

reviewing data extracts; and data summary and display. Framework analysis was chosen over other qualitative approaches due to its ability to answer specific research questions (Ward et al., 2013), in this case questions relating to the use of Promotional Guides with fathers in practice. It allowed the categories and themes identified in the data to be explicitly and systematically considered, while facilitating sufficient flexibility to detect and characterise new themes emerging from the data (Dixon-Woods, 2011). The findings were discussed amongst the research team (all four authors) at each stage before agreement was reached about the final themes. The computer software package NVivo (version 11) was used to facilitate this process.

Data from the observation of health visitors were incorporated into the initial thematic framework constructed from the health visitor interviews. This involved explicitly and systematically considering the observation data against the initial categories and themes identified from the interviews. Although this was a predominantly deductive process, the framework facilitated enough flexibility to detect and characterise any new themes which emerged. The focus of the observations was on the content and delivery method of the Promotional Guide system. The data obtained aligned well into the existing themes and subthemes of the initial framework with no new themes emerging.

**Ethical Considerations**

The study adhered to the Research Governance Framework for Health and Social Care and Good Clinical Practice (GCP). All methods were carried out in accordance with

relevant guidelines and regulations. Study participation was voluntary and written consent obtained from all participants. The interviews were transcribed with the principle of anonymity in mind and a confidentiality agreement was in place for the approved transcribing service used. Approval was obtained from the Health Research Authority (HRA) and given favourable opinion by London - Fulham Research Ethics Committee (IRAS no: 203629).

## Results

In total 18 health visitors participated from the two NHS sites. Eleven participated in interviews and seven in observations of their use of Promotional Guides in practice. Participants' ages ranged from 25 to over 60; length of qualification as a health visitor ranged from under two years to over 20 years; and the majority worked full-time (n=13). Health visitors also came from various ethnic backgrounds: 44% described themselves as Black (including African, Caribbean and British), 44% as White (including English, Irish and other), 6% as Asian (other), and 6% as Mixed (White and Black African). Most health visitors (n=15) had received their Promotional Guide training in the past three years, with only three reporting to have been trained more than three years prior to this study. All health visitors reported to receive some form of supervision, the majority being in receipt of two to three different types from a range of supervision, to include preceptorship, restorative (an evidence-based model of reflective supervision used within health visiting), clinical, safeguarding, managerial, and peer supervision. See Table 2 for full participant characteristics.

Five main themes were identified from interview and observational data:

1. Inquiry into fathers' mental health
2. Promotional Guides in Practice
3. Health visitors' perceptions of the Promotional Guides System
4. Barriers to using promotional guides with fathers
5. Facilitators and recommendations for using Promotional Guides with fathers

**1. Inquiry into fathers' mental health**

Health visitors practice around asking fathers about their mental health and wellbeing varied. One participant described inquiring about the father's wellbeing before the mother:

"*It's always about asking about them first thing you enter the house, asking about their wellbeing before the woman. Usually that always helps because nobody's asking them*" (HV10).

Some health visitors did not pay as much attention to fathers' mental health as they did with mothers. Instead, they asked about fathers' general health rather than asking them specific questions on mental health.

"*I haven't really asked about mental health as such, but I ask how they - how do they feel about becoming parents, and do they understand how their life's going to change and how long have they been waiting for the baby?"* (HV2)

Only one health visitor mentioned assessing paternal mental health using the Whooley questions if the father was present during the visit (these questions (Whooley et al., 1997) are recommended in NICE guidance on Antenatal and Postnatal Mental Health (NICE, 2018) and include two questions on low mood and loss of interest or pleasure.

During the **observations**, most health visitors made general enquiries about how the father was feeling and discussed some of the changes they may experience following the birth of their baby. In two observations, health visitors asked fathers direct questions about their mental health; in two observation episodes, health visitors did not discuss paternal mental health at all.

## 2. Promotional Guides in Practice

### *Health Visitor involvement with Promotional Guides*

Health visitors' involvement with use of Promotional Guides varied between the study sites. In one trust, the Promotional Guides were only used antenatally on a targeted basis. Although there were management expectations that Promotional Guides would be used universally at every antenatal contact, in practice they were only used on more vulnerable families (those with identified additional needs such as safeguarding, mental health, domestic violence etc):

"…*at the moment it's changed and we're only doing targeted families. So this is just families that, you know, there's concern*" (HV9)

*"…. we are only doing antenatal contact for vulnerable clients*" (HV8)

In the other trust, health visitors were expected to use the Promotional Guides antenatally and postnatally, however use varied between practitioners. Some used them routinely with all parents, some only antenatally, and some only when time allowed or when they felt it was necessary.

Six of the seven observations of Promotional Guides used in practice were of antenatal contacts and only one was a postnatal contact.

One health visitor considered it was easier to use the guide postnatally "*because with postnatal, you go to people's home and you have a control over your time …"* (HV1)

However, this view was not shared by all, with different expectations placed on the health visitors in the two trusts around the tools they should use to carry out the postnatal assessment. One health visitor explained the difficulties relating to this, *"….we have about three different tools that we use for assessing postnatal care and given an hour and a half in which to complete them. So, using the postnatal guidance as well as the assessment tools from the trust has become quite a chore, you know, to try and complete that within the hour and a half."* (HV10)

***How Promotional Guides were used by health visitors (Fidelity)***

Promotional Guide topic cards are designed to facilitate parental leadership of the conversation, by allowing the parent to choose a topic card of their choice. All health visitors described using the Promotional Guide topic cards as prompts to allow parents

to take the lead and choose the topics that they wanted to discuss. If fathers were present during these contacts, they were included in the discussions:

"*When a card is presented, we usually space it out so that whatever they want to talk about they pick it up and talk about it. So they have the autonomy to choose what … they take the lead, it might be the man or the woman*" (HV7)

Some health visitors found it difficult to find a balance between offering health promotion advice (as required by their organisation) and letting the parents lead the conversations, as HV8 explained: "*The problem is that you want to give this advice and give this information but if you are using the promotional guide, it's not an advice-giving session, it's led by the client. So I guess it's a bit of a compromise between letting them set the agenda, but also wanting to maximise the impact of the visit from a health promotion point of view. I also feel that the promotional guides that I'm balancing those two bits, and I have to kind of hold back a little bit on the amount of health promotion I would usually give*". (HV8)

***Inviting fathers***

There was variable practice with regards to inviting fathers to attend the Promotional Guide contacts. Health visitors reported not having a system in place for specifically inviting fathers, with invitation letters usually addressed to 'parents' or 'parent to be'.

"*Never. There's just no system in place to do that*". (HV1)

"*I've never known a contact where the father's been exclusively invited*" (HV4)

Some were more proactive in following up the invitation letter with a phone call to invite fathers. In cases where fathers were not invited but present during the contact, they were included in the Promotional Guide discussions.

"…*they present themselves, they come with the mothers to antenatal. So, that's up to them, they weren't invited. So, if they present themselves, then I will always engage them in the process*". (HV1)

***Steps to engage with mothers and fathers***

All health visitors discussed the approach they used to introduce the Promotional Guides to the women. This was done through the Promotional Guide topic cards, allowing women to choose the topics that they wanted to discuss, which helped to engage women with the Promotional Guide conversations (Observation, HV12, HV18).

Most health visitors did not take any additional or specific steps to engage with fathers. When the father was present, they ensured that they were included in the discussions and informed about the important role they played as a parent. One health visitor explained: "*I haven't had to do anything different from, you know, the times that I've used them. I find that the dads are as keen as the mums are. So I've not had to do anything different or say anything different to the dads that I've not said to the mums*" (HV9). This practice was also noted during the observations.

### *Managing time between both parents*

Health visitors talked about prioritising their time for the person who needed it more, which generally tended to be the mother: "*More time seems to go towards the mother, normally, because they've got more questions*" (HV4).

When fathers were less vocal than their partner, health visitors encouraged them to participate and ask questions to ensure that they felt involved, an approach seen in most of the observations. Sometimes health visitors found it challenging when the mother and father had a lot to discuss, given the timeframe of the visit, and had to prioritise the most important topics for discussion.

"*I think the difficult when you've got mum and dad is that they can be that they want to talk about everything. Or more things than you've got time for. So a lot of it is trying to narrow it down to be specific about what we can do in the timeframe*". (HV5)

Health visitors also used their professional judgement when prioritising the needs of the mother and father, and whether it was appropriate to have certain discussions with both parents together, for example if domestic violence was a potential issue.

"*You have to mostly use your professional judgement. If there are sensitive issues like domestic violence, you really don't want to do it together*". (HV7)

### *Follow up and changes*

Some health visitors described lacking the opportunity to follow up families after the initial Promotional Guide contact either due to the lack of continuity of care, with follow up not carried out by the same practitioner, or because they had to provide a 'targeted' offer, rather than follow-up all families.

Where health visitors saw changes in fathers following the Promotional Guide contacts, they were mainly in the context of the father's level of involvement with their child and partner.

"*I think mostly it's around their engagement with the child. So, we speak to them about dads' clubs, and …… about mental health*". (HV10)

One health visitor talked about improvement seen in other health behaviours such as smoking, where a father took positive steps to stop smoking following a discussion with the health visitor about passive smoking during the antenatal Promotional Guide contact.

### 3. Health visitors' perception of the Promotional Guide System

#### *Benefits of the Promotional Guide contact*

All health visitors viewed the Promotional Guides as father inclusive, "….*because some of the pictures. Like the recent and the past experience, I like the fact that it's got a picture of the father in it*" (HV6). The promotional guides were described as a useful tool because it "*sparks that conversation and gets you into knowing a little bit more about*

*the family than you would otherwise. It's not a tick box exercise so it makes you relate to the family"* (HV10).

Health visitors discussed the beneficial aspects of the Promotional Guide contact with fathers, "*They have found it useful, beneficial and educating because it raises more awareness, so it goes beyond what they expected about antenatal, because it's quite detailed and there is no limit to how far they can discuss*" (HV7).

Feedback from fathers following Promotional Guide visits suggested that they felt enabled to have better dialogues with their partner as a consequence. One health visitor said: "*I could see the dad's behaviour and the dad and mum were having this dialogue much better than if I were to ask mum about things and dad was sitting there like, you know, non-participant observer*". (HV1)

Health visitors described the topic cards as "*user-friendly and when you lay them out, I like the colours of them. They're very nice bright colours, which I'm always a keen fan of*" (HV3). The topic cards could be prompts to enable parents to talk about topics they may not have considered otherwise: "*Some will point to a card and say they haven't really thought about it, so it is a prompter, it's a good prompt*" (HV4). One health visitor, who had recently qualified found the topic cards particularly helpful: "*Just as a prompt and as a prompt with the little key questions on the back of the cards, even for me as well. So, being newly qualified as well, it's just - it does help"* (HV4). During the observations the Promotional Guide topic cards were handed to parents, who were asked to choose a few together for discussion. This seemed to encourage the father to raise queries and concerns he had, which were then discussed further (Observation, HV16).

Overall, the health visitors spoke positively about the Promotional Guide system. They valued its partnership approach, which enabled them to explore parents' feelings more effectively than being guided by their own or organisational priorities.

***Benefits of involving fathers***

All health visitors interviewed referred to the benefits of involving the father in Promotional Guide contacts. Fathers being involved would "*give them a better awareness of what is going to happen, and just to give them an idea of the changes that are going to happen to both their lives. And even discussing things like feeding and how you can get them involved in skin-to-skin and even if there's breastfeeding, how they can be involved in the baby's life"* (HV4).

Having the father involved benefited the mother, as fathers would be able to provide more support to their partners during the perinatal period, and develop better bonding with their babies. Involving the fathers for these contacts was also perceived to enhance the health visiting assessment of the family situation, identifying any strengths and weaknesses they may have. "*I think it's a helpful thing, it's a positive thing in …. a lot of many ways, albeit like I said if it is to tease out if there is any domestic violence, or if it is just to cement the different things that they may have held in tradition of what the man is supposed to be doing or not doing, what is expected of them from a professional. All of those things*." (HV10)

Having fathers involved was also discussed in relation to mental health and the important role fathers can play in supporting maternal and infant mental health.

The topic guides enabled the health visitor to discuss the importance of skin-to-skin contact with the dad and how he could get involved once the baby was born (Observation, HV16).

When health visitors used the Promotional Guides with both parents together, they occasionally faced challenges arising from the couple's relationship, however benefits of using the Promotional Guides were reported to far outweigh the negative aspects.

"*Well the obvious ones are things, if the relationship isn't particularly good. Or if there's a domestic violence in the relationship. Or there are things that mum wants to talk about that she doesn't want to talk about in front of the dad. Or vice versa I suppose. And that's the only negatives I can see". Otherwise I think that the positives outweigh the negatives*." (HV5)

**4. Barriers to using Promotional Guides with fathers**

***Capacity and duration of Promotional Guide contacts***

One of the main challenges was the lack of capacity. Although they valued the Promotional Guides and found them a useful intervention, health visitors often did not have the capacity to use them routinely in practice.

"*I feel that as professionals we've been trained for it. You have the, you know, capability of using it. The only trouble is sometimes, you know, there's no capacity and it's a time management issue, and then the staff are not able to use it"* (HV9)

Many struggled with the demands of the service and found it difficult to balance their time between facilitating the Promotional Guide conversation and delivering key health promotion messages as directed by their NHS trust. This health visitor summed up the difficulties: *"..we understand the values of the promotional guide in terms of exploring parents' feelings about the pregnancy, their hopes and fears for the baby, but we also have to come back to the office and tick boxes to say that we've discussed smoking and drinking, we've discussed breastfeeding, we've discussed accident prevention, we've discussed immunisations, and it is that balance which is tricky*". (HV8)

The lack of capacity also meant that many health visitors were not using the Promotional Guides with fathers.

In one NHS trust, health visitors allowed an hour and a half for the Promotional Guide contact, however some found that it often took longer to complete especially when couples had a lot to discuss. Additionally, there was a view that the dad in the conversations would take up more time as *"… if you've got dad as well you don't know the extent to which dad wants to explore things*" (HV9).

In the other NHS trust only half an hour was allocated for the antenatal contacts, leaving the health visitors worried and reluctant to start up a conversation that they may not be able to finish.

"*You know we don't have very much allocated time. They can open up a huge can of worms sometimes because of the nature of the topics. And also because it's led by them*". (HV5)

### *Access to fathers*

Gaining access to fathers was a main barrier. Fathers were often not present during visits: "*With fathers I find they're mostly not in contact. I'd say if I did ten new birth visits I'll probably have one occasion that a father was at home*" (HV6).

Another health visitor explained that the timing of these contacts being at 6-8 weeks postnatally meant "*they are hardly ever there at the six to eight weeks for follow-up check*". (HV6)

Many health visitors stated that fathers were unable to attend these appointments due to not being able to take time off work. Of the seven observations carried out, although the father was invited by the health visitor, none were present during the antenatal Promotional Guide visit due to work commitments.

### *Language and culture*

Language and cultural differences were another barrier. Health visitors described difficulties of using the guides through an interpreter, with concerns that discussions were not as effective due to being misinterpreted or misunderstood.

"*And even if you use interpreters it's not going to mean the same when you're going through somebody else who interprets that. So that will be the barrier*". (HV11)

Some were also concerned about not having access to an interpreter:

Health visitors described an individual's cultural background as a barrier to involving men with the Promotional Guide contact. They perceived that men from different cultures viewed this contact to be related to childbearing and childcare, and "*having babies is, like, women's work*" (HV2); "*a lot of Asian families … tend to honestly just leave it for the woman to do baby care than having to kind of maybe talk about their feelings…"(*HV10).

## 5. Facilitators and recommendations for using Promotional Guides with fathers

### *Systems and processes*

Health visitors identified several facilitators for using the Promotional Guide System in practice. They felt that if parents were informed that the Promotional Guide contacts were aimed at both parents and if the invitations reflected this, it would encourage more fathers to attend appointments, especially if given advanced notice of the appointment date.

"*I mean in an ideal world before we did an antenatal contact, we would send out a letter addressed to both parents saying 'we warmly invite you both to this home visit. The health visitor is coming to learn more about you both and your family' and put it like that. …and that letter would go out about a month and a half in advance so that dad can book some time off work if he needed to and that sort of thing".* (HV8)

Health visitors also felt that the venue in which the contact took place was important. For example, the home setting was seen as ideal as it offered privacy and would allow parents to feel more relaxed (HV3).

When a contact was undertaken in a clinic setting one health visitor talked about displaying the Promotional Guide topic cards on the desk so that "*if you've got the fathers sitting there and you've got a desk with the guides all spread out, they're drawn to it. Their eyes are drawn to it, so they can see it."* (HV4)

Being allowed to dedicate adequate time to use the Promotional Guides viewed as essential, as one health visitor explained: "*if you want to have a meaningful conversation that means that they're going to go away with something, then you can't really do it in less than half an hour"* (HV5)

Although continuity of care was problematic as referred to earlier, having the same practitioner facilitating the Promotional Guide contacts could better facilitate the process.

Of the one postnatal observation carried out, the health visitor undertaking the visit was not the same practitioner who carried out the antenatal contact for this family. In this case, it was clear she had not had the chance to build any rapport with these parents (Observation, HV12).

***Training and supervision***

Health visitors were complementary about their initial Promotional Guide training and had health visitor champions within their workplace. However, they raised concerns about the lack of routine use and refresher training or updates: "*And the less that you are using, you know, a certain skill that you've been trained to do, the more you are at*

*risk of losing that skill……Because for a year now I don't think there's been any updates or any refresher training on the use of the promotional guides*." (HV9)

Having good opportunities for clinical supervision was seen as a facilitator to the implementation of Promotional Guides to both mothers and fathers, "*I think the clinical supervision is quite good, and the team ones are quite helpful as well"* (HV9).

A lack of support networks for fathers, was a challenge as health visitors did not know where to sign post fathers who requested for more support.

***Management and organisational support***

There was a general view that more commitment and support from senior managers was needed to implement the Promotional Guides in an effective manner as health visitors considered that Promotional Guides were not a priority for the organisation: "*there is always shifting priorities anyway, and use of the Promotional Guide used to be a priority when they're investing in the training. I think it has now gone off the burner*" (HV8).

Although as one health visitor described *"the expectation is that the contact will be undertaken. The organisation would like us to use to the Promotional Guide antenatally. The organisation would like us to be engaged better with fathers*" (HV8), there were no systems in place to enable this or monitor its use. The uptake of Promotional Guide contacts were not routinely collated by their organisations, and systems did not enable the recording of contacts with fathers: "*it's not like it's accounted for in our own*

*assessment tool…..we've got a separate assessment, our own assessment tools on our computer screens is actually about the mother and the baby*". (HV10)

To enable better facilitation of the Promotional Guide system with fathers "*it would be good if there was more systems in place like a number …I mean, we've no idea who's using it, who's not using it, and how many Practitioners use it. It might be useful to have a record of how often they're using it. I mean, we receive the training, but really, there hasn't been follow-ups since then and what discussion/supervision, in relation to scenarios that came up during their usage*". (HV3)

A fidelity questionnaire was used for the interviews and observations (see summary in Table 3). All 18 health visitors used the Promotional Guide topic cards to form the basis of contacts. Through the discussions of the topics chosen by the parents, health visitors identified or reported to identify specific priorities for parents, and the necessary resources (to include family members, friends and other social supports) needed to achieve their goals. However, no health visitor encouraged parents to keep a written record of their priorities, goals, and improvements. The completion of the 'family strengths and needs summary' was variable, with reports/observations of 67% (n=12) not to completing it at all, 22% (n=4) using it to inform their assessment without actually completing or recording it, and only 11% (n=2) fully completing it (manually completing and recording it).

An additional question was included in the study questionnaire about the 'Family Map', which was introduced by the Centre for Parent and Child Support (CPCS) in 2016, for

use following a Promotional Guide contact. The Family Map enables parents to use a visual format to identify their goals and the resources needed to achieve them. It also helps them to make a written record of the plans made to meet their goals. None of the health visitors interviewed in this study were aware of the Family Map and those observed did not use it during their Promotional Guide consultations.

**Table 2: Fidelity checklist summary from interviews and observations with health visitors**

| Part No. | Use of PG Guide materials | Identified main priorities with parents | Encouraged parents to records priorities | Identification of resources for goal achievement | Completed Strengths & Needs summary | Used Family Map |
|---|---|---|---|---|---|---|
| **HV1.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Completed fully | No |
| **HV2.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Not completed | No |
| **HV3.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Use to inform assessment but not completed | No |
| **HV4.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Not completed | No |
| **HV5.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Not completed | No |
| **HV6.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Not completed | No |
| **HV7.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Use to inform assessment but not completed | No |
| **HV8.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Not completed | No |
| **HV9.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Complete fully | No |

| | | | | | | |
|---|---|---|---|---|---|---|
| **HV10.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Use to inform assessment but not completed | No |
| **HV11.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Use to inform assessment but not completed | No |
| **HV12.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Not completed | No |
| **HV13.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Not completed | No |
| **HV14.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Not completed | No |
| **HV15.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Not completed | No |
| **HV16.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Not completed | No |
| **HV17.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Not completed | No |
| **HV18.** | Use the PG topic cards as the basis of contact | Yes | No | Yes | Not completed | No |

## Discussion

This process evaluation was carried out as part of the New Dad Study (NEST), which focussed on first-time fathers' mental health and wellbeing. Other parts of this study have been previously reported (Baldwin et al, 2018; 2019; 2021 under review). This paper reports the process evaluation exploring health visitors' views of using Promotional Guides with fathers, their level of engagement with and acceptability of the intervention, fidelity of delivery and reported impact on first-time fathers' mental health and wellbeing.

Health visitors' practice around asking fathers about their mental health and wellbeing varied. A few health visitors asked fathers direct questions about their mental health, most asking general questions about the fathers' wellbeing if he was present at the contact. Some health visitors reported to prioritise maternal mental health over paternal, a finding consistent with fathers' accounts of not being asked direct questions about their mental health (Baldwin et al, 2021). This suggests that enquiring about paternal mental health is not part of routine health visiting practice and further work is needed which includes staff training, organisational support and commitment.

All health visitors were trained in the Promotional Guide system and in receipt of at least two to three types of supervision in practice, which were key to delivering the intervention. Despite this, the health visitors' involvement with Promotional Guides varied between the two study sites. In both, the Promotional Guides system was

implemented and offered in two of the five Universal contacts: antenatal health promoting visit and six to eight week assessment (PHE, 2018), however in practice this did not happen. In one site, only the Antenatal Promotional Guide was used by health visitors on a targeted basis for families with additional needs, with intervention use based on the individual health visitor's professional judgement. In the other site, health visitors used the Antenatal and Postnatal Promotional Guides, but practice was reported to be ad hoc varied considerably between practitioners. Some used them with all parents, while others only used them antenatally when time allowed or when they felt it was necessary. This practice was also confirmed by the observations carried out, six of which were for antenatal contacts and only one for postnatal.

In both study sites, some invitation letters for the Promotional Guide appointments were addressed to 'parents' or 'parents-to-be' but neither site had a system for explicitly inviting fathers. A few health visitors used their own initiative to invite fathers by phone or letter, but this was not routine practice. This explains the previous findings reported by fathers, where only a small number of men were invited to attend the antenatal and postnatal health visitor appointment with their partner (Baldwin et al, 2021).

When health visitors did use the Promotional Guide system, they used the topic cards as a basis of their conversation, offering parents the choice of topic that they wanted to discuss, as intended by the programme. If fathers were present, they were included in the discussions and encouraged to participate. When both the mother and father was

present, health visitors used their professional skills to manage the time between both parents, prioritising their time for the person who needed it more. They also made assessments of the appropriateness of talking to both parents together and where necessary arranged separate appointments (such as in cases of domestic abuse). When fathers were less vocal than their partner, health visitors encouraged them to participate and ask questions to ensure that they felt involved, which was also observed by the researcher during the observations. The findings suggest that health visitors used their 'professional skills' and a 'partnership approach' to using the Promotional Guides as outlined by the programme.

Health visitors also considered the intervention to be inclusive of fathers, due to the way in which the topic cards were designed for 'our baby and us' and included pictures of fathers as well as mothers and babies. Health visitors recognised the importance of involving fathers in these visits and the positive impact it could have on the whole family. While health visitors valued the Promotional Guide system, they often experienced challenges of using them routinely due to time constraints and the increased demands of the services, at both study sites. This also resulted in the intervention not being used with fathers.

Other barriers included not being able to access fathers due to their work commitments, and language and cultural differences. Some health visitors held the view that fathers from certain cultures perceived childbirth and childrearing to be related to the mother

only, and highlighted this as a barrier to men engaging or getting involving in the antenatal and postnatal health visitor appointment. Interestingly, men in this study also highlighted this view held by health professionals, which they felt acted as a barrier to involving fathers in contacts during the perinatal period (Baldwin et al, 2021, under peer review). This suggests that health professionals may be holding on to the more traditional 'breadwinner role' of fathers, which could be preventing them from engaging effectively with men from certain cultures during this period.

Facilitators for using the Promotional Guides system included informing fathers that the intervention was aimed at both parents; explicitly inviting fathers along with mothers; sending them appointments in advance; being able to offer the appointment in home settings, being allowed to dedicate adequate time to deliver the intervention and to have continuity of care (the same health visitor delivering the antenatal and postnatal visit). While wider changes in organisational and social culture are necessary for health professionals to effectively engage with fathers, small changes by individual health visiting teams such as these could have a great impact (Bateson et al, 2017).

Health visitors identified a lack of management support and organisation policy or guidance for the use of the Promotional Guide system and a lack of monitoring of uptake or impact. This was considered a huge gap in the implementation process of the intervention. According to Day et al. (2014), co-ordinated action is required by service managers for the use of Promotional Guides to be effective and sustainable, which should include having clear operational guidance as well as guidance for systems for monitoring routine use and impact of the Guide. This was also highlighted in a UK

based qualitative study of nine health visitors, which identified factors affecting the implementation of the Promotional Guide in practice (Morton and Wigley, 2014). Similar to the findings of the current study, Morton and Wigley (2014) reported that health visitors favoured the partnership approach used as part of the Promotional Guide practice, which enhanced their practice, similar to those also reported by Barlow and Coe (2013) in their evaluation study of the level of implementation and stakeholder perceptions. However, implementation was affected by the lack of integration of client needs with organisational agenda, lack of organisational compliance, and lack of appropriate recording and monitoring systems for Promotional Guides (Morton and Wigley, 2014). As these issues were identified as factors affecting implementation in the current study, a clear implementation strategy and operational guidance that explains "*how the content, timing and duration of Promotional Guide contacts and resulting family strengths and needs analysis and assessment should be recorded*" (Day et al., 2014, pg-.667) should be included in practice.

While all health visitors had received the initial Promotional Guide training, no refresher courses were offered, with concerns raised that the lack of routine use would de-skill their practice. Participants raised concerns about not being able to offer fathers with support if they required it, due to a lack of knowledge about what was available to them. Ensuring health visitors are aware of support services available to fathers in their local area, either through training or supervision sessions, could facilitate better support being offered to fathers.

Information obtained from the fidelity checklist showed that the completion of the 'family strengths and needs summary' by health visitors, identified as an essential component of the intervention, was variable. Two thirds of the health visitors did not complete the 'family strengths and needs summary' at all, while some used it to inform their assessment without actually completing or recording it, and only 2 health visitors reported to fully complete it for each promotional Guide visit. Furthermore, none of the health visitors were aware of the 'Family Map', which was introduced to the Promotional Guide programme in 2016, which reflects the lack of ongoing training or refresher courses relating to the intervention highlighted by the health visitors.

The lack of routine use of the Promotional Guide system by health visitors in this study is probably reflective of the national picture where health visiting numbers have declined drastically over the past four years. The reduced health visiting workforce having to prioritise working with the most vulnerable families, resulting in a universal health visiting service not being provided to all families as set out in Public Health England's Commissioning Guidance (IHV, 2019a).

The finding from this study suggests there were two main factors that prevented effective implementation of this intervention in the two study sites. They relate to organisational, community and public policy level rather than individual or interpersonal. In other words, it was the lack of organisational support, investment in and commitment to the intervention that has led to inconsistency in staff training and support (no refresher courses, no policies or guidelines to inform practice), which resulted in inconsistent practice in relation to the way in which the intervention is offered (targeted

offer, some only offered antenatally etc.) and delivered (inadequate time allocated to visit, inconsistent use of resources).

The organisation operates in the context of the national picture. Health visiting provision in England is locally commissioned (in contrast to the devolved nations of Wales and Scotland), leaving vital decisions to local government members. According to the Institute of Health Visiting (IHV), "*whilst there have been some examples of good commissioning in recent years, even senior Directors of Public Health recognise that commissioning in some areas is not as good as it could be*" (IHV, 2019b, pg-11). This means that the key performance indicators (KPIs) set by the local commissioners and the quality of support that families receive could vary significantly. The most common health visiting KPIs tend to be numerically driven based on the number of contacts undertaken, breastfeeding rates and child health reviews, rather than the emotional and psychosocial aspects of parenting that the Promotional Guides focus on, which are more difficult to measure numerically.

The health visitors in this study often worried about meeting the KPIs set by their local commissioners and adjusted their practice accordingly. By prioritising KPIs over providing a 'meaningful service' increases the risk of simply "*ticking the box, but missing the point*" as highlighted in the Position Statement issued by IHV in July 2019 (IHV, 2019a). In order for the Promotional Guides system to be implemented properly and its benefits to be assessed, senior health visiting managers and leaders need to have a better understanding of the intervention and how it may have the potential to support both the mother and father's transition to parenthood. "*When the contribution of Promotional Guide practice is unclear to senior managers, there is a risk that resources*

*and investment will be directed elsewhere and the achievements and impact of practitioners using the Guides will be undervalued and overlooked*" (Day et al., 2014, pg- 665). Senior managers and leaders need to ensure that the use of Promotional Guides is aligned to the commissioning priorities so that local policies and guidance can be developed to support health visitors in practice. It is also essential that adequate monitoring systems are in place so that the intervention fidelity and impact can be evaluated. This is likely to make the delivery of the Promotional Guide system more meaningful to both practitioners and parents, rather than the inconsistent way in which it is currently being delivered in the two study sites.

**Strengths and Limitations**

There are several strengths associated with this study. Health visitors found being involved in the study was acceptable and study aims were important. They spoke positively about the Promotional Guide programme and considered it to be a useful and suitable intervention for supporting fathers. The identified facilitators and barriers to using this intervention with fathers can inform future practice and research.

As health visitors' participation in the interviews and observations were voluntary, a limitation could be that the views and practices of the participants may not be representative of all health visitors in the two NHS organisations. It is possible that only those who were more proactive and/or confident in using the Promotional Guides volunteered to take part. Furthermore, it is acknowledged that there are some limitations associated with the non-participant observation approach used in this study. Health

visitors being observed by the researcher (who is also a trained health visitor), may have led the participants to behave differently, a phenomenon referred to as the Hawthorne effect. In this case it is possible that health visitors used the Promotional Guides comprehensively to the best of their ability during the observation, when that may not be their usual practice. However, health visitors not using the 'Family Strengths and Needs Summary' or the 'Family Map' during the observations (which were identified as key intervention components), suggests that health visitors were unaware of these resources, as discussed previously.

**Recommendations for Practice & Research**

Fathers should be explicitly invited to antenatal and postnatal appointments with the health visitor and informed that the appointment is for the father as well as the mother. Health visitors should enquire about fathers' mental health and wellbeing, and ask direct questions as they do with mothers. Men are then more likely to express their own needs and engage more. A consistent approach to the delivery of the Promotional Guide system is required. For this to happen improvements need to be made at organisational, policy level and practitioner level. Health visitors using the Promotional Guide system with fathers (and mothers) should inform them about the intervention and that it is designed for the mother and father, which is likely to increase engagement. When using the Promotional Guide system, health visitors need to ensure that they use all materials designed for use in the intervention. Organisational policies should clarify expectations around Promotional Guide use with fathers; its content, duration and timing; and have robust recording and monitoring systems in place. Regular staff training, updates and

supervision for the Promotional Guide system needs to be embedded in practice, to include the use of ‘Family Strengths and Needs’ summary and ‘Family Map’. Health visiting leaders and managers need to ensure that data is collected on Promotional Guide use and outcomes reviewed. These should be reported to commissioners to inform future commissioning priorities and decisions.

Further research is needed to assess the effectiveness of the Promotional Guide system used by health visitors with mothers and fathers. For this to happen the implementation gaps identified in this study and in the report by Baldwin et al (2021, under peer review) need to be addressed first.

## Conclusions

This study considered the acceptability, feasibility and fidelity of using the Promotional Guide programme with fathers from the health visitor’s perspective. The findings provided an insight into health visitors’ experiences of working with fathers, inquiring about men’s mental health needs and their use of the Promotional Guides with men during the perinatal period. Triangulation of data collection was achieved through interviews with health visitors and observation of health visitors using the intervention in practice. Feedback from health visitors and the observation findings were consistent in relation to engagement and involvement, mental health enquiry and promotional guide use. This study identified a number of barriers and facilitators to the use of Promotional Guides with fathers. Recommendations were made for improving services for first-time

fathers, implementing the Promotional Guide system with fathers, highlighting areas for future research.

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## Contributions

The research team consisted of the first author (SB), who undertook all aspects of this study (including recruitment, data collection, data analysis and writing the first draft of the paper), with support from three members of her research team (DB, JS, MM). The findings of the study were discussed amongst the research team at each stage and there were several iterations of this process, before the final results were developed and agreed by all authors. All authors reviewed the manuscript.

## Competing interests

The authors declare no conflict of interest

## Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request**.**

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# 'When the bedbugs come, that's another problem': exploring the lived experiences of bedbug infestations among low-income older adults and service providers who support them

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## Keywords

bedbugs; pest control; integrated pest management; older people; housing; health services

## Abstract

**Aims:** Older adults in low-income housing communities are more vulnerable to bedbug infestations. Prior research, however, has predominately focused on the effectiveness of integrated pest-management strategies, with little attention given to the lived experiences of tenants struggling with infestations. We used a qualitative approach to explore what it is like to live with and treat bedbug infestations from the perspectives of low-income older adults and service providers.

**Methods:** Participants included low-income older adults ($n = 58$) and service providers ($n = 58$) who offer supports directly in the buildings. Semi-structured qualitative interviews and focus groups were used to explore the challenges of preparing and treating units for bedbugs, and examine how bedbugs impact access to support services.

**Results:** Bedbugs were a widespread issue, and underlying physical, mental, social, and financial challenges made it difficult for older tenants to prepare their units and access treatment. Tenants also faced bedbug stigma from community services, as many were unwilling to provide services in infested units. Although some service providers utilized strategies to minimize exposure, many were concerned these strategies created additional stigma.

**Conclusion:** Our findings highlight an urgent need to increase public health funding to support older adults with the costs of bedbug elimination and to enhance pest-management strategies through partnerships with health and social service agencies to improve outcomes for older adults.

## INTRODUCTION

Over the past 20 years, there has been a global resurgence of bedbugs.[1] Bedbugs are found in dark places, such as mattresses, bed frames, furniture, and baseboards.[2] They emerge at night for blood meals from a sleeping human host; with continual feeding access, bedbugs multiply exponentially in a few short months, leading to large infestations.[3] Bedbugs are prevalent in low-income communities,[3–5] where ineffective pest management has been linked to insufficient financial resources, low awareness among residents, and an inability to prepare units for treatment.[6–10] Control of bedbugs requires an integrated pest-management strategy that combines chemical (i.e. insecticide) and


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non-chemical (e.g. steaming, encasement, vacuuming, de-cluttering) elimination strategies with early detection, education, and outreach.[7]

Bedbug infestations represent a significant public health concern.[11] In addition to the economic impact,[12] the health consequences are tremendous: the bites lead to itchy and painful lesions and rashes,[5] and infestations cause sleep disturbances,[3] psychological distress, and stigma.[13] The detrimental impacts of bedbugs may be more severe for older adults,[13] who are least likely to be aware of and report infestations.[14] For instance, Wang et al.[15] found that awareness of bedbugs among low-income older adults was low, yet 45% of units were infested. When infestations were identified, older tenants struggled with treatment compliance due to limited financial resources and physical disabilities.[9] Older residents with unmanaged pest infestations may also be at risk of losing access to in-home health and social services, as service providers may be hesitant to go into infested homes.[16]

Much of the research to date has focused predominately on understanding the scope and clinical relevance of bedbug infestations and evaluating integrated pest-management strategies.[3,7] There is a dearth of research on the lived experiences of those with chronic infestations. For example, a recent scoping review on the mental health impacts of bedbugs found that only 5 of 51 reviewed articles presented original research.[13] There is also a lack of qualitative evidence, which limits our understanding of what it is like to live with and treat an infestation from the perspective of tenants. Given that low-income older adults may be more vulnerable to infestations,[9,13,15,17] it is critical to understand the unique challenges that they face living with bedbugs. This study used a qualitative approach with low-income older adults, as well as with service providers who support them, to explore: (1) the challenges older tenants face preparing their units and receiving treatment and (2) how bedbug infestations impact their access to in-home health and social services.

## METHODS

This article is based on data from a larger qualitative study aimed at understanding the lived experiences of older adults residing in social housing in Toronto, Canada.[18] Pest control emerged as a pervasive issue negatively impacting quality of life for tenants. Therefore, this article explores the challenges of managing bedbug infestations from the perspectives of older adults and service providers who support them.

### Study context

This study was conducted in Toronto, which was ranked as Canada's top bedbug city in 2019 and 2020.[19] We worked with a social housing provider that is home to over 35,000 older adults (aged 59 years or older). The housing provider recognizes that effective pest management is essential for building healthy communities; however, pest infestations have been on the rise. For example, recent news articles highlight how mail services were halted in a seniors' building due to an ongoing bedbug infestation in the mailroom. Furthermore, in 2020 the housing provider received over 50,000 service requests for pest infestations, predominately bedbugs. To manage infestations, the housing provider uses an integrated pest-management approach that incorporates community engagement, education, proper preparation for treatment, and responsible use of pesticides.

### Sample

Older adults ($n = 58$) were recruited through flyers placed in common areas of their building (e.g. lobby). Interested tenants contacted the researcher to schedule an interview or sign up for a pre-scheduled focus group. Characteristics of participating tenants are shown in Table 1.

Service providers ($n = 58$) were recruited through flyers distributed to various health and social service agencies that operated in the buildings. Interested participants contacted the researcher to schedule an interview or sign up for a pre-scheduled focus group. Service providers represented frontline and management roles from a variety of sectors, including social work, nursing, housing, psychiatry, supportive housing, care coordination, and community support services (CSS).

### Data collection

Interviews were conducted by telephone or in-person at an agreed upon location. In addition, six focus groups (two with tenants and four with service providers) were carried out. Tenants had the option to complete their interview in English ($n = 41$), Chinese ($n = 14$), or Tamil ($n = 3$). Data were collected between November 2019 and February 2020. All sessions were facilitated by a trained interviewer and lasted approximately 1 h. The discussion explored several topics related to tenancy management and access to services. Sample interview questions related to pest management are provided in Table 2. All sessions were audio-recorded and transcribed verbatim. Non-English transcripts were professionally translated and reviewed by the interviewer for accuracy. All transcripts were uploaded into NVivo 12 for analysis.

Ethics approval was granted from the Sunnybrook Health Sciences Centre, and informed consent was obtained from all participants at the beginning of the study. Tenants received a CAD$25 gift card for their participation while service providers received refreshments or a CAD$10 gift card.

### Analytic approach

Our research team utilised a qualitative descriptive approach[20] to elicit a rich description of bedbug management from the perspective of older adult tenants and service providers. This approach is widely used in health research[21,22] due to the emphasis on learning from lived experiences and using that knowledge to influence policy and practice.[20] Following the principles outlined by Braun and Clark[23] and Saldana,[24] transcripts were read and re-read, and line-by-line coding was carried out using the method of constant comparison. Rigour was established through a combination of techniques including double-coding, audit trails, memoing, and team meetings.

Table 1

**Tenant characteristics**

| Characteristics | Mean value ± standard deviation (range) | % (*n*) |
|---|---|---|
| Age | 70.4 ± 8.4 years (57–92 years) | |
| Gender (male) | | 50% (*n* = 29) |
| Live alone | | 75% (*n* = 44) |
| Length of tenancy | 9.1 ± 8.4 years (3 months–38 years) | |

Table 2

**Sample interview questions**

Tenant interview questions:

- When you think about what makes a 'home', what three words come to mind?
- What do you like most about your home?
- What helps you to maintain your apartment (e.g. keep it free of pests)?
- What makes it challenging for you to keep your apartment in good shape?

Service provider interview questions:

- When you think about what makes a 'home' for older tenants, what three words come to mind?
- What are the main challenges older adults face maintaining their unit?
- What factors influence how successful tenants are at maintaining their unit?
- When tenants have challenges with their unit condition (e.g. pests), how do you work with housing staff/service providers to support them?

Following our analysis, a composite narrative was created to draw together the shared experiences of tenants managing a bedbug infestation. Composite narratives draw on data from several interviews to create a single story that reflects a common understanding,[25] and they give voices to groups with unique lived experiences.[26–28] The choice for a composite was also driven by the personal and compelling stories shared by tenants. Following the steps described by Willis,[25] the narrative was created out of coded data emerging from tenants who had lived through persistent bedbug infestations that spanned many treatment cycles. The creation of the narrative was iterative, involving repeated cycles of reviewing the data and writing the narrative. The final narrative synthesizes the lived experience of tenants and conveys the richness of their stories through verbatim quotes.

## RESULTS

Bedbugs were a 'paramount issue [. . .] regardless of what building or what part of the city' (SP30, Care Coordinator). They were a constant source of fear, and tenants felt that no matter how hard they worked, the bedbugs always came back. Infestations had reportedly increased over the past two decades, with one geriatric psychiatrist describing how 'this is something I never thought I would talk about, I literally never dealt with it in the 80's and 90's [. . .] and now it's become a nightmare' (SP14, Geriatric Psychiatrist). In fact, infestations had become so widespread that this participant felt the housing provider was 'fighting a losing battle – they're like a finger in a dike but they don't have enough fingers'.

Many tenants had repeated experiences with bedbugs; the composite narrative shown in Box 1 reflects this experience. The remainder of our results discuss the challenges of preparing and treating units for bedbugs, including the reasons that make unit preparation challenging for older tenants, the difficulties coordinating treatment, and the impact of bedbugs on accessing in-home health and social services.

### Preparing the unit – 'If things don't get prepped properly, you'll never get rid of the bedbugs, but you can't expect a senior to be able to prep their unit'

Service providers and tenants stressed the importance of the pre-treatment preparations, emphasizing that the unit 'has to be prepared in a flawless way' (SP13, Supportive Housing Manager) or else the bedbugs return; however, there was a widespread understanding that older adults face obstacles preparing their unit. As one service provider described, 'they might have the wherewithal to prep but they don't have the physical ability. Or they might have mental health [challenges] and not understand how to prep or comply with the requirements' (SP9, CSS Manager). These physical and mental health challenges were exacerbated by a lack of financial and social resources that would usually be drawn upon in the absence of accessible prep services (see Table 3).

'Flawless' unit preparation included de-cluttering and 'bag[ging] up all your stuff. Not just your clothes. Everything. Things on the walls, all into bags' (SP7, Tenant Services Coordinator). This was particularly difficult for tenants living in bachelor apartments 'where there is nowhere to put all your packed stuff' (Tenant 35). 'Living out of bags' (Tenant 27) was stressful and frustrating, as it was difficult to find belongings among the 'dozens of bags' (Tenant 28). Tenants described living in 'chaos' (Tenant 25) and noted that preparation process 'destroyed their life' (Tenant 21). Throwing out infested furniture was particularly traumatic but commonplace. As one tenant described,

> *I had nice drapes on there. I saw one crawling down. Gone. I got rid of my couches. I got rid of my bedding. I washed the clothes so much I don't*

Box 1 Rose.

Rose is 70 years old. For the past 5 years, she has lived alone in her bachelor apartment. Unfortunately, Rose has bedbugs. She has had them six or seven times since she moved in, and each time it destroys her life. She is not sure where they came from this time – she thought she had been so careful to avoid her neighbour who she knew had refused bedbug treatment. Rose puts out a powder she got from the hardware store to try and stop them, but the infestation continued to grow: '[The bedbugs] basically ended up [in] my couch, behind my bookcase, behind my wall unit. They were in my bedroom, they were actually in my bed [. . .] and literally when I would lie down to go to bed, I could feel them moving [on me]'.

Rose was afraid to tell her housing provider – she is worried they will make her throw out her things or that they might ask her to leave because she keeps having issues. After a few weeks, she finds the courage to report the infestation, and housing staff tell her that a pest control company would be coming to spray her apartment next week and that she needed to prepare her unit. Even though Rose is 'one of the more fit seniors in the building', she knows from experience that 'the prep is extremely hard' and she cannot do it on her own. Even though it's not her job, her social worker put on a 'hazmat suit' and helped Rose throw out her bed and her couch, which she was told were too infested to clean. Since Rose cannot afford to buy new furniture, her social worker is going to make a referral to the local furniture bank to replace the items that were thrown out, but until then, she will have to 'sleep on the floor'.

Throwing out her belongings makes Rose upset, but she knows it's her only option. 'I don't like losing my stuff, but I do. And the only way to get rid of [the bed bugs] is to get rid of all the stuff you have'. Together, they also packed away all of Rose's clothes, and put the rest of her belongings into freezer bags, including her books and pictures, so that the bugs won't get them. 'Everything I had in my apartment was all in plastic bags in the middle of my floor or on my kitchen table. I cannot move in my apartment, [. . .], I've got maybe [two or three feet] of space that I can maneuver in. [. . .] It looks like a tsunami'.

Since her apartment is so small, Rose 'filled up [her] bathtub [with bags], so every time [she] wanted to take a shower, [she] had to empty [it] out'. Rose is worried about how long she'll have to live this way; she knows it will be at least 6 weeks before she can unpack her things, but it could be longer. With all her stuff in bags, she no longer feels safe or at home in her apartment. She also doesn't want her friends to find out – what if they start avoiding her now?

Rose does not trust her housing provider to get rid of the bedbugs. The contractors rarely show up, and when they do, they 'are in and out in five minutes'. Tomorrow, she is going to go out and buy a steamer so that she can 'steam the bejeebers out of everything' like the baseboards and her chairs. Rose hopes that this will help her have more control in her life and stop living out of bags.

*think they're even going to stand up any longer. I can't afford this anymore. I can't afford living on the floor, sleeping on the floor, because if I get them again, everything's going back to the garbage. I've just had enough.* (Tenant 39)

Service providers indicated they do 'the best we can with the hours we have' (SP13, Supportive Housing Manager) to help with preparation, but most were not resourced to provide full support. There was also a noted gap with the lack of 'post-prep' services to help tenants unpack and re-organize their apartment after treatment:

*A big problem [. . .] is there's not really any post prep. So, you got the prep, you got the treatment, but all your stuff is in bags on the floor now and it's been three months and your bags are all over the floor and you can't physically put the stuff away. Now you're pissed because you agreed to this service, and you didn't think it was going to disrupt your life and now it has [. . .] and no one is helping you put it away.* (SP6, Social Worker)

### Getting treated – 'It takes a concentrated effort to help the people that are most vulnerable'

Service providers emphasized the need to work together with tenants, housing staff, and vendors to successfully treat the units. Without effective coordination, service providers described the risks of tenants refusing treatment or bringing infested items back into the newly treated unit because their coats, bags, wheelchairs or walkers, and cat carriers were not steamed:

*You need to organize to have a [personal support worker] there to make sure they get showered and bathed, that they put on clean clothes, and that somebody is there when the pest control guy comes so that he knows he needs to steam down the walker. It's a lot to coordinate.* (SP7, Tenant Services Coordinator)

One service provider attributed their success to the fact that they were a member of an 'integrated pest-management table' that included staff from their agency and the housing provider who worked together to apply a case management approach to tenants with chronic bedbug infestations.

A notable challenge was that 'people don't know where to go when they have to be out of the unit for four hours' (SP7, Tenant Services Coordinator). While one nurse practitioner described how their 'program has access to a respite unit while they are getting bed bug treatment' (SP2, Nurse Practitioner), others stressed that tenants 'don't have anywhere to go' (SP24, Care Coordinator) and that it was unreasonable 'to ask an 80-year-old woman with mobility issues to spend five hours in the lobby' (SP1, Social Worker). This process was even more complicated for tenants with pets. One tenant discussed the difficulty he had putting his cats in carriers to keep them in the gymnasium all day (Tenant 7), while a service provider described how they 'put

Table 3

**Challenges faced preparing units for treatment**

| Challenge | Supporting quote |
|---|---|
| Lack of education and awareness | 'A lot of times people won't say anything if they see it's a problem. Others don't see the problem. 'Oh, it's couple of bugs' meanwhile they are everywhere. And so, that's challenging, as well as them understanding the cycle of bedbugs and the importance of prep. There are sometimes inconsistencies in how that's communicated and the expectations around that'. (SP1, Social Worker) |
| Lack of social support | 'They have very limited social support, so there is no one to do the prep for them'. (SP14, Geriatric Psychiatrist) |
| Poor physical health | 'I have osteoarthritis in both my legs and in my lower back. I've had two knee surgeries on my left knee, total knee replacement. I cannot bend down, and I cannot pick things off the floor'. (Tenant 7)<br>'If they have a visual impairment, they can't see the bedbugs. They don't always react to a bite, and they can't see the bite'. (SP15, Case Manager) |
| Memory problems | 'We work with a lot of people with cognitive impairment, and someone will come in and put all the stuff in bags and then the tenant doesn't remember why [their stuff] is in bags. So, they open them all back up again'. (SP2, Nurse Practitioner) |
| Lack of financial resources | '[The housing provider] will come in to treat the unit, but these seniors, they don't have any income, they can't pay for any private help to come and help them [prep]'. (SP33, Care Coordinator) |
| Lack of support services | 'A lot of times, a person can't get access to [prep] services unless they are going to be evicted'. (SP13, Supportive Housing Manager)<br>'The bed bugs end up coming back. [. . .] but it's hard to find funding for people who get bedbugs repeatedly. Agencies, I find, will fund the first time, then you're on your own'. (SP31, Care Coordinator) |
| Excess clutter | 'Hoarding and bedbugs, they go together. Once they have accumulated a lot of things in the apartment, the bedbugs live there'. (SP51, Supportive Housing Nurse) |
| Fear of repercussions | 'The tenants that are afraid to come forward because they're afraid of . . . Let's say, seniors in general, have a feeling where they're losing some control over their lives. [With bedbugs], the fear is that if someone comes in, maybe they'll make me throw away all of my belongings, maybe they'll throw me out, maybe they'll do something I don't understand, and I'll get sick, or whatever'. (Tenant 35) |

the cat on the balcony and hope it's okay' (SP6, Social Worker) because there were no other options. Tenants and service providers alike questioned why there was not a more systematic approach to treatment supports; while tenants described that they were sometimes able to use an empty unit in their building, these were not reliably available.

Quality control with pest vendors was also an issue. Participants were concerned that the housing provider 'takes the lowest bidder' (SP52, Supportive Housing Nurse) and had several examples of vendors not coming at the designated day or time, as well as superficially treating the unit. Participants stressed the need to 'enforce' proper treatment protocols, as vendors were known to cut corners:

> *Sometimes I'm playing the role of, 'they didn't get their spraying this week? What happened with that?' or 'they've had all their sprayings, but it looks like there's still some bugs there', you know? Getting them back in. [I have to] advocate, but also [be] the bug inspector as well, it seems.* (SP1)

Tenants wanted to be able to give input on pest control vendors. One tenant exclaimed, 'we're the ones that live there, right? If anybody's going to know, we're going to know [. . .] we're going to see [who] is getting results or not getting results' (Tenant 27). In the absence of effective pest management, tenants took it upon themselves to implement their own measures. They used diatomaceous earth (Tenant 16) and eucalyptus and bleach cleaning solutions (Tenant 17), paid for private fumigation (Tenant 30), and purchased hand-held steamers (Tenant 15 and Tenant 27). Others lobbied their City Councillor for building-wide pest-management initiatives. For instance, one tenant shared a list of 21 written deputations presented at City Council describing their chronic infestations, while another discussed a recent experience organizing a meeting between housing staff and their local councillor:

> *We've been asking for [a building-wide treatment] for a long time, and we've done our own in-house surveys, we've followed the pest*

Table 4

**Strategies used by service providers to reduce exposure in infested units**

| Safety strategy | Supporting quote |
|---|---|
| Wear personal protective equipment | 'It depends on how bad the bedbugs are. So, it can be from just the booties that cover the shoes, if they are not bad at all, to the knee-high booties, to a full suit'. (SP13, Supportive Housing Manager) |
| Bring a change of clothes | 'I always bring myself a change of clothes or two in my car, because sometimes if I know I've been in a unit that is pretty infested, then before I leave the building, I change my clothes'. (SP6, Social Worker) |
| Bring a stool to sit on | 'Yeah, you can't really have a conversation with somebody, particularly if you're getting into complicated stuff, while you're standing. Plus, I need to be taking notes, like I can't do that standing up [. . .] if it's reasonably safe, if I can find like a plastic chair or something to sit on, I'll do that. But barring all of that, I have a little camp stool just a little foldable camp stool that I take with me, and I just sit on that'. (SP2, Nurse Practitioner) |
| Education sessions | 'We do extensive training as well with staff. We actually brought [housing's pest control manager] in one time to give a presentation to staff just around what to do if you're in an environment with bedbugs. There are techniques and tactics that we teach staff. Some of the things, like you said, the bedbug one, some of the number ones are really like, not using cuffed pants, for example, not sitting, don't put your things down, checking yourself as soon as you leave. Or leave your belongings in the car or outside the door'. (SP10, CSS Manager) |

> *people around to see how many units they were doing. No one in management was listening to our problems. So, we thought it was time to phone the councillor. It has taken [4 months] to get a response from [housing] to come to a building meeting. [In the end], they said the building is lined up for the full building treatment that we have been asking for since [last year].* (Tenant 35)

### Access to services – 'There's a lot of agencies that won't even go into someone's place if they have bedbugs'

Tenants experienced bedbug stigma from community services: some were not eligible for services if they had an active infestation, and others were asked not to attend medical appointments until the infestation was cleared:

> *Going to physiotherapy, I put my coat on, and I saw that I had bedbugs on my coat that had been super dried twice. I thought, [if I tell them], they'll make me cancel and they will make me pay for the physio anyways.* (Tenant 15)

Service providers discussed going into infested units only if they felt comfortable. For instance, one nurse practitioner indicated that they would go into units 'as long as the infestation is not overwhelming, like [if] there's bedbugs falling off the ceiling, which we have sometimes' (SP2). In the absence of entering units, service providers would try to meet clients in common areas of the building but cautioned that this was 'not a practical policy' (SP1, Social Worker) because many clients are unable to safely leave due to mobility challenges. Other service providers distinguished between providing hands-on care versus psychiatric and mental health support, suggesting that it was more difficult to provide personal care (e.g. bathing) in infested units, especially as the packed bags create safety hazards navigating the unit.

Service providers did not want to 'be the cause of the bedbugs that spread' (SP16, CSS Manager). To reduce risk, they implemented a variety of strategies to limit exposure in infested units (see Table 4). Despite the need for these safety measures, some were concerned that they dehumanized their client. For instance, one service provider reflected that 'when you're pulling the [full] body suit on, the tenants know there is a real serious problem. Usually the first question is, why am I still here if it's bad enough for you to put that on?' (SP8, Tenant Services Coordinator). Another felt it was impossible to maintain a client's dignity if you bring your own chair into their home (FG34, Care Coordinator).

## DISCUSSION

Our findings shed new light on the experiences of bedbug infestations among low-income older adults and the health and social service providers who support them. Participants described fighting a losing battle against pervasive bedbug infestations. Older tenants faced several obstacles navigating the pest-management process, including difficulties preparing their unit and coordinating treatment. In addition to the detrimental impacts on mental health, bedbugs negatively impacted access to services. Findings point to several opportunities to enhance integrated pest-management strategies to improve outcomes for low-income older adults.

This study highlights the stress that older adults experience managing bedbugs: tenants lived in fear of having to manage another infestation. The process of preparing their unit for treatment felt insurmountable due to physical, mental, social, and financial barriers. For those who were forced to throw away their belongings, the added financial strain of replacing their belongings created additional distress. Many tenants also experienced stigma from service providers who refused services due to bedbugs. While experiences of distress, stigma, and fear have been widely reported in commentaries and case

Table 5

**Practice recommendations.**

| | |
|---|---|
| Provide More Unit Prep and Unprep Services | More public health funding is needed to support older tenants with unit preparation, furniture replacement, and reorganization (i.e. unprep) after treatment to reduce the physical, psychological, and financial impacts of bedbug infestations. |
| Include Service Providers as Members of the Integrated Pest-Management Team | Integrated pest-management teams should be expanded to include health and social service providers, as they play a critical role in identifying and reporting infestations, supporting unit preparation, liaising with pest control vendors, and facilitating follow-up preventive measures, including identifying re-emerging infestations, and providing support for factors (e.g. clutter) that place older tenants at risk for re-infestation. Including health and social service providers as members of the integrated pest-management team will allow for the co-creation of best practice guidelines for operating in infested units and facilitate opportunities for training on strategies to identify infestations and reduce personal exposure when supporting clients in infested units. |
| Enhance Pest-Management Approaches for Older Adults | Social housing providers need to tailor their pest-management approach in response to the unique challenges faced by older tenants. This should include more diligent, building-wide monitoring of infestations, as well as providing resources to support the preparation and treatment process such as mattress encasements, heavy duty garbage bags, and a safe place to stay in during treatment. |

reports over the past decade, very little original research has been conducted.[13] Therefore, our findings provide some much-needed insights into the concerns of low-income older adults about bedbugs, and how these infestations impact their mental health.

In prior research, spatial factors (e.g. clutter) were recognized as key safety concerns in homecare.[29,30] Bedbugs, however, were not discussed, despite the potential reluctance to provide care in infested homes.[16] In this study, service providers discussed the need to balance their personal safety with their duty to clients; however, strategies to reduce exposure in infested units were not always perceived as feasible to implement, particularly when they further stigmatized the client. The lack of best practice guidelines for providing services in infested units also led to inconsistent policies across agencies, creating additional barriers to support.

Older tenants and service providers both expressed concerns over the quality of pest control vendors and the implications this had for the treatment process. Studies show that choosing the lowest cost vendor is not uncommon, but dedicated and careful vendors are needed to ensure success.[8] As a result of poor-quality vendors, tenants had little trust in their housing provider to manage infestations and resorted to implementing their own initiatives, including mobilizing political ties to advocate for better vendors and building-wide treatment protocols.

## Recommendations

Based on our findings, three recommendations have emerged to enhance the integrated pest-management process for low-income older adults (see Table 5 for a summary).

### Provide more unit prep and unprep services

Non-compliance with the preparation process is a well-known barrier in pest management.[6–10] Our findings build on this literature and shed further light on the physical and mental health challenges older tenants face executing and complying with the preparation process. Lack of social support and financial resources exacerbated these issues, and there were very few services available in the community to fill these gaps. There was also a dearth of formal supports to help tenants unpack and re-organize their apartment following treatment. In a noteworthy evaluation of an integrated pest-management approach with low-income older adults,[8] housing staff were responsible for carrying out preparations. Without resources to support underlying physical, mental, social health challenges, compliance with the preparation requirements is likely to be an ongoing issue.

### Include service providers as members of the integrated pest-management team

Successful integrated pest-management programmes involve a three-way partnership between residents, building managers, and pest managers;[6] however, our findings identify health and social service providers as key partners. As evidenced by one agency in this study, integrated pest-management meetings between housing staff and service providers allowed for case management approaches to be applied, ensuring that tenants with complex needs were fully supported throughout the treatment process. This practice also facilitated training opportunities for frontline staff on how to identify bedbugs and strategies to reduce exposure in infested units. This type of interprofessional team is further supported by Ashcroft et al.[13] who called for interdisciplinary collaborations to develop effective strategies to support clients during pest infestations.

### Enhance pest-management approaches for older adults

There are several ways for housing providers to tailor their pest-management approach to better support older tenants. One widely-requested example was a designated unit for older tenants and their pets to use while their unit is being treated. In other studies, housing staff provided mattress encasements and

heavy duty garbage bags to older tenants to support unit preparation.[8]

Our findings also highlight the need for more deliberate, building-wide monitoring to address persistent and re-emerging infestations. For instance, Cooper et al.[8] found that a rigorous bi-weekly post-treatment follow-up schedule with older tenants was important for ensuring infestations were completely cleared. Participants in this study also called for more regular unit inspections as well as more accountability for pest control vendors, as they observed that vendors cut corners during treatment. While this level of monitoring may be more resource intensive,[8] it may also help re-build trust among tenants that their housing provider is committed to providing a pest-free home.

### Limitations

This study does not capture the experiences of housing administrators and pest managers, who are critical members of the integrated pest-management team. Future research should apply qualitative approaches to consider the barriers and facilitators of integrated pest-management strategies with low-income older adults from these perspectives.

## CONCLUSION

Older adults in low-income housing communities are more vulnerable to pest infestations and face a variety of obstacles navigating the pest-management process. As a result, many have repeat experiences with bedbugs. There is an urgent need to increase public health funding to support older adults with the cost of bed bug elimination and to enhance pest-management strategies through partnerships with health and social service agencies.

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# Cross-sectional and longitudinal relationships between cardiorespiratory fitness and health-related quality of life in primary school children in England: the mediating role of psychological correlates of physical activity

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**Abstract**

**Purpose.** The aims were (i) to analyse the cross-sectional and longitudinal associations between children's cardiorespiratory fitness (CRF) and health-related quality of life (HRQoL), and (ii) to examine whether these associations were mediated by physical activity self-efficacy and physical activity enjoyment.

**Methods.** This study involved 383 children (10.0±0.5 years) recruited from 20 primary schools in northwest England. Data were collected on two occasions 12 weeks apart. The number of laps completed in the 20m Shuttle Run Test was used as the CRF indicator. HRQoL was assessed using the KIDSCREEN-10 questionnaire. Physical activity self-efficacy and enjoyment were assessed with the social-cognitive and Physical Activity Enjoyment Scale questionnaires, respectively. Linear mixed models with random intercepts (schools) assessed associations between CRF and HRQoL cross-sectionally, and longitudinally. Boot-strapped mediation procedures were performed, and indirect effects (IE) with 95% confidence intervals (CI) not including zero considered as statistically significant. Analyses were adjusted for sex, time of the year, socioeconomic status, waist-to-height ratio, maturation and physical activity.

**Results.** CRF was cross-sectionally associated with HRQoL (β=0.09; 95%CI=0.02, 0.16, $p$=0.015). In the longitudinal analysis, CRF at baseline was associated with HRQoL at 12 weeks after additionally controlling for baseline HRQoL (β=0.08; 95%CI=0.002, $p$=0.15, $p$=0.045). Cross-sectionally, physical activity self-efficacy and enjoyment acted individually as mediators in the relationship between CRF and HRQoL (IE=0.069; 95%CI:0.038; $p$=0.105 and IE=0.045; 95%CI:0.016; $p$=0.080, respectively). In the longitudinal analysis physical activity self-efficacy showed a significant mediating effect (IE=0.025; 95%CI=0.004; $p$=0.054).

**Conclusions.** Our findings highlight the influence of CRF on children's psychological correlates of physical activity and their overall HRQoL.

**Key words:** Health, physical fitness, quality of life, youth.

## 1. Introduction

Health-related quality of life (HRQoL) is a multidimensional concept which reflects an individual's own perception of their physical, mental, social health, and functionality.[1] HRQoL has been highlighted as an important health indicator[2] since perceived well-being and functionality are considered important components of health surveillance.[3] Indeed, investigating HRQoL has been nowadays considered relevant due to its relationship with both self-reported chronic diseases (e.g., diabetes, breast cancer, arthritis, and hypertension) and their risk factors (e.g., body mass index, physical inactivity, sleep patterns, diet quality, and smoking status).[4] Measuring HRQoL can help to determine the burden of preventable disease, injuries, and disabilities, and can provide valuable new insights into the relationships between HRQoL and risk factors.[5] Thus, over the past twenty-five years, HRQoL has become an important outcome in healthy children, being commonly examined by professionals, such as clinicians, caregivers, educators, or public health authorities due to a collective interest towards the subjective perception and evaluation of an individual's own life.[6–8] Given the importance of HRQoL, identifying factors that may contribute to improving children's HRQoL is a public health priority.

Among possible factors influencing children's HRQoL, previous cross-sectional studies have revealed significant positive associations with cardiorespiratory fitness (CRF). CRF represents a measure of the body's ability to deliver and use oxygen to support muscular activity during physical activity[9] and is considered an important health marker.[10] Previous research suggests that CRF may be a potentially useful strategy to enhance children's HRQoL, however evidence of this relationship is limited to cross-sectional studies.[11–13] For example, Andersen et al.'s study of 1129 schoolchildren aged 10 years, showed that CRF was positively associated with overall HRQoL.[11] Another study including 415 children aged between 8 and 9 years reported a positive weak correlation between CRF and HRQoL in boys, but not in girls.[12] Moreover, the study of Redondo-Tébar et al., which involved 1413 younger children, aged 4 to 7 years, concluded that children with higher CRF levels had greater HRQoL.[13] While informative, these studies cannot explain the dynamic processes that could occur over time, neither provide a long-term perspective of the influence that CRF might have on HRQoL, which could contribute to understanding the determinants of children's health outcomes.[14] Thus, to strengthen the current evidence base, investigation into the longitudinal associations between CRF and HRQoL is warranted.[15]

CRF has been considered a physiological component that has been reported to influence psychological correlates of physical activity.[16,17] This is possibly due to the impact that sufficient levels of CRF have on brain functioning (e.g., serotonin), self-worth, life satisfaction[16] and the reward system.[17] Indeed, previous literature reported that children with higher levels of CRF had stronger psychological correlates of physical activity, such as physical activity self-efficacy[18] and physical activity enjoyment[16] compared to low CRF peers. Thus, CRF seems to be an important

attribute positively influencing psychological correlates. On the other hand, two previous studies which implemented new school playground activities, reported positive associations between children's physical activity enjoyment and HRQoL.[20,21] Taken together, it is plausible that the positive association between CRF and HRQL in children is explained through the influence that CRF exerts on the psychological correlates.

Based on this previous research, there is a need for future studies to investigate variables influencing HRQoL, specifically focusing on CRF as a variable that could impact HRQoL as well as other physical activity correlates,[22] which could act as possible underlying mechanisms in that association. This will be of interest for health authorities seeking to improve children's overall HRQoL through the implementation of educational interventions at schools and the design of public health strategies. Therefore, the aims of this research were (i) to analyse the cross-sectional and longitudinal association between children's CRF and HRQoL, and (ii) to examine whether these associations were mediated by physical activity self-efficacy and physical activity enjoyment separately, as key psychological correlates of physical activity.

## 2. Material and methods

### 2.1 Study design

This observational study used baseline and follow-up data from the *Active West Lancs* primary school physical activity and wellbeing programme. The aim of this programme was to evaluate the impact of a combined educational and exercise programme designed to promote and enhance children's physical activity behaviours and knowledge, fitness, and wellbeing. The programme aligned to the UK government's Childhood Obesity Strategy recommendation for children to engage in 30 minutes of physical activity during the school day.[23] The programme was delivered in four clusters of five schools over four consecutive12-week phases between 2018 and 2019. As no significant pre-post changes were observed in CRF and HRQoL outcomes over the 12-weeks, for this study the baseline data were treated as cross-sectional, and the combined 12-week follow-up longitudinal data were treated as longitudinal.

### 2.2 Participants

The 20 schools were situated in West Lancashire, northwest England. All year 5 children (age 9-10 years) in the schools were informed about the project and received an information pack to share with their parents/carers. Written informed consent and assent were required from parents/carers and children respectively, before children could participate in the project in accordance with the project approvals granted by the University Research Ethics Committee (#SPA-REC-2015-182). Children were included if they provided the required informed parental

consent, assent, and medical screening forms, which indicated an absence of any medical conditions or disabilities preventing participation in the data collection and/or regular physical education lessons. The analytical sample consisted of 383 children (44.4% girls) at baseline and 272 children (43.4% girls) at 12-week follow-up. The participants' drop-out at follow-up was primarily due to absence from school on data collection days. This study used participants' valid data for CRF at baseline and HRQoL at baseline and at 12-weeks follow-up.

## 2.3 Active West Lancs Programme

The Active West Lancs programme consisted of classroom-based healthy lifestyle education lessons based on the 'Dr Feelwell' concept developed by MerseyCare National Health Service Foundation Trust (https://www.merseycare.nhs.uk/), and structured 'Born to Move' physical activity lessons (https://www.lesmills.com/borntomove/). Both were taught once per week for 45-60 minutes by physical activity specialists from an organisation which delivers physical education, physical activity, health, and wellbeing sessions in West Lancashire primary schools. The lessons complemented the regular curriculum and did not replace mandatory subjects that cover physical activity, health, and wellbeing concepts (e.g., physical education). The data reported in the present study are from the 20 schools involved in the four phases of the programme (January-April, April-July, September-December 2018, and January-April 2019) (supplementary figure 1).

## 2.4 Measures

### *2.2.4.1 Cardiorespiratory fitness*

The 20-m multistage shuttle run test (20mSRT)[24] was conducted to provide an estimate of CRF. This test has been used extensively with participants of a similar age to those in the current study.[25] Prior research showed its validity (corrected mean *r* at the population level [95% CI]: $r_p$ = 0.78 [0.72-0.85]) and reliability (intra-class correlation coefficients ranging from 0.78 to 0.93) in children.[26] Participants were encouraged to run for as long as possible until exhaustion or until they had reached their maximal effort. Otherwise, the test ended if the participant failed to reach within 2m of the marked line on two consecutive occasions. The 20mSRT was administered by the research team on a flat, clean surface indoors (e.g., sports/assembly hall) or outdoors (e.g., school playground) depending on available facilities and was completed in groups of up to 10 children. The total number of completed laps (shuttles) was used as a proxy indicator of CRF.

### *2.2.4.2 Health-related quality of life*

The KIDSCREEN-10 Index questionnaire was used as a measure of global HRQoL[3]. KIDSCREEN-10 is a 10-item questionnaire, which asks participants how they felt in the last week. Items reflect the factors of physical well-being, psychological well-being, autonomy,

parent relations, peers and social support, and school environment, which are derived from the 27-item version of KIDSCREEN and are presented using a 1-5 Likert scale (i.e., 1 = "nothing" and 5 = "very much").[1] Cronbach's alphas are 0.82 and test–retest reliability was also generally satisfactory with internal consistent coefficients (ICCs) ranging from 0.61 to 0.70.[27] The Cronbach's alpha for internal consistency of this questionnaire was 0.73 and 0.71 for the cross-sectional and longitudinal samples, respectively. Raw scores were converted to T-scores using the methodology described in the KIDSCREEN administration manual.[3] The questionnaire was completed in classrooms following instructions from the research team and in the presence of the class teachers.

*2.2.4.3 Socioeconomic status*

Neighbourhood-level socioeconomic status (SES) was calculated for each child using the 2019 Indices of Multiple Deprivation (IMD).[28] The IMD is a UK government-produced deprivation measure for England comprising income, employment, health, education, housing, environment, and crime.[28] IMD rank scores were generated from parent-reported home postcodes using the National Statistics Postcode Directory database. Every neighbourhood in England is ranked from one (most deprived area) to 32,844 (least deprived area).[28]

*2.2.4.4. Anthropometric variables*

Height was measured using a portable stadiometer (Leicester Height Measure, Seca, Birmingham, UK), and body mass was measured using calibrated scales (813 model, Seca). Body mass index (BMI) was calculated for each participant, BMI z-scores were assigned,[29] and International Obesity Task Force BMI cut-points applied to classify the participants as underweight, normal weight or overweight/obese.[30] Waist circumference was measured, using an anthropometric tape measure from the minimal waist site to the nearest millimetre, with participants in the standing position and at the end of expiration. Waist-to-height ratio (WHtR) was calculated as a measure of central obesity.[31] Age at peak height velocity (APHV) was used as a proxy somatic measure of biological maturation. This method is based on anthropometric variables to predict APHV, which is a commonly used indicator of biological maturity.[32] The method employs validated sex-specific regression equations which include participants' chronological age and height.[32] All the measurements were undertaken by trained researchers. To ensure accurate and standardised measurements all researchers firstly completed a six-hour training and supervised practice session using the assessment protocols. In addition, in order to avoid interindividual variability each researcher was responsible for administering the same measures during baseline and follow up assessment periods.

*2.2.4.5. Moderate-to-vigorous physical activity*

Self-reported moderate-to-vigorous physical activity (MVPA) data were collected using the Youth Activity Profile (YAP) English version.[33] The YAP is a 15-item questionnaire comprised of three sections (school-day MVPA, out-of-school MVPA, and sedentary behaviour), with five questions per section. Participants are asked to recall their MVPA and sedentary behaviour over the past 7 days during context-specific time segments (e.g., active travel to and from school, break time, etc.). The out-of-school segment refers to activity levels before school, immediately after school, evening, and at weekends. All questions were structured using a 5-point Likert scale (e.g., for active travel to school, a score of 1 indicated 0 days per week of active travel, whereas a score of 5 indicated 4–5 days per week). For this study, only data from the school-day and out-of-school MVPA questions were used. For each child, mean values for school-day and out-of-school MVPA were calculated and averaged resulting in a score for overall MVPA (1=low, 5=high). The YAP was completed in classrooms following instructions from the research team and in the presence of the class teachers.

*2.2.4.6. Psychological correlates of physical activity: self-efficacy and enjoyment*

Self-efficacy was measured using a valid and reliable questionnaire which contained 8 items related to the child's ability to be physically active.[34] The items were rated on a 5-point Likert scale ranging from 1 (very easy / disagree a lot) to 5 (very difficult / agree a lot). The Cronbach's alpha for the internal consistency of the cross-sectional sample was 0.77 and 0.78 for the longitudinal sample. Enjoyment was assessed through the Physical Activity Enjoyment Scale (PACES) for children.[35] A 5-point Likert-type scale (1 = "disagree a lot" to 5 = "agree a lot") is used to answer 16 statements. The average of the answers assigned to the 16 items is the final score. The Cronbach's alpha for the internal consistency of the sample was 0.87 and 0.88 for the cross-sectional and longitudinal samples, respectively.

**2.5 Statistical analyses**

Preliminary analyses involved checking all variables for normality using normal probability plots and Kolmogorov–Smirnov tests. The data assumed a normal distribution and descriptive statistics were calculated for all continuous measures using means (SD) and percentages for categorical variables. As exploratory analyses did not show a significant interaction of sex and CRF in relation to HRQoL ($p > 0.05$), the main analyses were performed with the total mixed-sex sample.

For study aim (i), mixed linear models examined the cross-sectional association between CRF and HRQoL with adjustment for sex, time of year, SES, WHtR, APHV, and MVPA; and the longitudinal association between CRF at baseline and HRQoL 12-weeks later adjusted for sex, time of year, SES, WHtR, APHV, MVPA, and HRQoL at baseline. Schools were included as random intercepts for aim (i) analysis. For study aim (ii), mediation analyses were conducted to assess the mediating role of each psychological correlate of physical activity (i.e., physical

activity self-efficacy and physical activity enjoyment) on the association between CRF and HRQoL with adjustment for sex, time of year, SES, WHtR, APHV, MVPA and schools. Cross-sectional mediation analyses were performed with CRF as the independent variable, HRQoL as the dependent variable and physical activity self-efficacy, and physical activity enjoyment individually introduced as mediator variables, with adjustment for the covariates. Further, longitudinal mediation analyses were performed with CRF at baseline as the independent variable, HRQoL at 12-week follow-up as the dependent variable and each psychological correlate individually introduced as mediator variables, with adjustment for the same covariates, with the addition of HRQoL at baseline. Effect sizes (Cohen's d) were calculated for both cross-sectional and longitudinal linear mixed models as suggested by Brysbaert and Stevens[36] and defined as: small (<0.2), medium (0.2-0.5), and large (0.5-0.8). For the mediation analyses effect sizes, $R^2$ was used to calculate $f^2$ ranges, carried out as proposed by Cohen[37] and defined as small (<0.02), medium (0.02-0.15), and large (0.15-0.35). The PROCESS SPSS Macro version 2.16.3, model 4, with 5000 bias-corrected boot-strap samples and 95% confidence intervals (CIs) was used for these analyses[38]. Mediation was assessed by the indirect effect of CRF (independent variable) on HRQoL (dependent variable) through (i) self-efficacy, and (ii) enjoyment (mediators). Indirect effects (*a*b* paths) with confidence intervals not including zero were considered significant. Mediation percentage ($P_M$) indicates how much of the association between CRF and HRQoL was explained by the mediator variables.[38] We performed post-hoc power statistical analyses to examine the impact of the changes from 383 to 272 on the results presented. Statistical significance was set at $p<.05$ for all analyses which were performed using IBM SPSS Statistics version 23 (IBM, Armonk, NY).

## 3. Results

Participants' baseline characteristics are presented in Table 1. The percentage of children at baseline and 12-week follow-up in the normal weight group was 78.1% and 82.7%, respectively. The drop-out from overweight and obese participants from baseline to follow up was 21.9% and 17.3%, respectively. On average, for the 20mSRT test, children performed 32.5 shuttles at baseline and 36.3 at 12-week follow-up. Mean HRQoL scores were 50.4 at baseline and 50.3 at 12-week follow-up. The psychological correlates of physical activity showed the same values at baseline and at 12-week follow-up.

**Table 1**. Characteristics of the participants at baseline and at 12-weeks follow-up.

| | Baseline (n = 383) | Follow-up (n = 272) |
|---|---|---|
| **Variable** | **Mean (SD) or frequency (%)** | |
| Sex | | |
| Boys | 213 (55.6%) | 154 (56.6%) |
| Girls | 170 (44.4%) | 118 (43.4%) |
| Age (y) | 10.0 (0.5) | 10.2 (0.4) |
| SES (IMD rank) | 15902.2 (10201.5) | 16513.47 (9911.7) |
| WHtR | 0.5 (0.1) | 0.5 (0.1) |
| APHV (years) | -2.5 (0.7) | -2.3 (0.7) |
| Height (cm) | 139.8 (6.4) | 140.8 (6.4) |
| Mass (kg) | 35.4 (7.8) | 35.9 (7.6) |
| BMI ($kg \cdot m^{-2}$) | 18.0 (3.0) | 18.0 (2.9) |
| Weight status | | |
| Under Weight | 24 (6.2%) | 17 (6.3%) |
| Normal Weight | 275 (71.8%) | 203 (74.6%) |
| Overweight/Obese | 84 (21.9%) | 52 (19.1%) |
| Waist circumference (cm) | 65.3 (8.0) | 65.7 (8.8) |
| YAP MVPA score | 3.4 (0.8) | 3.7 (0.8) |
| CRF (shuttles) | 32.5 (16.0) | 36.3 (17.1) |
| HRQoL | 50.4 (9.7) | 50.3 (10.0) |
| Physical activity self-efficacy | 3.6 (0.7) | 3.6 (0.8) |
| Physical activity enjoyment | 4.3 (0.6) | 4.3 (0.7) |

Data are presented as mean (± SD) or frequencies (percentages). Differences between baseline and follow-up were examined by paired *t*-test ($p<0.05$). SD: standard deviation; %: percentage; SES: socioeconomic status; IMD: indices of multiple deprivation; WHtR: waist to height ratio; APHV: peak height velocity; BMI: body mass index; YAP: youth activity profile; MVPA: moderate to vigorous physical activity; CRF: cardiorespiratory fitness; HRQoL: health-related quality of life.

The results of the linear mixed model showing the cross-sectional associations between CRF and HRQoL are presented in Table 2. A positive association was observed between CRF and HRQoL ($p$=0.015) after adjusting for sex, time of year, SES, WHtR, APHV, and MVPA. A medium effect size (d = 0.26) was found for this model. The unadjusted cross-sectional linear mixed model showing the association between CRF and HRQoL is presented in supplementary table 1. Table 3 presents the linear mixed model outcome analysing the longitudinal associations between CRF and HRQoL. The analysis revealed a positive association between CRF at baseline and HRQoL at 12-week follow-up ($p$=0.045) after adjusting for covariates including HRQoL at baseline. A medium effect size (d = 0.35) was found for this model. The unadjusted longitudinal linear mixed

293 model showing the association between CRF at baseline and HRQoL at 12-week follow-up is
294 presented in supplementary table 2.

**Table 2**. Cross-sectional associations between cardiorespiratory fitness and HRQoL (n= 383).

| | Model 1 | | |
|---|---|---|---|
| | **β** | **95% CI** | ***p*** |
| Intercept | 57.67 | 44.43 – 70.90 | **<0.001** |
| Sex | 2.80 | -0.54 – 6.14 | 0.100 |
| Project phase | -0.71 | -1.75 – 0.32 | 0.158 |
| SES | 5.31 | -5.41 – 0.00 | 0.324 |
| WHtR | -18.24 | -39.04 – 2.56 | 0.086 |
| APHV | -0.09 | -2.45 – 2.27 | 0.941 |
| YAP MVPA | 0.16 | -1.09 – 1.40 | 0.806 |
| Cardiorespiratory fitness | 0.09 | 0.02 – 0.16 | **0.015** |

Model 1: adjusted for the fixed effects of sex, time of the year, socioeconomic status, waist to height ratio, peak height velocity and moderate to vigorous physical activity. Clustering for analysis was schools. Health related quality of life was measured using KIDSCREEN-10.
Data are presented as standardized regression coefficient (β) and 95% confidence interval (CI). Statistically significant values are in bold. HRQoL: health-related quality of life; SES: socioeconomic status; WHtR: waist to height ratio; APHV: peak height velocity; YAP: youth activity profile; MVPA: moderate to vigorous physical activity.

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**Table 3**. Longitudinal associations between cardiorespiratory fitness at baseline and HRQoL at 12-weeks follow-up (n= 272).

| | Model 2 | | |
|---|---|---|---|
| | **β** | **95% CI** | ***p*-value** |
| Intercept | 21.46 | 6.7 – 36.22 | **0.005** |
| Baseline HRQoL | 0.52 | 0.42 – 0.63 | **<0.001** |
| Sex | 3.41 | 0.04 – 6.78 | 0.47 |
| SES | 1.53 | -8.52 – 0.00 | 0.764 |
| Project phase | -0.63 | -1.91 – 0.65 | 0.337 |
| WHtR | 0.50 | -21.83 – 22.82 | 0.965 |
| APHV | -0.58 | -2.82 – 1.67 | 0.615 |
| YAP MVPA | -0.05 | -1.28 – 1.18 | 0.940 |
| Cardiorespiratory fitness | 0.08 | 0.02 – 0.15 | **0.045** |

Model 2: adjusted for the fixed effects of sex, time of the year, socioeconomic status, waist to height ratio, peak height velocity, moderate to vigorous physical activity and baseline HRQoL. Clustering for analysis was schools. Health related quality of life was measured using KIDSCREEN-10.
Data are presented as standardized regression coefficient (β) and 95% confidence interval (CI). Statistically significant values are in bold. HRQoL: health-related quality of life; SES:

socioeconomic status; WHtR: waist to height ratio; APHV: peak height velocity; YAP: youth activity profile; MVPA: moderate to vigorous physical activity.

Figure 1 shows the adjusted cross-sectional mediating effect of self-efficacy and enjoyment in the association between CRF and HRQoL. There was a significant indirect effect (path *a***b*) between CRF and HRQoL when each psychological correlate of physical activity was individually included in the analyses. CRF was positively associated with both single psychological correlates (*a* path; all $p<0.001$), which were also positively associated with HRQoL (*b* path; all $p<0.001$). However, in each model the direct effect between CRF and HRQoL was not significant (*c*' path; all $p>0.05$). The outcome of these cross-sectional mediation analyses suggested that CRF could indirectly influence HRQoL through its effects on children's physical activity self-efficacy ($P_M=82.7\%$) and enjoyment ($P_M=54.1\%$). Mediation analyses effect sizes were medium to large, with $R^2$ ranging from 0.07 to 0.19 for enjoyment and from 0.09 to 0.22 for self-efficacy. For the cross-sectional mediation models the post-hoc power of the regressions included ranged from 99.7% to 100%.

The results of the adjusted longitudinal mediating effects of both physical activity self-efficacy and enjoyment on the association between CRF at baseline and HRQoL at 12-week follow-up are shown in Figure 2. There was a significant indirect effect of baseline self-efficacy in the longitudinal association between baseline CRF and HRQoL at 12-week follow-up (path *a***b*), but not for enjoyment. Moreover, baseline CRF was significantly associated with baseline self-efficacy (*a* path; $p<0.01$), whereas a non-significant association was found with baseline enjoyment (*a* path; $p>0.05$). Baseline self-efficacy and enjoyment were positively associated with HRQoL at 12-week follow-up (*b* path; all $p<0.01$). Finally, the direct effect between baseline CRF and HRQoL at 12-week follow-up was non-significant (*c*' path; all $p>0.05$). The results of the longitudinal mediation analyses suggested that baseline CRF could indirectly influence HRQoL 12 weeks later through its effects on children's baseline physical activity self-efficacy ($P_M=29.4\%$) and enjoyment ($P_M=15.8\%$), separately. $R^2$ ranged from 0.10 to 0.20 for enjoyment, and from 0.09 to 0.25 for self-efficacy (i.e., medium to large effects). For the longitudinal mediation models the post-hoc power of the regressions included was 100%.

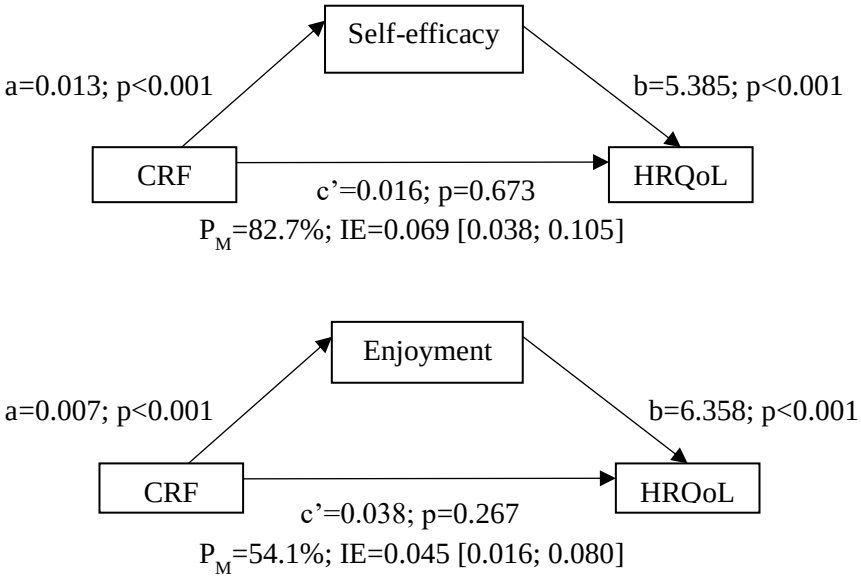


**Figure 1**. Psychological correlates of physical activity (i.e., self-efficacy and enjoyment) mediation models of the cross-sectional relationship between CRF and HRQoL, adjusted for sex, time of the year, socioeconomic status, waist to height ratio, peak height velocity, moderate to vigorous physical activity and schools (n = 383). Results are showed as unstandardized regression coefficients; *p*-value. IE = indirect effect [lower and upper levels for 95% confidence interval of the indirect effect between CRF and HRQoL]. $P_M$: percentage of mediation; CRF: cardiorespiratory fitness; HRQoL: health-related quality of life.

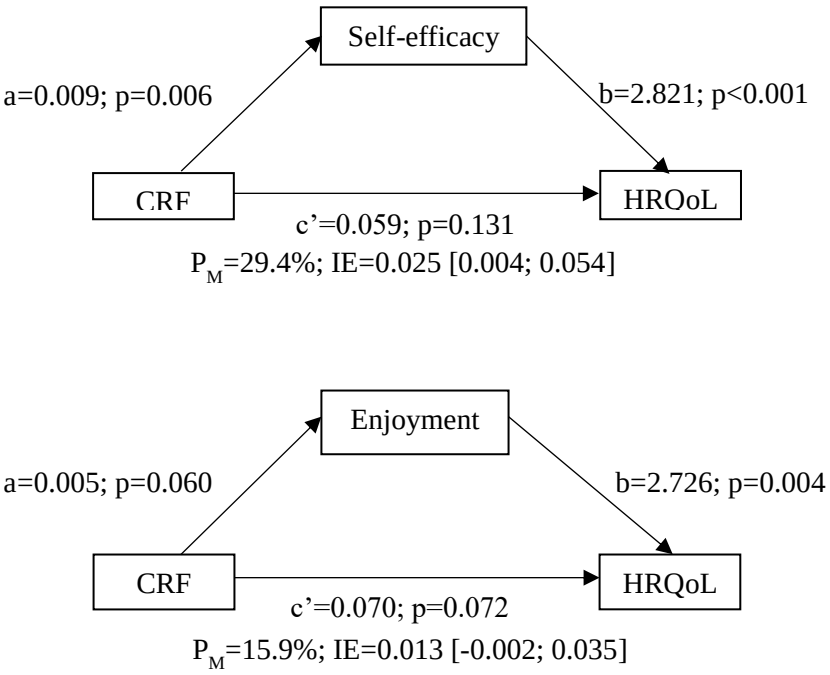

**Figure 2**. Psychological correlates of physical activity (i.e., self-efficacy and enjoyment) of the longitudinal relationship between CRF at baseline and HRQoL at 12-week follow-up, adjusted for sex, time of the year, socioeconomic status, waist to height ratio, peak height velocity, moderate to vigorous physical activity, schools, and HRQoL at baseline (n = 272). Results are showed as unstandardized regression coefficients; *p*-value. IE = indirect effect [lower and upper levels for 95% confidence interval of the indirect effect between CRF at baseline and HRQoL at 12-week follow-up]. $P_M$: percentage of mediation; CRF: cardiorespiratory fitness; HRQoL: health-related quality of life.

## 4. Discussion

The results of our cross-sectional and longitudinal analyses showed that among northwest England primary school children (i) CRF was positively associated with HRQoL and (ii) this association was mediated by self-efficacy and enjoyment as psychological correlates of physical activity. Our findings expand prior knowledge about the association between CRF and HRQoL in children and reveal for the first time potential underlying mechanisms involved in the association between CRF and HRQoL, highlighting the significant roles of single physical activity correlates such as self-efficacy and enjoyment.

Our cross-sectional results showed a positive association between CRF and HRQoL. Similar findings were found in previous studies,[11–13,39] which reported that children with higher levels of CRF had better HRQoL. For instance, a study in Norwegian 10-year-olds revealed that CRF had a small to medium effect size ($R^2$ ranging from 0.17 to 0.5) in its positive association with all HRQoL domains (i.e., physical and psychological well-being, autonomy and parents, social support and school environment).[11] Also, Redondo et al. reported a small (all $R^2$<0.5) positive association between CRF and HRQoL among children aged 4 to 7 years.[12] Regarding longitudinal associations between CRF and HRQoL, our novel findings revealed a positive association between CRF at baseline and children's HRQoL at 12-week follow-up after adjusting for confounders. This outcome is partially supported by previous longitudinal research in different age groups by confirming the individual positive small association of CRF at baseline on HRQoL over a 2-year period follow-up ($R^2$<0.5).[40] These findings might be somewhat explained by the positive influence that CRF has on both physical and mental dimensions of health in children[2] over time,[41,42] which may positively impact children's HRQoL. We hypothesise that the similarity between our study's effect sizes and the ones of previous evidence might be due to the several dimensions of HRQoL which could not be fully influenced by CRF.

Since mediation analysis assumes that the independent variable influences the mediator, our cross-sectional and longitudinal results suggest that CRF at baseline influenced the psychological

variables, which, in turn, may affect HRQoL at baseline and 12-weeks later. With respect to path *a*, our findings could be partially supported by a previous cross-sectional study which reported that children with higher CRF levels had higher physical self-efficacy and physical activity enjoyment than their peers with low CRF.[18] Regarding our longitudinal results, we were not able to make comparisons since no evidence relating CRF and physical activity self-efficacy over time was found. We hypothesise that it is plausible that CRF influenced physical activity self-efficacy and enjoyment through motor skill development/proficiency and sport experiences. Children's CRF levels are associated with increased motor competence,[43] positive sport and physical activity experiences,[44,45] which in turn may affect several domains of their HRQoL. However, there is paucity of evidence in this area and further research is warranted. With respect to path *b*, our findings are in line with previous cross-sectional[21] and interventional[20] studies which reported a positive association of children's physical activity enjoyment and their HRQoL. However, no previous studies have examined the cross-sectional and longitudinal associations between children's physical activity self-efficacy and their HRQoL. The association found in our study between both psychological correlates and HRQoL may be related to the mental domain of the construct, predisposing children to higher scores of psychological well-being.[21,46]

The results obtained in the present study through mediation analyses, a powerful statistical technique that can be used to clarify the process underlying the relationship between two variables,[38] add support for the psychological correlates of physical activity being an intermediate step on the causal pathway between CRF and children's HRQoL. Thus, our findings are consistent with the idea that the promotion of children's physical activity self-efficacy and physical activity enjoyment may be of importance to improve their HRQoL.

Our mediation results are partially supported by only one previous cross-sectional study. This involved overweight adolescents, and showed the mediating role that motivational variables (i.e., self-determined motivation) have in the association between CRF and HRQoL.[47] However, the mediating roles of physical activity self-efficacy and enjoyment in children have not been previously investigated. Yet, based on prior cross-sectional research in other populations framed by self-determined motivation, being more physically fit leads to the need for more autonomy and competence during physical activity practice and, therefore, the development of more autonomous forms of self-regulations, which might benefit persistence and mental well-being[47,48] with a positive impact on their HRQoL.

Given the need of further research on correlates of physical activity due to its influence on behavioural change[17] and the temporal trends in physical fitness reporting a global declining tendency over the years,[49] our data may have significant implications for HRQoL improvement. Indeed, maintaining children's HRQoL is important for current health, as well as, has transferable value for future societal health. Our findings are of interest to educators and policy makers, to

raise the importance of CRF for improving children's psychological correlates of physical activity and their HRQoL.

Strengths of this study include the homogeneous age-matched and relatively large sample of children. The multilevel analyses accounted for school-level variance and adjusted for important fixed effects confounders. Furthermore, the mediation models added significant novelty to provide improved insights into the CRF-HRQoL relationships. There are also limitations which warrant consideration. The findings obtained from the cross-sectional elements of the study preclude claims of causal inferences and directionality between CRF and HRQoL, whereas there is more confidence about causality in those from the longitudinal aspects which controlled for baseline HRQoL and confounders. The 12-weeks duration of the follow-up is short which limits the significance of the longitudinal results. Moreover, the sample was drawn from one geographical region of northwest England, therefore the results may not be generalizable to populations elsewhere. MVPA was assessed using a self-report instrument which is open to recall and social desirability biases; however, the YAP is a validated method that was administered in the same way at both time points, thus limiting variation in responses between baseline and follow-up. Lastly, we acknowledge that more accurate estimates of CRF could have been obtained using a laboratory-based physiological direct measure. However, such measures were not feasible within our study, and the 20mSRT is the most widely used field-based test of CRF in children, which demonstrates criterion validity against gas-analyzed peak$VO_2$, and has strong ecological validity and feasibility in school settings.

## 5. Conclusion

The results of the current study showed that CRF was cross-sectionally and longitudinally associated with HRQoL in primary school children in England. Furthermore, self-efficacy and enjoyment as psychological correlates of physical activity act separately as mediators in the positive association between CRF and HRQoL. Therefore, we contribute to the comprehension of the relationship between these key factors, suggesting that both optimal CRF levels and better psychological correlates of physical activity are important for children's HRQoL. Our findings should be considered when designing education and public health interventions and strategies aiming to improve HRQoL during childhood.

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588 **Supplementary material**

**Supplementary table 1**. Cross-sectional associations between cardiorespiratory fitness and HRQoL (n= 383).

| | Model 1 | | |
|---|---|---|---|
| | **β** | **95% CI** | ***p*** |
| Intercept | 57.30 | 44.94 – 49.66 | **<0.001** |
| Cardiorespiratory fitness | 0.09 | 0.04 – 0.16 | **0.002** |

Model 1: Unadjusted. Health related quality of life was measured using Kidscreen-10. Data are presented as standardized regression coefficient (β) and 95% confidence interval (CI). Statistically significant values are in bold.

589

**Supplementary table 2**. Cross-sectional associations between cardiorespiratory fitness and HRQoL (n= 383).

| | Model 1 | | |
|---|---|---|---|
| | **β** | **95% CI** | ***p*** |
| Intercept | 47.75 | 44.06 – 49.43 | **<0.001** |
| Cardiorespiratory fitness | 0.11 | 0.03 – 0.18 | **0.004** |

Model 1: Unadjusted. Health related quality of life was measured using Kidscreen-10. Data are presented as standardized regression coefficient (β) and 95% confidence interval (CI). Statistically significant values are in bold.

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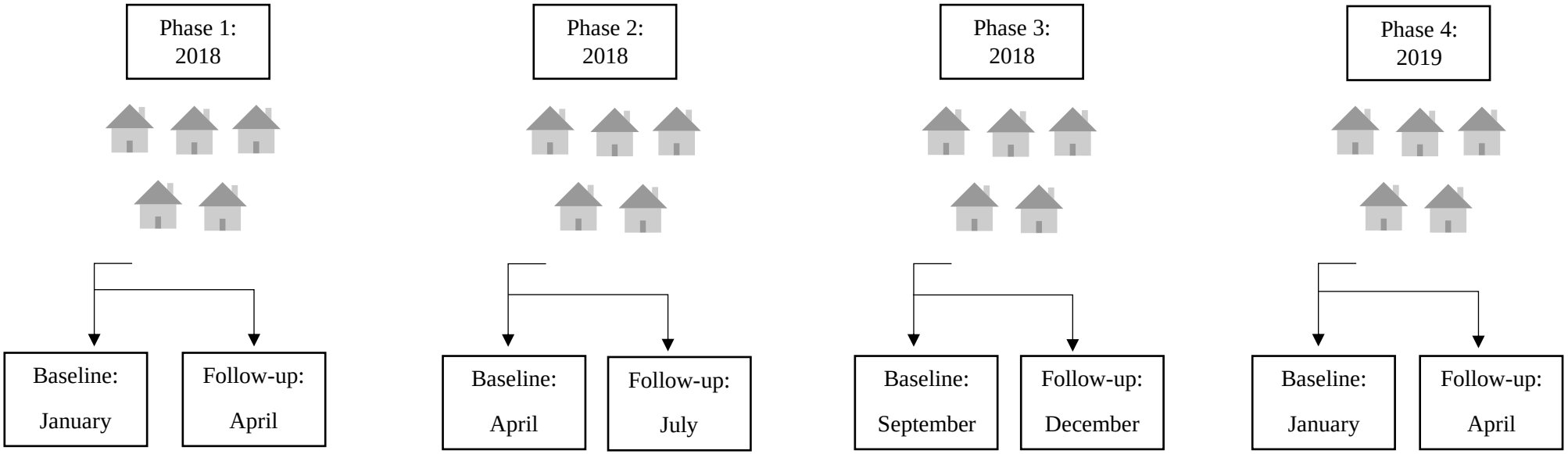


**Supplementary figure 1**. Active West Lancs Programme phases of data collection.