Cambridgeshire County Council

Sheffield Hallam University | Centre for Behavioural Science and Applied Psychology

Supporting physical activity amongst residents in Cambridgeshire

Phase one report: Insight gathering and intervention recommendations

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Executive Summary

Sheffield Hallam University were commissioned by Cambridgeshire County Council and Peterborough City Council to undertake research to understand the barriers and facilitators for seven health behaviours.

In Cambridgeshire, we explored:

- Physical activity, Diet, Smoking in adults, Alcohol consumption, Uptake of NHS health checks, and Vaping in young people

In Peterborough, we explored:

- Uptake of routine childhood vaccinations

This report presents the findings from the physical activity workstream in Cambridgeshire. The findings for other health behaviours in Cambridgeshire and Peterborough are presented in separate reports.

The aim was to:

- Identify the barriers and facilitators for physical activity in Cambridgeshire
- Make recommendations for interventions that have the potential to address those identified needs

Our approach

We used the Capability, Opportunity and Motivation – Behaviour (COM-B) [1] model to explore factors influencing physical activity.

We conducted a survey and carried out interviews with residents in Cambridgeshire to explore the barriers and facilitators for physical activity.

We conducted a rapid evidence review using the Behaviour Change Wheel (BCW) [2] to understand what types of interventions have been implemented to support physical activity in adults.

We then produced a heat map [3] to explore whether, and to what extent, existing interventions have the potential to address these identified barriers and facilitators.

Informed by the BCW, we made intervention recommendations to address those identified barriers.

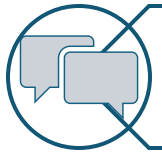
We used the APEASE evaluation criteria [2] to explore which intervention recommendations are likely to be acceptable, practical, effective, and affordable for residents to receive, and for Cambridgeshire County Council and/or wider stakeholders to deliver, and whether receiving and/or delivering these interventions are likely to result in unintended consequences or impact on inequalities.

Key findings – local survey

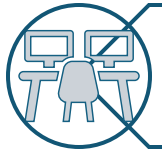
We surveyed 1,037 residents in Cambridgeshire, with 61.6% classified as being **physically inactive**. Residents were recruited from all districts across Cambridgeshire.

The mean age of residents was 47.27 years (18.46), and 52.3% were female

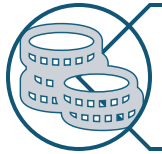
73.5% identified as being White British



32% reported having at least one health condition or disability



61.3% were employed. 28.9% reported having no formal educational qualifications



22.6% reported an annual household income of under £20,000

The results showed that residents:

- Living in **Fenland** were less active than residents in other districts and reported more barriers to being active.
- Who were **unemployed** were less active than residents in employment and reported more barriers to being active.
- who are **older** (70-79 years old) reported more barriers to being active, particularly in relation to their **physical capability** to be active.
- living with a **health condition** were less active and reported more barriers to being active.

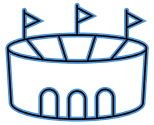
The findings also showed that only **10% of participants had accessed a Healthy You service**, yet 74% were willing to access Healthy You if necessary.

Key findings – interviews

We interviewed 10 residents from Cambridgeshire aged between 19 – 63 years old. Seven were currently unemployed, four lived in Fenland, and four reported having a long-term health condition. We identified a wide range of barriers (B) and facilitators (F) for being physically active, including:

A lack of knowledge about how to be active and how to use equipment (B).

Being surrounded by people that were supportive of a person being active helped facilitate a person to be active (F).



A lack of appropriate facilities and classes reduced a person's opportunities to be active (B).

If a person had belief in their own ability and belief that being active would benefit them (F).

Intentions to be active alone were not sufficient for a person to be active (B).

Having had positive experiences of physical activity and enjoying physical activity encouraged a person to be active (F).

Key findings – rapid evidence review

We conducted a rapid evidence review of 24 interventions to explore what types of interventions have been implemented to promote physical activity in adults.

The main types of interventions implemented were:

- Enablement (used in 24 interventions) – intervention components that support an adult to be physically active, beyond education, training or environmental restructuring. This included providing social support/ practical help for participating in physical activity.
- Education (used in 17 interventions) – intervention components that aimed to increase knowledge or understanding of physical activity, the health implications of being active, and how to perform different exercises, including when and where.
- Environmental Restructuring (used in 9 interventions) – intervention components that aimed to change the physical or social environment to support a person to be physically active. This included sending reminders or prompting activity and providing resources which would allow a person to monitor their levels of physical activity.
- Persuasion (used in 7 interventions) – intervention components that use methods to persuade a person to be active. This included reviewing achievements towards physical activity goals, working with an exercise professional to support physical activity, and highlighting the consequences of behaviour.

Most Common Behaviour Change Techniques (BCTs) used were:

- 1.1 Goal Setting (Behaviour) *(set or define a goal in relation to the desired behaviour)*
- 1.2 Problem Solving *(analyse factors influencing the behaviour & generate strategies to overcome barriers)*
- 3.1 Social support (unspecified) *(arranging or providing social support for the performance of the behaviour)*
- 2.3 Self-monitoring of Behaviour *(a method for a person to monitor & record their behaviour(s))*
- 2.2 Feedback on Behaviour *(advising a person on how they can perform a behaviour)*

Key Findings - Heatmap

We identified whether 24 published interventions have the potential to address the identified barriers and facilitators for physical activity

Only two interventions addressed a person's emotion, primarily focusing on how to overcome negative emotions related to physical activity. The qualitative insights highlighted that those who were active had positive emotions related to being active, therefore we need to consider how to promote positive emotions related to physical activity.

22 of the 24 interventions focused on promoting intentions to be physically active, using goal setting of the behaviour to help form those intentions. Participants in the interviews discussed how they struggled to translate intentions into behaviour, and we know from research across different health behaviours (including physical activity) that there is an 'Intention-Behaviour Gap' which people struggle to overcome. Therefore, promoting intentions alone may not be sufficient to address a person's motivation to be active.

Two BCTs which were not used in any intervention were Demonstration of behaviour (BCT 6.1) and Behavioural practice/rehearsal (BCT 8.1). The qualitative insights highlighted that some participants were unsure what or how they were meant to be physically active, which is a barrier that needs addressing to support a person to be active and develop their skills and motivation to be active.

Goal setting of physical activity was frequently used alongside self-monitoring to encourage participants to become active. Although there is evidence to support the effectiveness of these BCTs, in the review the focus was on the behaviour (i.e. physical activity), whereas the findings from the interviews indicate that outcomes to being active related to other aspects e.g. positive mood from being active. Goal setting and monitoring might be better placed to focus on other aspects such as emotion and mood to reinforce these positive experiences, rather than solely on the behaviour of physical activity.

Our recommendations

Intervention recommendation 1:
BeST Engage toolkit for physical activity service providers

Our survey found that only 10% of participants had accessed a Healthy You service, yet 74% were willing to access Healthy You if necessary. We suggest a **behavioural science-informed toolkit** that sets out simple steps and provides design briefs for physical activity service providers. These design briefs will guide physical activity service providers in how to use behavioural science to design or tailor their messages/ communications/ resources about their physical activity programme to address key barriers to resident's uptake and engagement with those services [4]. This toolkit will help providers create behavioural science-informed:

- Resident facing communications (posters, leaflets, social media posts)
- Professional facing resources to support referrals
- Video resources for residents and professionals

Intervention recommendation 2:
Turning Intentions into Action

Residents reported a willingness to be active but had not yet translated these good intentions into action. These residents would benefit from further support to take the next step and to translate those good intentions into physical activity behaviour. Research supports the need for techniques such as **Coping Planning** or **'What-If' strategies** to be implemented to help a person turn their intentions to be active, into behaviour. An intervention could provide an individual with resources and support to develop these Coping Plans to overcome any barriers they may face. The intervention should include:

- The opportunity for a person to consider what barriers they may face when trying to be active (e.g. having competing priorities).
- Encouraging a person to develop strategies to overcome these potential barriers or to provide individuals with a list of strategies that could work (e.g. exercising at home, if a person does not want to go outside in bad weather).

The resources could be self-directed or completed with the support of a Healthy You advisor or peers.

Intervention recommendation 3:
Demonstration of Physical Activity Locally

Participants that were inactive highlighted how they lacked knowledge of what and how they could be active. It was also discussed how there were facilities available in a person's local area but that these may not have been maintained. Resources could be created which would **educate residents about how they could be active and where they could be active**. Resources could look to:

- Provide advice and guidance on what activity or exercises a person could do.
- Inform individuals how they could use the facilities and environment around them to be active (e.g. local walking routes, parks) as well as services and classes that are already being run.

Demonstration of activities and behaviours could be done by local people in local areas, making the information more relatable to residents and providing them with **role models.**

Conclusions

This mixed-method research has identified key Capability, Opportunity, and Motivational barriers and facilitators for physical activity. Factors influencing a person's physical activity levels are wide-ranging and complex and will vary between individuals. A range of interventions are needed to encourage a person to be more physically active, and the current physical activity level and intentions to be active need considering before implementing an intervention.

We have made a series of recommendations about how to support Cambridgeshire residents to be more active. These recommendations include developing a behavioural science 'toolkit' for service providers to support uptake and engagement with existing physical activity services and programmes, demonstrating to individuals how and where they can be active, and turning intentions to be active into behaviour.

Recommended citation:
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Physical activity: Main report

Background

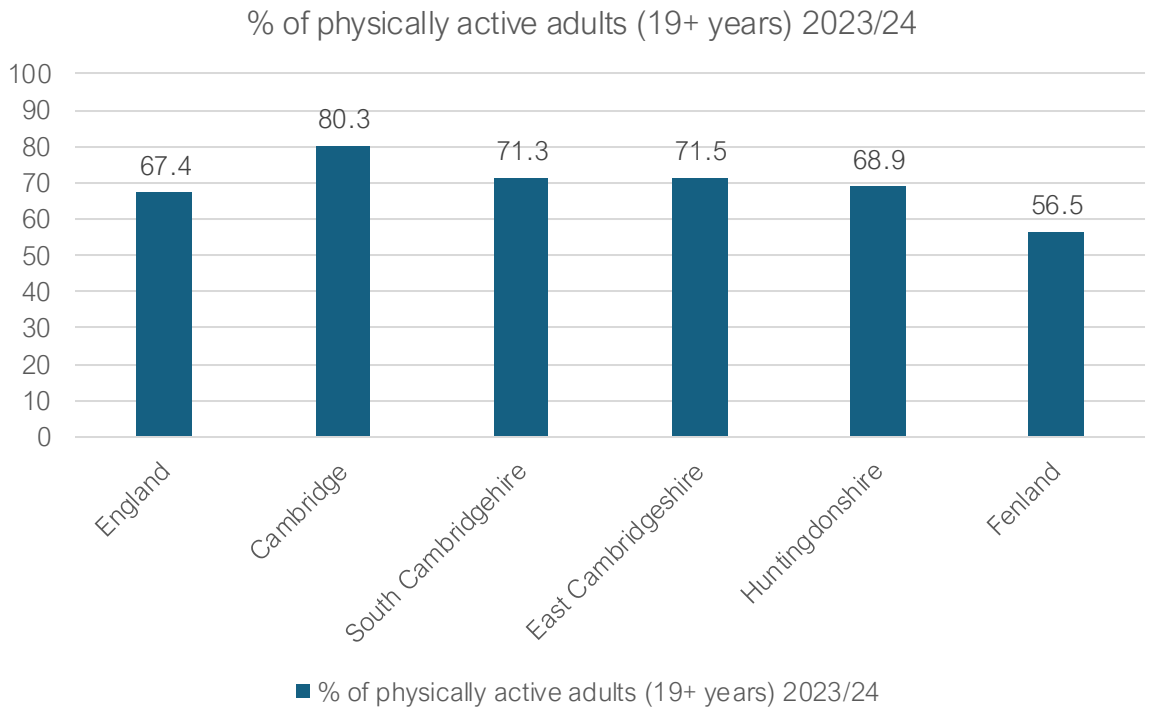
There are certain areas in Cambridgeshire where physical activity is lower than the national average [5].

A lower proportion of adults are classified as being physically active in Fenland (56.5%) compared with England (67.4%). Although there has been a slight rise nationally, levels have declined further in Fenland.

There is a strong association between obesity/ being overweight and physical inactivity [6], and a higher proportion of adults are classified as being overweight or obese in Fenland (70.1%) and Huntingdonshire (66.5%) compared with England (64.5%) [7].

Several initiatives have been implemented locally, including the Healthy You service which offers a range of programmes to support local residents to be physically active [8].

However, without an in-depth understanding of the barriers and facilitators for physical activity amongst residents in Cambridgeshire, we don't know what else needs to be put in place to address any unmet needs.



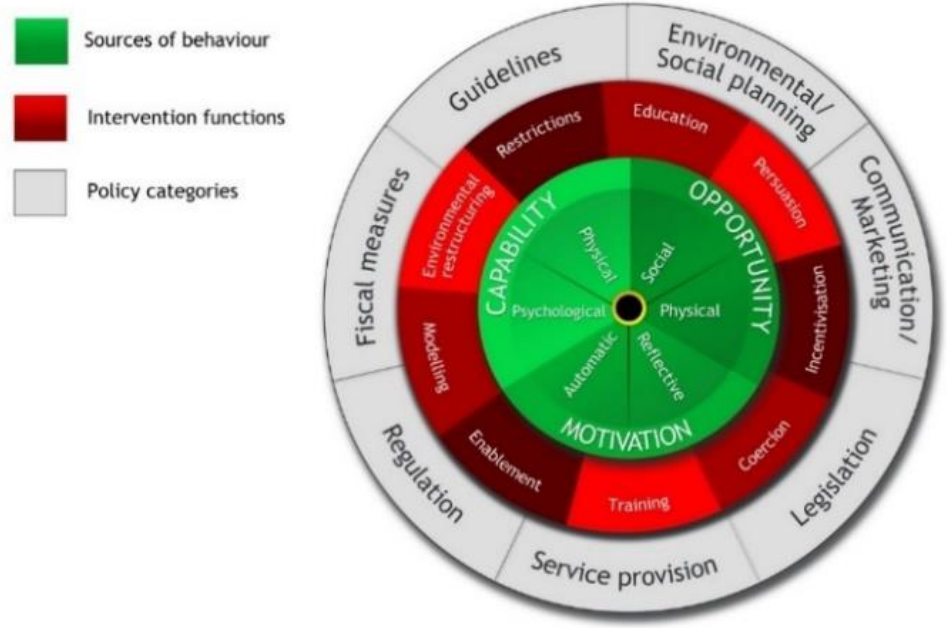
How we used behavioural science in this context

Theoretical approach

We used the Behaviour Change Wheel [2] to make theory-informed intervention recommendations for supporting physical activity amongst residents in Cambridgeshire. This involved:

- Understanding the barriers and facilitators for physical activity, using the capability-opportunity-motivation model of behaviour (COM-B) (green circle) and the Theoretical Domains Framework (TDF) [9]
- Matching the types of intervention functions that are likely to address those identified barriers and facilitators (red circle)
- Matching the types of policy categories that can help to deliver those identified interventions (grey circle).

We described the content of the intervention recommendations in terms of its Behaviour Change Techniques (BCTs), which are the 'active ingredients' of the intervention [10].



We used the APEASE evaluation criteria [2] to explore which intervention recommendations are likely to be acceptable, practical, effective, and affordable, and whether receiving and/or delivering these interventions are likely to result in unintended consequences or impact on inequalities.

Local survey of residents in Cambridgeshire

We conducted a survey of residents in Cambridgeshire. We defined physical activity as being physically active for at least 30 minutes per day.

The objectives were to explore:

(1) who is less likely to be physically active across Cambridgeshire

(2) the barriers and facilitators to being physically active

(3) whether the barriers and facilitators to being physically active vary by those who are and are not physically active

(4) whether the barriers and facilitators to being physically active vary by key demographic and health variables

(5) who is accessing Healthy You

Individuals were recruited via on-street market researchers between August – October 2024. Eligibility criteria included: participants aged 18 or above; Cambridgeshire resident; able to provide consent. A purposive sampling strategy was used to recruit a diverse sample e.g., living in areas of varying deprivation; ethnicity; age.

The survey measured:

- **Physical activity** (This was measured with one item, "In the past week, how many days they have done a total of 30 minutes or more of physical activity") [11]
- **Capability, Opportunity and Motivation** to be physically active for at least 30 minutes per day [12]
- **Demographic and health data** (i.e., age; partial postcode; gender; ethnicity; country of birth; whether they speak a language other than English at home; employment status; health status; annual household income; education level).

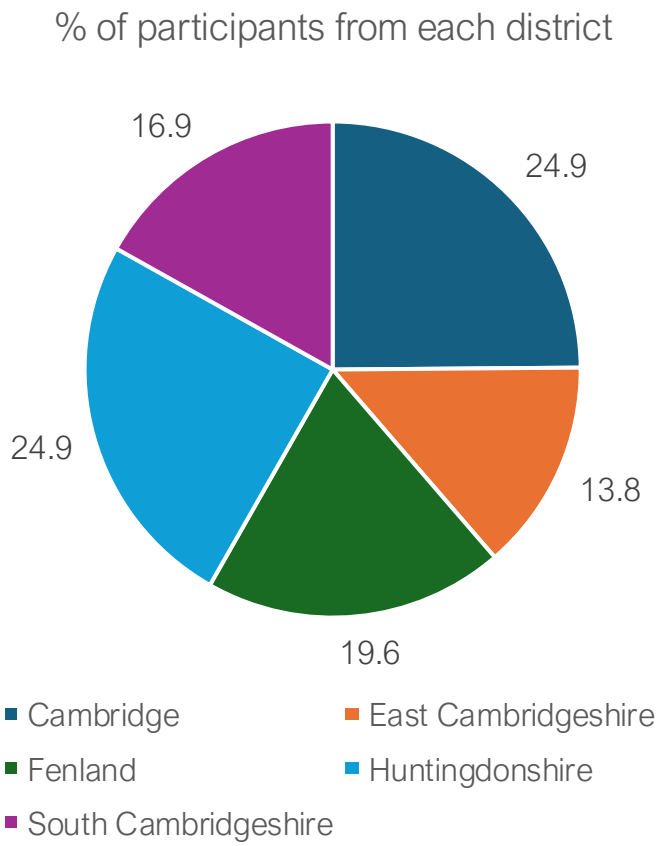
Descriptive statistics and/or univariable statistics were conducted to address each research question. The analysis was done using SPSS version 26.0 (IMB Corp).

Ethical approval

Ethical approval was granted by Sheffield Hallam University Research Ethics Committee (ID ER65436549) and Cambridgeshire County Council. All participants provided informed consent before participating.

Survey findings – Participants

In total, 1,037 residents in Cambridgeshire took part in the survey.



The mean age of residents was 47.27 years (18.46), and 52.3% were female

49.9% were from moderately deprived (IMD 3 – 6) and 43.6% were from the least deprived (IMD 7 – 8) areas of Cambridgeshire

73.5% identified as being White British,13% identified as being White Other, and 6.8% identified as being Black or Black British

18.2% reported that they spoke a language other than English at home and 19.9% reported that they were born outside of the UK

32% reported having at least one health condition or disability

61.3% were employed, 22.1% were on maternity/paternity leave or retired, and 16.5% were not working. 28.9% reported having no formal educational qualifications

22.6% reported an annual household income of under £20,000

Survey findings – Physical activity

On average, residents reported doing at least 30 mins of physical activity on **3.45 days a week**

38.4% **met** the physical activity guidelines

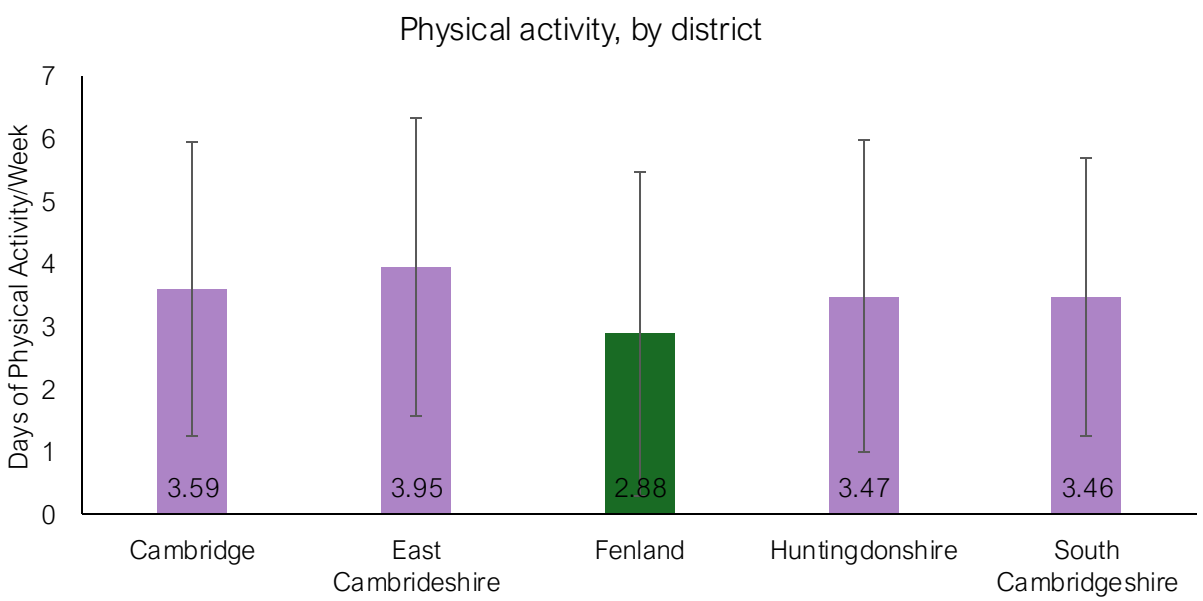
They reported doing physical activity on ≥ 5 days in the past week

61.6% **did not meet** the physical activity guidelines

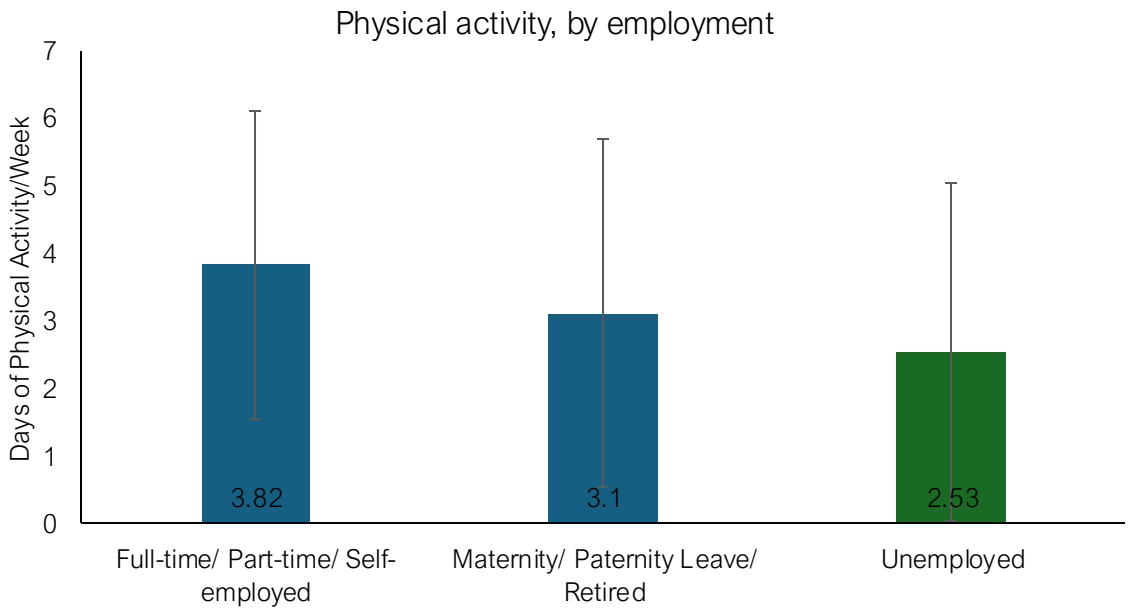
They reported doing physical activity on < 4 days in the past week

Research Question 1: *Who is less likely to be physically active across Cambridgeshire?*

Residents were **less likely to be physically active** if they lived in **Fenland**, compared with those living in Cambridge and East Cambridgeshire.



Residents were **less likely to be physically active** if they were **unemployed,** compared with those in employment.



Research Question 1: *Who is less likely to be physically active across Cambridgeshire?*

Age

Those who were aged 60 – 69 years and 70 – 79 years reported being less physically active (engaging in on average 3.12 days and 3.03 days of physical activity a week, respectively) compared with those aged 30 – 39 years (engaging in on average 3.92 days of physical activity a week).

Educational status

Those who reported having no formal educational qualifications reported being less physically active (engaging in on average 3.18 days of physical activity a week) compared with those who were educated to degree level or above (engaging in on average 3.81 days of physical activity a week).

Presence of a health condition or disability

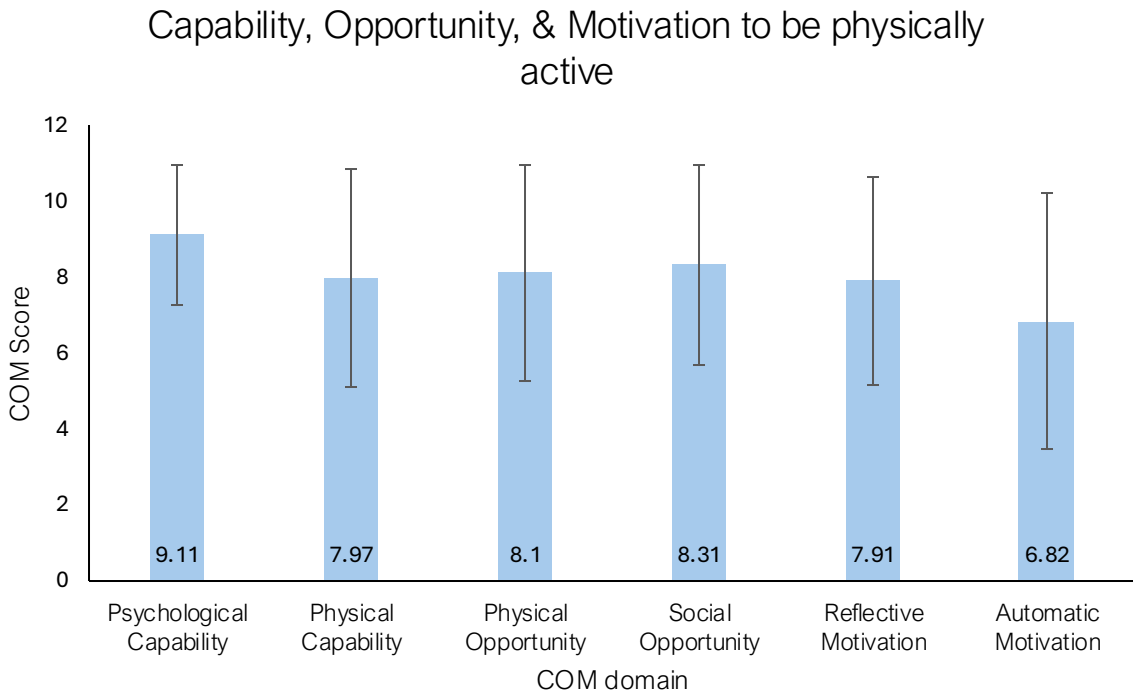
Those who reported having one or more health conditions or disabilities reported being less physically active (engaging in on average 2.47 days of physical activity a week) compared with those reporting having no health conditions or disabilities (engaging in on average 3.90 days of physical activity a week).

Research Question 2: *What are the barriers and facilitators for being physically active?*

This graph shows the mean Capability (psychological, physical), Opportunity (physical, social), and Motivation (reflective, automatic) scores for being physically active. Across the entire sample, residents reported that they:

- Know about the importance of being physically active for 30 minutes a day and have the skills to make decisions and plans to be physically active for 30 minutes a day (**Psychological Capability**)
- Have the physical skills and enough physical stamina to be physically active for 30 minutes a day (**Physical Capability**)
- Have sufficient time and the necessary resources (e.g., equipment and space) to be physically active for 30 minutes a day (**Physical Opportunity**)
- Have the necessary support from people (e.g., from friends and family) to be physically active for 30 minutes a day (**Social Opportunity**)
- Intend to (or want to) be physically active for 30 minutes a day (**Reflective Motivation**)

The lowest score was for **Automatic Motivation**. Compared with the other COM items, residents reported weaker beliefs that being physically active for 30 minutes a day is something they do automatically (without thinking about it).



COM scores in the graph: Each COM item is assessed on an 11-point scale, from strongly disagree (=0) to strongly agree (=10), with higher scores indicating stronger capability, opportunity, and motivation to be physically active

Research Question 3: *Do the barriers and facilitators to being physically active vary by those who are and are not physically active?*

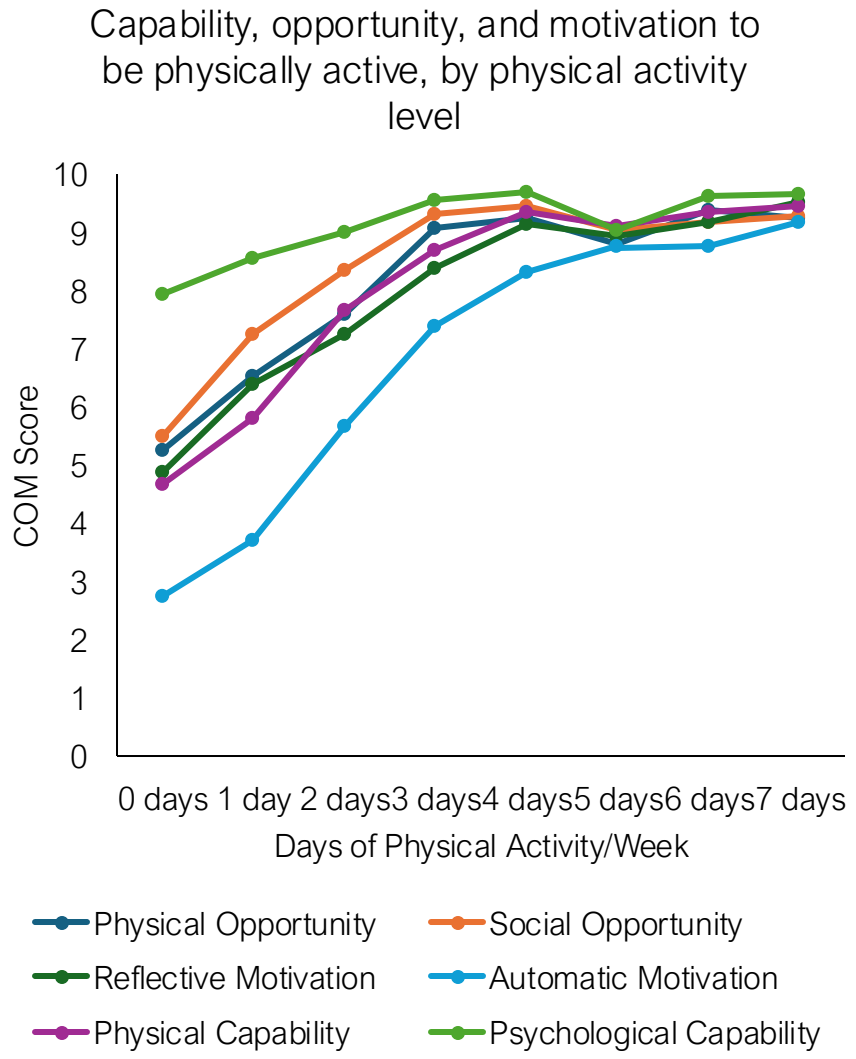
This graph shows capability (psychological, physical), opportunity (physical, social), and motivation (reflective, automatic) scores for being physically active, by level of physical activity.

Residents who reported **less physical activity** reported:

- Weaker beliefs that they have the physical skills and enough physical stamina to be physically active for 30 minutes a day (**physical capability**)
- Weaker beliefs that they have sufficient time and the necessary resources (e.g., equipment and space) to be physically active for 30 minutes a day (**physical opportunity**)
- Weaker beliefs that they have the necessary support from people (e.g., from friends and family) to be physically active for 30 minutes a day (**social opportunity**)
- Weaker intentions to (or willingness to) be physically active for 30 minutes a day (**reflective motivation**)

The largest difference in COM scores was for **automatic motivation**. Residents who reported less physical activity reported weaker beliefs that being physically active is something they do automatically (without thinking about it).

The smallest difference in COM scores was for **psychological capability.** This means that regardless of level of physical activity, residents know about the importance of being physically active and believe they have the skills to make decisions and plans to be physically active.



COM scores in the graph: Each COM item is assessed on an 11-point scale, from strongly disagree (=0) to strongly agree (= 10), with higher scores indicating stronger capability, opportunity, and motivation to be physically active

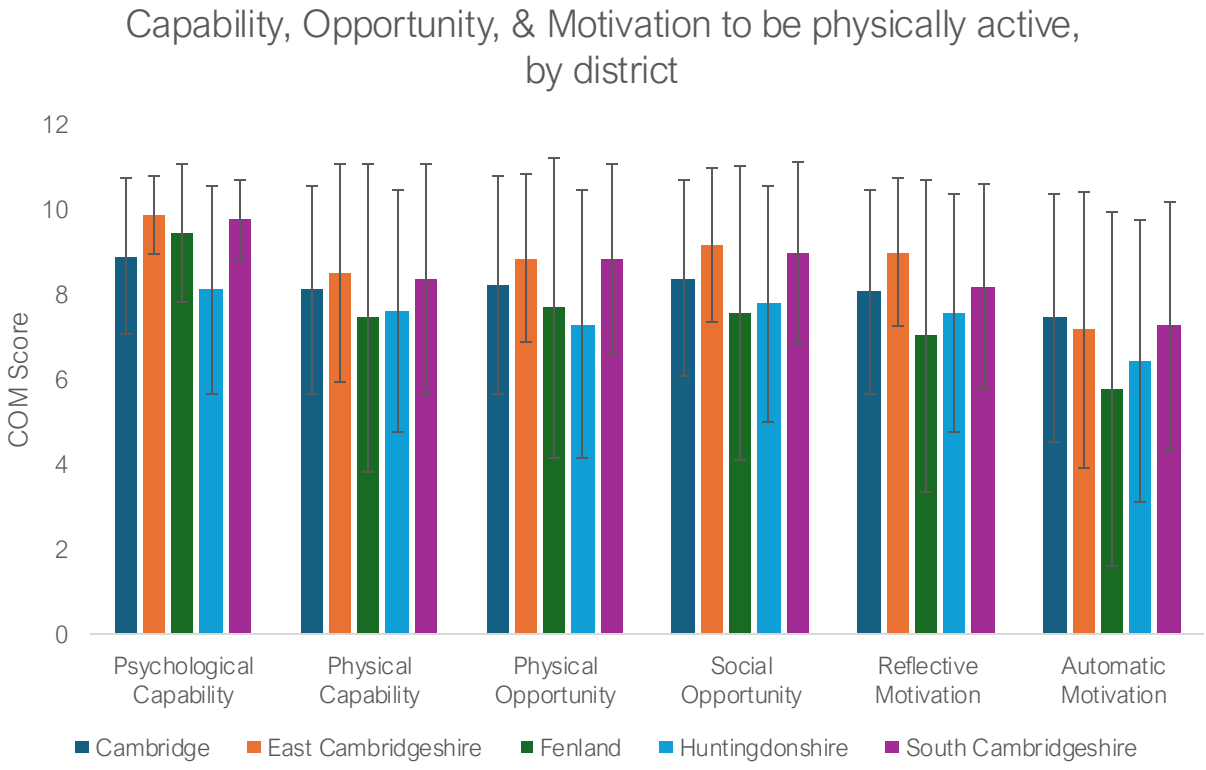
Research Question 4: Do the barriers and facilitators to being physically active vary by key demographic and health variables?

Residents in **Fenland** were less likely to be physically active. There was a significant difference in physical activity by district. This graph shows the mean Capability (psychological, physical), Opportunity (physical, social), and Motivation (reflective, automatic) scores for being physically active, by district. As shown in the graph, there were some key differences in COM by district.

Overall, compared with residents from other districts there was a trend for residents in Fenland to report:

- Weaker beliefs that they have the physical skills/ enough physical stamina to be physically active (**physical capability**)
- Weaker beliefs that they have sufficient time and the necessary resources to be physically active (**physical opportunity**)
- Weaker beliefs that they have the necessary support from people around them to be physically active (**social opportunity**)
- Weaker intentions or willingness to be physically active (**reflective motivation**)
- Weaker beliefs that being physically active is something they do automatically, without thinking about it (**automatic motivation**)

There was a trend for residents in Fenland to report having the **psychological capability** to engage in physical activity – they know about the importance of being physically active and believe they have the skills to make decisions and plans to be physically active.



COM scores in the graph: Each COM item is assessed on an 11-point scale, from strongly disagree (=0) to strongly agree (= 10), with higher scores indicating stronger capability, opportunity, and motivation to be physically active

Research Question 4: Do the barriers and facilitators to being physically active vary by key demographic and health variables?

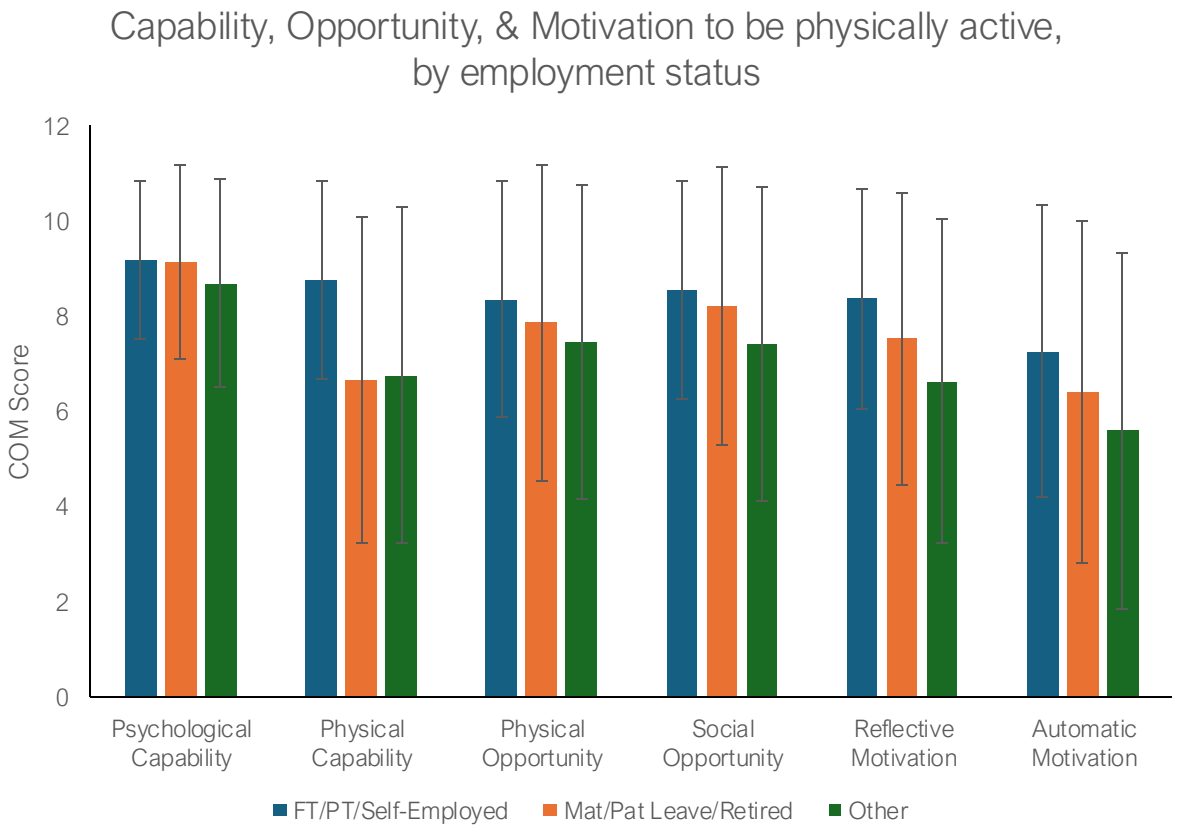
Residents were less likely to be physically active if they were **unemployed**, compared with those in employment.

This graph shows the mean Capability (psychological, physical), Opportunity (physical, social), and Motivation (reflective, automatic) scores for being physically active, by employment status.

Overall, compared with residents in employment there was a trend for unemployed residents to report:

- Weaker beliefs that they have the physical skills/ enough physical stamina to be physically active (**physical capability**)
- Weaker beliefs that they have sufficient time and the necessary resources to be physically active (**physical opportunity**)
- Weaker beliefs that they have the necessary support from people around them to be physically active (**social opportunity**)
- Weaker intentions or willingness to be physically active (**reflective motivation**)
- Weaker beliefs that being physically active is something they do automatically, without thinking about it (**automatic motivation**)

There was a trend for unemployed residents to report having the **psychological capability** to engage in physical activity – they know about the importance of being physically active and believe they have the skills to make decisions and plans to be physically active.



COM scores in the graph: Each COM item is assessed on an 11-point scale, from strongly disagree (=0) to strongly agree (= 10), with higher scores indicating stronger capability, opportunity, and motivation to be physically active

Research Question 4: Do the barriers and facilitators to being physically active vary by key demographic and health variables?

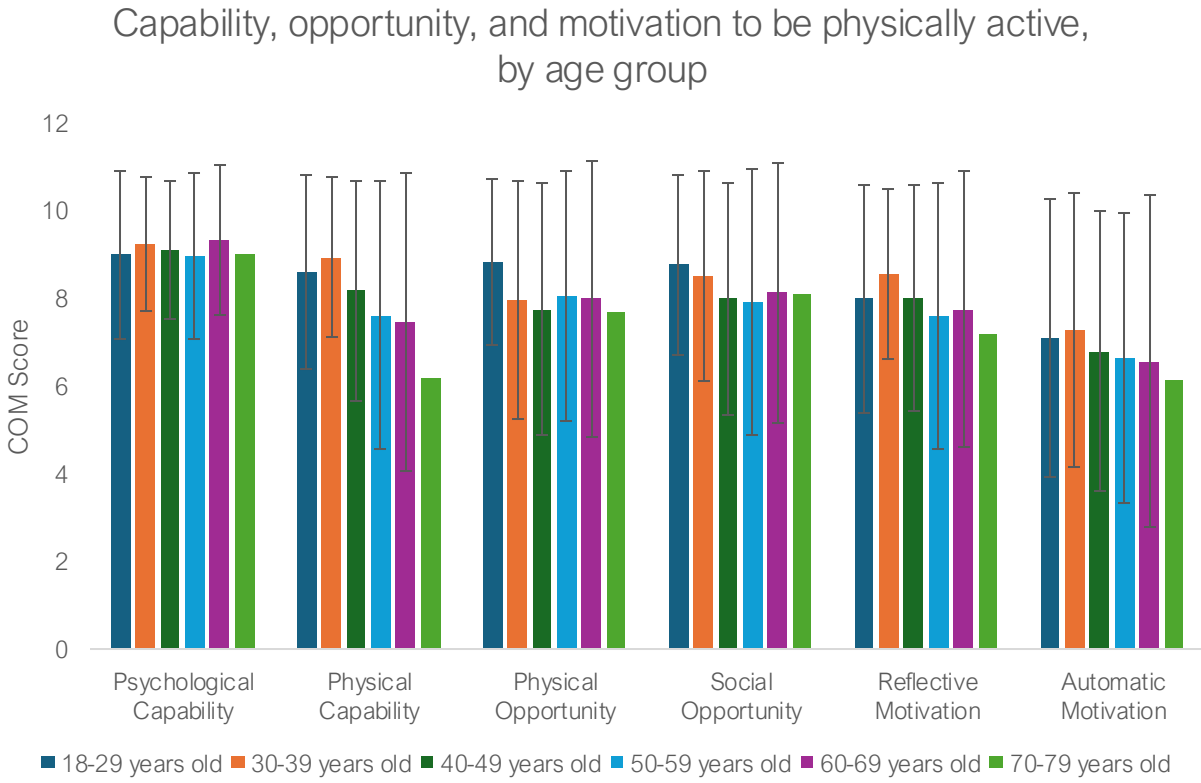
Those who were aged 60 – 69 years and 70 – 79 years reported being less physically active compared with those aged 30 – 39 years.

This graph shows the mean Capability (psychological, physical), Opportunity (physical, social), and Motivation (reflective, automatic) scores for being physically active, by age group.

As shown in the graph, the most notable difference in COM scores was for **physical capability**.

There was a trend for **older residents** (those aged 70 – 79 years) to report weaker beliefs that they have the physical skills and enough physical stamina to be physically active for 30 minutes a day (**physical capability**), with a mean COM score of 6.18.

In contrast, younger residents (those aged 18 - 29 years & 30 – 39 years) reported stronger beliefs that they have the physical skills and enough physical stamina to be physically active, with a mean COM score of 8.59 and 8.93.



COM scores in the graph: Each COM item is assessed on an 11-point scale, from strongly disagree (=0) to strongly agree (= 10), with higher scores indicating stronger capability, opportunity, and motivation to be physically active

Research Question 4: Do the barriers and facilitators to being physically active vary by key demographic and health variables?

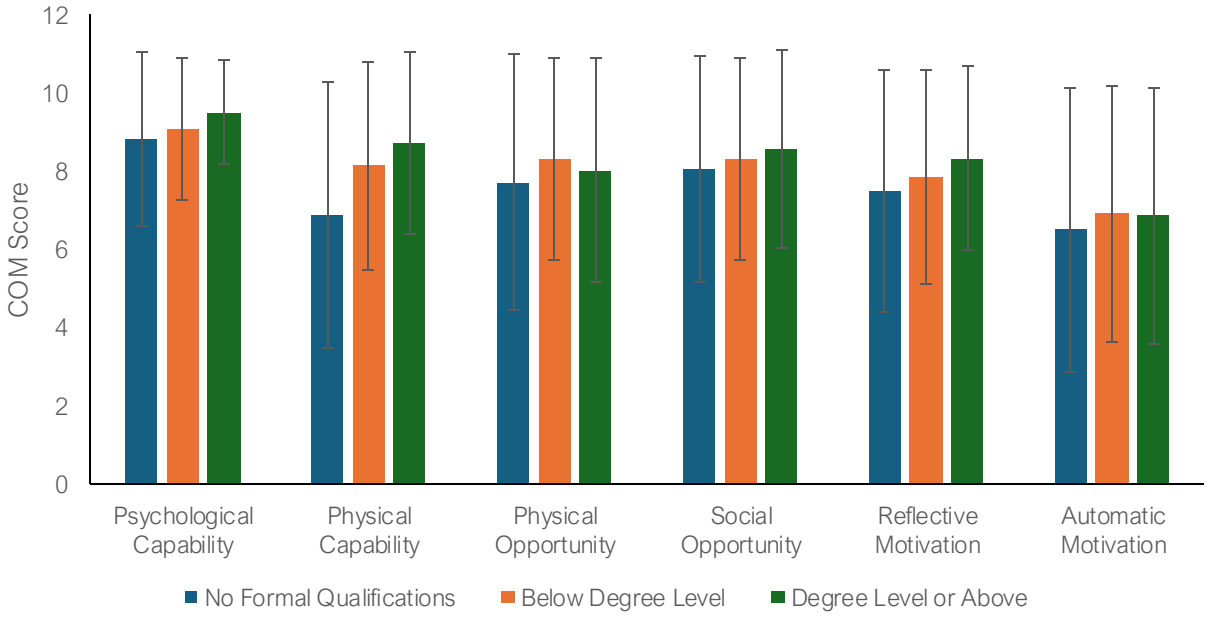
Those who reported having no formal educational qualifications reported being less physically active, compared with those who were educated to degree level or above.

This graph shows the mean Capability (psychological, physical), Opportunity (physical, social), and Motivation (reflective, automatic) scores for being physically active, by formal educational status.

As shown in the graph, the most notable difference in COM scores was for **physical capability**. There was a trend for those with **no formal educational qualifications** to report weaker beliefs that they have the physical skills and enough physical stamina to be physically active for 30 minutes a day (**physical capability**), with a mean COM score of 6.89.

In contrast, residents who were educated to degree level or above reported stronger beliefs that they have the physical capability to be physically active, with a mean COM score of 8.71.

Capability, opportunity, and motivation to be physically active, by education level



COM scores in the graph: Each COM item is assessed on an 11-point scale, from strongly disagree (=0) to strongly agree (= 10), with higher scores indicating stronger capability, opportunity, and motivation to be physically active

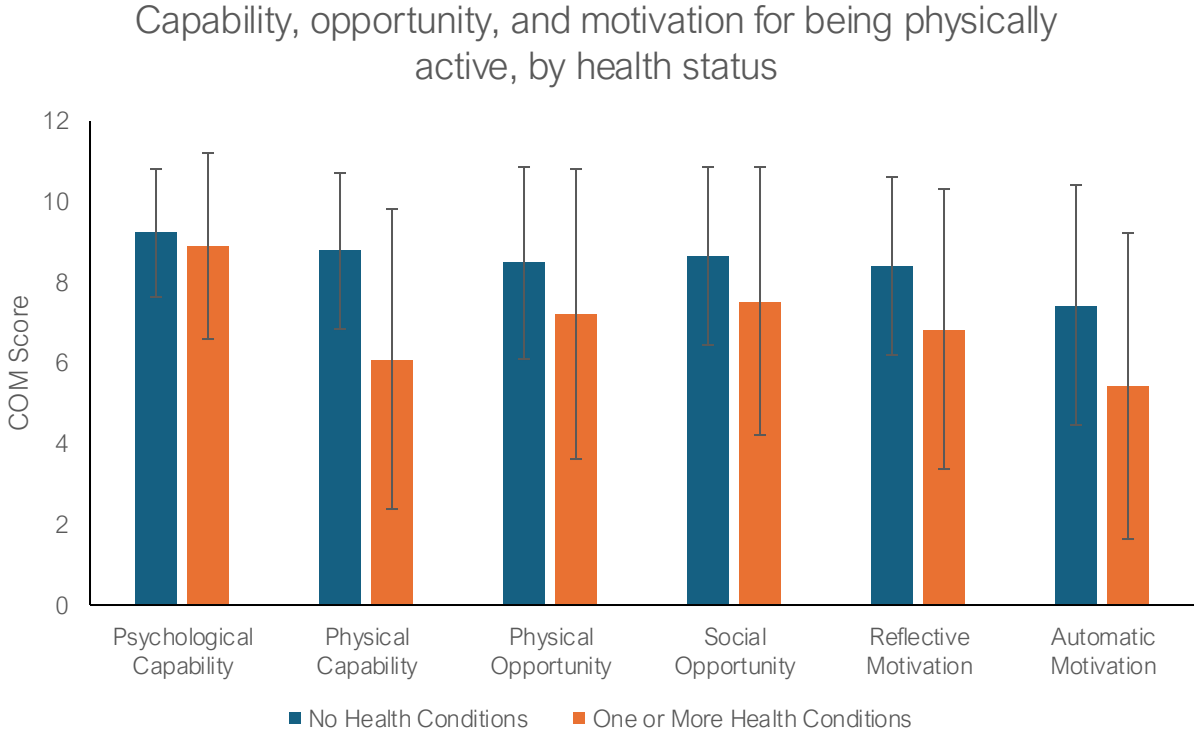
Research Question 4: Do the barriers and facilitators to being physically active vary by key demographic and health variables?

Those who reported having one or more health conditions or disabilities reported being less physically active compared with those reporting having no health conditions or disabilities.

This graph shows the mean Capability (psychological, physical), Opportunity (physical, social), and Motivation (reflective, automatic) scores for being physically active, by health status.

As shown in the graph, there were key differences in Capability, Opportunity, and Motivation to be physically active.

There was a trend for residents – regardless of health condition – to report having the **psychological capability** to engage in physical activity, that is, knowing about the importance of being physically active and believe they have the skills to make decisions and plans to be physically active.



COM scores in the graph: Each COM item is assessed on an 11-point scale, from strongly disagree (=0) to strongly agree (= 10), with higher scores indicating stronger capability, opportunity, and motivation to be physically active

Research Question 5: Who is accessing Healthy you?

There are several services and programmes being delivered to promote physical activity across Cambridgeshire, particularly those being delivered by Healthy You.

Overall, 106 (10.6%) participants that completed the survey reported that they had accessed a Healthy You service, 55 of them accessing a physical activity service.

Of those who had not accessed Healthy You, 74.1% (n=668) were willing to access the service in the future. When looking at inactive participants, there was still a high percentage of participants that were willing to access Healthy You services (72.9%).

	All (n=1037)	Physically active (n=394)	Physically inactive (n=631)
Uptake of Healthy You services			
Yes	106 (10.2%)	33 (8%)	73 (11.5%)
No	901 (86.9%)	354 (89.8%)	539 (85.4%)
Unsure	24 (2.3%)	5 (1.2%)	17 (2.6%)
Prefer not to say	6 (0.6%)	2 (1%)	2 (0.5%)
Willingness to access Healthy You amongst those who have not accessed a service			
No – but willing to access in the future	668 (74.1%)	271 (76.6%)	393 (72.9%)
No – and unwilling to access in the future	90 (10.0%)	31 (8.7%)	56 (10.4%)
No – and unsure whether they would be willing to access in the future	143 (15.9%)	52 (14.6%)	90 (16.7%)

Summary – local survey

We surveyed 1,037 residents in Cambridgeshire, with 61.6% classified as being physically inactive. Residents were more likely to be physically inactive if they were:

A resident in Fenland

Older

Unemployed

Had no formal educational qualifications

Living with a health condition or disability

The next phase of the research was to gather qualitative insights from Cambridgeshire residents to explore the barriers and facilitators to them being active.

Based on our survey findings, we targeted adults living in Fenland and that were currently unemployed. We sought to recruit a mix of ages, genders, ethnicities, and those with existing health conditions.

Interviews with residents in Cambridgeshire

We conducted interviews to explore the barriers and facilitators to physical activity in more depth. The objectives were to:

(1) Explore the barriers and facilitators to residents being physically active

(2) Understand how residents could be supported to be active

Sampling and recruitment

Individuals were recruited between January – April 2025. Eligibility criteria were Cambridgeshire residents aged over 18-years old. We specifically aimed to recruit residents who were currently unemployed and lived in Fenland based on the findings from the survey. Individuals were recruited via different strategies, including adverts and social media, an online research panel, and expressions of interest from participants of the earlier survey. All participants were offered a £20 gift voucher as a thank you for their participation.

Ethical approval

Ethical approval was granted by Sheffield Hallam University Research Ethics Committee (ID ER68324734) and Cambridgeshire County Council.

Data collection

Interviews were conducted online (e.g. Teams) or via telephone. A semi-structured topic guide was developed which consisted of questions about a person's current understanding of physical activity and their self-defined activity levels, their opinions of the current recommended guidelines of 150mins per week, and factors influencing their physical activity levels.

Analysis

Data were audio-recorded, transcribed, and anonymised. Framework analysis was used to code the data [13] using NVivo. The transcripts were coded into domains, using the 14 TDF domains as a framework. Text was coded under the domain (theme) that best matched the content. Text relating strongly to more than one TDF domain was coded in both. The types of statements under each TDF domain were than analysed using inductive content analysis. Sub-themes arising from the data (under each TDF domain) were identified to create sub-categories.

Interview findings – Participants

In total, 10 Cambridgeshire residents took part in an interview

Participants ranged in age from 19-63 years old

One participants was male; nine were female

Four participants reported having a long-term health condition

Seven participants were currently unemployed

Four participants lived in Fenland

*Are there **Capability** barriers (B) and facilitators (F) for being active?*

Residents reported the following **Capability** barriers (b) and facilitators (f):

Knowledge

- Having knowledge about what activities to do or how to use equipment (B/F)
- Being unaware of physical activity services or support available to a person in their local area (B)
- Knowing about the impact of being physically activity (F)
- Having a broad definition of what physical activity is e.g. not just sport/gyms (F)

So, I guess any sports that you play but maybe also like if you do like a lot of walking or maybe even cleaning the house if it's quite intensive cleaning. Yeah, like cleaning or walking around a lot or any type of sport. [7]

I suppose I struggle with an element of I don't know how a lot of the equipment works so I tend to just go to the same two machines. [2]

Behavioural regulation

- A person monitoring the amount of physical activity they did & having a goal to aim for (F)

I had an [smart watch] originally was when I started getting more into exercise it was the [smart watch] with the half an hour closing the rings. That kind of got me looking at the oh okay [8]

*Are there **Opportunity** barriers (B) and facilitators (F) for being active?*

Parents reported the following **Opportunity** barriers (b) and facilitators (f):

Social influences

- Being surrounded by friends and family that either do or not support a person to be physically active (B/F)
- Lack of support & guidance on how to be active from professionals (B)
- Being able to do activities with similar people & similar ages (B/F)
- Having supportive people around them who may relieve a person of certain tasks to allow them to be active (F)

I just didn't have that motivation. My friend was very much of the same. They weren't interested in participating so there wasn't one of you were spurring the other on. [2]

I think they pointed me in the NHS website and said, "Have a look at that for resources." Which wasn't really the best. [4]

Environmental context and resources

- Weather (B/F)
- Access to local facilities (B/F)
- Facilities & infrastructure not being maintained (B)
- Access to transport allowing a person to attend physical activity opportunities, or meaning they have to be active through walking to places (B/F)
- Time commitments (B/F)
- Cost of activities, particularly gyms (B)
- Timings of sessions being restrictive (B)
- Safety & Health Concerns (B/F)

Then you're restricted on what times you can use the swimming pool because they do a lot of swim schools. So then pretty much general swim is 8:00 till 8:45 and then they close. [2]

You do need a good bike, particularly in Cambridgeshire where there's potholes. [8]

*Are there **Motivation** barriers (B) and facilitators (F) for being active?*

Parents reported the following **Motivation** barriers (b) and facilitators (f):

Social/ professional role and identity

- Identifying or not identifying as an active person (B/F)
- Believing an active person is someone who does sports (B)

Beliefs about capabilities

- Believing they do not have the physical capability to be active (B)
- Being confident they can be active (F)
- Knowing the limits of their health conditions (B/F)
- Self-confidence to be active (B/F)

Intentions

- No intentions to be active (B)
- Intentions to be active (F)
- Having intentions to be active, but these not translating into activity (B)

I'm not a gym goer. I'm not motivated to go at all. [1]

I just can't walk very far, I'm absolutely knackered when I do. So I've picked up something as I've got older [5]

I know what my limits are. I know what I can and can't do. I know what my health issues are and I'm respectful of those and that's it. [6]

I feel quite ready to. I think it might just be the final push that I need to do it. Because I feel like I always say that I'll do stuff and then actually getting round to doing it [7]

*Are there **Motivation** barriers (B) and facilitators (F) for being active?*

Beliefs about consequences

- Having concerns about the negative impact of being active (B)
- Associate being active positively with their health (F)
- Believing that a change in circumstances would influence their PA (e.g. moving home) (B/F)
- Seeing being active as a long-term investment in health (F)

I do get dreadful backache sometimes when I exercise, which I have to work through. I have to ignore that and will work through that [6]

I feel like it's like taking a natural antidepressant each day. It's having that physical movement kind of just keeps me happy and in control of things. And it uses sort of that extra energy that I can sometimes have. Using it in the right way of doing something good. [8]

I guess the adrenaline rush. It's super aggressive [rugby]. I enjoy being pushed around, I just enjoy it. [3]

Emotion

- Not enjoying gyms/leisure centres (B)
- Enjoyment from being active (B/F)
- Mental health being improved through being active (B/F)
- Feeling uncomfortable from activity (B)

There's my state of mind. Sometimes I want to do something, then something comes up and just ruins the whole vibe, like I don't want to go out and do anything after a small inconvenience. [3]

*Are there **motivation** barriers (B) and facilitators (F) for being active?*

Goals

- Having short term goals (B)
- Having to focus on other goals/priorities in life (B)
- Having goals that are focused on health/weight (F)
- Developing meaningful goals to a person (F)

I'm just super occupied with school stuff, mental health and life, I don't really pay much attention to that. [3]

Reinforcement

- Having negative health impacts from being active (B/F)
- Seeing (or not) the impact from being active (B/F)
- Doing different behaviours can build habits which either help or hinder physical activity (B/F)

I would say that I'm still not as active, because once I started to get into the habit of kind of not doing anything, staying at home, and also because everything's kind of more online now, I had less reason to maybe go out and less reason to walk and stuff like that. [7]

And I hated being injured the pain of it not being able to run, not being able to do that, activity that I'd enjoyed. And I know that if I go to the gym it'll help [8]

Optimism

- Belief that they can't change their physical activity levels (B)
- Optimistic about change and how this could increase their physical activity (F)

To be honest, I'm not super happy with it, but I can't really do much about it at the moment. [3]

What do residents think would help people like themselves to be active?

Content:

- Keep it simple, point out the obvious – but don't be condescending
- Provide opportunities for different ages/populations

Delivered by:

- Someone with knowledge in the area and who works in the field (physical activity or health)
- Someone with personal experience of being active or becoming more active

Delivery Method:

- Social media
- Newsletter posted to residents through their door
- Healthcare setting – someone taking responsibility for promoting physical activity (e.g. doctor)

Summary – Interviews

We interviewed 10 residents of Cambridgeshire and identified key Capability, Opportunity, and Motivation barriers and facilitators to being physically active.

Capability

Overall, participants reported having awareness and knowledge of the impact of being physically active, particularly how this might impact their health. Participants reported generally having a broad understanding and definition of physical activity too, believing that it could be defined as any activity from sports to housework or gardening. Several participants lacked knowledge of what physical activity services or support was available to them. If a participant had knowledge of how to be active and how to use equipment/facilities, this was also a barrier or facilitator to them being active. Only one participant discussed using behavioural regulation strategies to promote physical activity and that they used self-monitoring of behaviour to facilitate physical activity.

Opportunity

Participants discussed the influence of family and friends on their physical activity, that if they were surrounded by people who were or were not active, this influenced them being active. Participants discussed wanting to be active with people who they felt were like themselves (whether that be age or ability) as this would encourage them to be active. Having people who were supportive and encouraged a person to be active, through taking on childcare for example, was a facilitator to a person being active.

Bad weather and lack of accessible facilities were seen as a barrier to physical activity, although active participants generally overcame these barriers. The cost and timing of sessions were a barrier to physical activity, with some participants discussing that there were limited times when they could access leisure facilities. A person's access to transport and how safe a person felt being active outside influenced their physical activity level.

Motivation

Motivation influenced physical activity in number of ways. If a person identified as being active or healthy, this meant they were more likely to be active and have intentions to be active. Having intentions to be active facilitated activity for some, but for others they still needed support to turn those intentions into behaviour. A person's belief in their own capability was a barrier or facilitator, for those reporting health conditions, if they knew their capabilities in relation to their health condition then this facilitated physical activity.

The perceptions a person had about the consequences of being active influenced their behaviour. Those that perceived that being active leads to benefits, such as improved health and quality of life later in life, were more likely to be active, compared to participants who perceived being active as having a negative impact. Active participants were more likely to have had positive experiences of physical activity, which reinforced them being active, particularly if they were aware or had felt any of these implications (e.g. improved mood after activity). If a person enjoyed being active and believed it was a positive thing to be active, then they were more likely to be active. However, some did not enjoy certain environments (e.g. gyms) or the feeling of being active (e.g. sweating) which was a barrier. Some participants were pessimistic that they could not be more active, which was a barrier to activity, compared to those who were optimistic about being active. A participant having goals that were meaningful to themselves facilitated activity, however for some they had competing priorities and goals, meaning that physical activity was not an important goal for themselves. Goals were not discussed as being set in relation to how active a person would be, rather on outcomes from being active (e.g. weight loss).

Interview Findings

Participants involved in the interviews varied in the amount of physical activity they did, some meeting the physical activity guidelines of 150 minutes a week comfortably, others not meeting them. It was clear from the analysis that the barriers and facilitators varied depending upon how active a person was, and these could generally be grouped into the three categories below. Participants were either; Inactive, Inactive but wanted to be active, and Active. It is important to consider how these influences upon physical activity behaviour varied depending upon the person, particularly when looking to develop interventions to promote physical activity.

Inactive – Don't want to be active

- No intentions to be active
- Lack of belief in capabilities
- Limited by the environment
- No enjoyment or positive experiences from being active
- Other prioritises over physical activity
- Do not spend time around people that are active
- Other life circumstances being prioritised

Inactive – Wants to be active

- Intentions to be active
- Goals to be active – typically outcome goal
- Other prioritises over physical activity
- Limited by their environment
- Do not identify as an active person
- Perceive activity to be sport/exercise
- Aware of negative implications of not being active
- Potentially some positive experiences/enjoyment from activity
- Limited knowledge of what to do and how
- Other prioritises over physical activity

Active

- Intentions to be active
- Enjoy being active & positive experiences
- Overcome challenges from the environment
- Belief in their capabilities and know their physical limits
- Identify as active or 'healthy'
- Monitor their activity
- Knowledge of what to do and how
- Have supportive people to encourage activity

Rapid evidence review of interventions

We conducted a rapid evidence review to identify what types of interventions have been implemented to promote physical activity in an adult population. We intended to keep the target population for interventions broad for the review, rather than focusing on one specific population (e.g. unemployed adults), to allow us to gain broader insights as to what interventions are being implemented.

The research question for the review was:

What interventions have been used to promote physical activity in adults?

Searches

Due to the number of systematic reviews that have been conducted in physical activity, we used a recent systematic review to identify interventions that have been conducted to promote changes to physical activity. This was more efficient that conducting our own search of databases, and in line with the methodology of a rapid evidence review.

The below systematic review was chosen as it only included interventions which have a minimum of a 3-month follow-up, which will provide important information on the maintenance of physical activity behaviours in adults. Forward searching was also conducted to see if any research papers have been published since this review.

Madigan, C. D., Fong, M., Howick, J., Kettle, V., Rouse, P., Hamilton, L., ... & Daley, A. J. (2021). Effectiveness of interventions to maintain physical activity behavior (device-measured): Systematic review and meta-analysis of randomized controlled trials. Obesity Reviews, 22(10), e13304. [14]

Data extraction

Data relating to the content of the intervention was extracted and classified using the Behaviour Change Wheel [2] and the BCT taxonomy [10]. Data were managed in Excel.

Analysis

Using the Theory and Techniques Tool (a heat map identifying links between BCTs and Mechanisms of Action: MoAs) [3], we then identified whether these previously tested interventions have the potential to address the barriers and facilitators for physical activity in Cambridgeshire, as identified in our survey and qualitative insight gathering activities. That is, we explored the extent to which there was a *match* between the content of the interventions (i.e., how they seek to change behaviour) and the barriers and facilitators to physical activity, and whether there were any gaps.

Rapid evidence review of interventions:

Description of included studies

In total, 24 interventions were included in the review.

- Seven interventions were conducted in the UK, six interventions were conducted in Australia, six interventions were conducted in the USA, three interventions were conducted in Belgium, and one intervention was conducted in Belgium, Spain, and the Netherlands.
- All studies used an objective measure of physical activity (e.g. accelerometer, pedometer) and had a minimum of a three-month follow-up.
- There was a mixture of interventions that focused on promoting physical activity for a specific population or health condition (e.g. adults with coronary heart disease) and those promoting physical activity for all adults.
- Mean ages of participants in the studies ranged from 35 years – 82 years old.

Types of interventions

We identified seven types of interventions:

- Enablement (used in 24 interventions) – intervention components that support an adult to be physically active, beyond education, training or environmental restructuring. This included providing social support/ practical help for participating in physical activity.
- Education (used in 17 interventions) – intervention components that aimed to increase knowledge or understanding of physical activity, the health implications of being active, and how to perform different exercises, including when and where.
- Environmental Restructuring (used in 9 interventions) – intervention components that aimed to change the physical or social environment to support a person to be physically active. This included sending reminders or prompting activity and providing resources which would allow a person to monitor their levels of physical activity.
- Persuasion (used in 7 interventions) – intervention components that use methods to persuade a person to be active. This included reviewing achievements towards physical activity goals, working with an exercise professional to support physical activity, and highlighting the consequences of behaviour.
- Training (used 4 interventions) - intervention components that imparted skills to support a person to be more physically active. This included problem solving to overcome barriers and managing stressful situations.
- Incentivisation (2 interventions) - intervention components that created an expectation of reward for a person to be physically active.
- Modelling (1 intervention) - intervention components that provide an example of a physically active person for people to aspire to or imitate.

Description of the strategies used in existing interventions

Intervention functions	BCTs	Description of the intervention component
Enablement (25 interventions)	**BCT 1.1 Goal Setting (Behaviour)** *(set or define a goal in relation to the desired behaviour)*	18 interventions either set or encouraged individuals to set their own goals to help them increase their physical activity levels, including how frequently they intended to be active or a goal of reaching a certain number of daily steps *(Study ID 3, 5-13, 15-18, 21-24)*
	BCT 1.2 Problem Solving *(analyse factors influencing the behaviour & generate strategies to overcome barriers)*	11 interventions encouraged an individual to consider the barriers to them being more active, and to then develop strategies that would allow them to overcome any barriers or promote any facilitator to being active. *(Study ID 3, 8, 9, 13, 16-19, 21- 23)*
	BCT 3.1 Social support (unspecified) *(arranging or providing social support for the performance of the behaviour)*	11 interventions provided individuals with an exercise professional (e.g. healthcare professional, personal trainer) to support them when they were undertaking physical activity, or created groups of like-minded people to be active together (e.g. all people with a particular health condition) *(Study ID 2, 5, 6, 8, 9, 11, 17, 20-23)*
	BCT 2.3 Self-monitoring of Behaviour *(a method for a person to monitor & record their behaviour(s))*	10 interventions encouraged an individual to monitor their levels of physical activity, this could be either through an app, webpage, or diary (written or online), which would allow them to reflect on how active they have been and if they are meeting or on track to achieve their physical activity goal *(Study ID 5, 6, 9, 14, 17-19, 21, 23, 24)*
	BCT 1.4 Action Planning *(develop a detailed plan of when a behaviour will be performed, including context, frequency, duration, & intensity)*	8 interventions asked an individual to develop a plan detailing when, where, how, and who they would be active with, for them to achieve their physical activity goal. Plans were also used to help an individual overcome any barriers that they may encounter. *(Study ID 2, 4, 5, 7-9, 21, 24)*
	BCT 8.7 Graded Tasks *(set easy-to-perform tasks, making them increasingly difficult, but achievable, until behaviour is performed)*	7 interventions asked individuals to increase their levels of physical activity gradually over the course of an intervention, until they were increasing their goal. An example of this was by asking an individual to do an additional 1,000 daily steps each week until they are reaching a goal of 10,000 daily steps *(Study ID 5, 9-11, 19, 20, 24)*
	BCT 9.2 Pros & Cons *(comparing reasons for wanting & not wanting to change behaviour)*	3 interventions asked individuals to consider the benefits and consequences of being more or less active, this was done with the support of a practitioner, or a person was asked to reflect individually about their pros & cons to being active *(Study ID 6, 7, 16)*
	BCT 3.2 Social Support (practical) *(arranging or providing practical help for the performance of the behaviour)*	2 interventions provided individuals with support from a healthcare professional in supporting them to be active, for example by taking them on walks to support them and give them confidence that they can complete the walk *(Study ID 1, 9)*
	BCT 9.1 Credible Source *(present a communication from a credible source in favour of the behaviour)*	2 interventions ensured that individuals had exercise professionals that already knew the individual and were relatable to help them develop a plan to increase their physical activity *(Study ID 13, 20)*
	BCT 1.6 Discrepancy between current behaviour and goal *(draw attention to the differences between a person's current behaviour & their goals)*	1 intervention encouraged individuals to reflect on the PA they were currently doing and how this differed from their goal and what they wanted to achieve *(Study ID 7)*
	BCT 4.2 Information about Antecedents *(provide information about factors that predict performance of a behaviour)*	1 intervention individuals were asked to identify preparatory factors and behaviours that would help them perform physical activity *(Study ID 13)*
	BCT 9.3 Comparative Imagining of Future Outcomes *(prompting the imaging of a person's future state if they do or do not change)*	1 intervention asked individuals to imagine the benefits they would envisage if they were to become more active and record these changes *(Study ID 13)*
	BCT 12.1 Restructuring the Physical Environment *(changing the physical environment to support PA)*	1 intervention provided individuals with access to a gym facility free of charge which enabled them to be physically active *(Study ID 6)*

Description of the strategies used in existing interventions

Intervention functions	BCTs	Description of the intervention component
Education (17 interventions)	BCT 5.1 Information about Health Consequences *(providing information about the health impact of being or not being physically active)*	10 interventions educated an individual on the benefits of being active, impacts upon health of not being active, &/or how to become more active. This was done through a variety of ways including, leaflets, posters (online & paper), or classes (both online & in-person). *(Study ID 7, 8, 10, 11, 14, 18, 19, 21, 23, 24)*
	BCT 1.2 Problem Solving *(analyse factors influencing the behaviour & generate strategies to overcome barriers)*	8 interventions discussed with individual's potential problems that they may encounter when trying to be active and provided examples of how they could overcome these challenges and introduce physical activity into their daily routines *(Study ID 3, 4, 11, 18-21, 24)*
	BCT 4.1 Instructions on how to perform a behaviour *(advising a person on how they can perform a behaviour)*	4 interventions educated an individual about how to perform a specific exercise, how to make modifications to their lifestyles to increase physical activity, how to achieve physical activity guidelines or daily step counts, or intensity exercise intensity thresholds that a person should be aiming for (e.g. exercising within heart rate ranges). *(Study ID 1, 4, 6, 21)*
	BCT 2.2 Feedback on Behaviour *(advising a person on how they can perform a behaviour)*	2 interventions had exercise professionals to provide an individual with feedback as to how active they were, feedback on the performance of an exercise, and how they were progressing in relation to achieving their goal *(Study ID 5, 10)*
	BCT 8.2 Behavioural Substitution *(prompting substitution of an unwanted behaviour with a wanted/neutral behaviour)*	1 intervention educated individuals on how they could substitute sitting time with light-physical activity to become more physically active *(Study ID 3)*
	BCT 11.2 Reduce Negative Emotions *(advise on ways to reduce negative emotions that facilitate performance of the behaviour)*	1 intervention educated individuals about how they could consider their emotions differently, particularly how they could handle stressful situations that impacted upon an individual being active *(Study ID 20)*
	BCT 13.2 Framing/ Reframing *(suggest the adoption of a new perspective to change emotions about performing a behaviour)*	1 intervention stated that cognitive framing was used, however there was insufficient information to determine how or what was done to support the promotion of physical activity *(Study ID 20)*
Environmental Restructuring (9 interventions)	BCT 7.1 Prompts/ cues *(introducing something into the environment with the aim to prompt PA)*	5 interventions prompted individuals to be active through reminders or messages (e.g. text messages, emails), or by providing individuals with workbooks where they would have reminders as to what PA they would be doing and when *(Study ID 7, 11-13, 17)*
	BCT 2.3 Self-monitoring of Behaviour *(a method for a person to monitor & record their behaviour(s))*	4 interventions provided an individual with a device or workbook which allowed them to monitor their PA levels and progress to achieving a goal *(Study ID 9, 15, 23, 24)*
	12.1 Restructuring the Physical Environment *(change or advise a change to the physical activity to facilitate performance of the wanted behaviour)*	1 intervention recommended that there needed to be changes to the local environment to ensure there were safer walking options for community members *(Study ID 17)*

Description of the strategies used in existing interventions

Intervention functions	BCTs	Description of the intervention component
Persuasion (7 interventions)	BCT 2.2 Feedback on Behaviour *(advising a person on how they can perform a behaviour)*	3 interventions provided individuals with feedback at the end of the day regarding whether they had me their daily physical activity target, typically this was done through a mobile phone app *(Study ID 1, 3, 15)*
	BCT 1.1 Goal Setting (Behaviour) *(set or define a goal in relation to the desired behaviour)*	2 interventions set individuals goals to be active which were based on what they were currently doing, rather than generic recommendations e.g. asking a person to do 3,000 extra daily steps, instead of asking them to achieve 10,000 daily steps *(Study ID 7, 17)*
	BCT 3.1 Social support (unspecified) *(arranging or providing social support for the performance of the behaviour)*	2 interventions had a person to work with an individual to elicit from them their beliefs about a behaviour and implications, allowing them to them tailor recommendations based on their beliefs *(Study ID 8, 15)*
	BCT 1.5 Review of Behavioural Goals *(review with a person their behavioural goals & how achievable these are for them)*	1 intervention discussed weekly goals with an individual to determine how realistic the goals were and celebrate any successes *(Study 17)*
	BCT 5.2 Salience of consequences *(emphasising the consequences of performing the behaviour to make them more memorable)*	1 intervention ensured that individuals were aware of the importance of both increasing physical activity and reducing sedentary behaviour *(Study 3)*
	BCT 10.3 Non-Specific Reward *(reward a person if there has been progress or effort towards performing the behaviour)*	1 intervention asked participants to identify a reward that was meaningful to themselves if they achieved their physical activity goal *(Study 13)*
Training (4 interventions)	BCT 1.2 Problem Solving *(analyse factors influencing the behaviour & generate strategies to overcome barriers)*	2 interventions trained individuals in how they could overcome the barriers that they faced to being active and relapse prevention *(Study ID 7, 19)*
	BCT 2.2 Feedback on Behaviour *(advising a person on how they can perform a behaviour)*	1 intervention provided individuals with feedback on their physical activity levels each week via phone or email from an exercise professional *(Study ID 2)*
	BCT 11.2 Reduce Negative Emotions *(advise on ways to reduce negative emotions that facilitate performance of the behaviour)*	1 intervention provided advice on how to reduce anxiety and manage stressful situations *(Study ID 10)*
Incentivisation (2 interventions)	BCT 10.4 Social Reward *(agree a verbal or non-verbal reward if there has been progress or effort towards performing the behaviour)*	1 intervention rewarded individuals by congratulating them for making progress in achieving their set goal *(Study ID 10)*
	BCT 10.10 Reward (outcome) *(arrange the delivery of a reward if there has been progress or effort towards performing the behaviour)*	1 intervention rewarded individuals for achieving health related outcomes, there is insufficient detail about what these rewards are or how frequently they were awarded *(Study ID 22)*
Modelling (1 interventions)	BCT 9.1 Credible Source *(present a communication from a credible source in favour of the behaviour)*	1 intervention used statistics and images of 'masculine' men to make messages more appealing and relatable for men *(Study ID 18)*

Heatmap

We identified whether 24 published interventions have the potential to address the identified barriers and facilitators for physical activity

Only two interventions addressed a person's emotion, primarily focusing on how to overcome negative emotions related to physical activity. The qualitative insights highlighted that those who were active had positive emotion related to being active, therefore we need to consider how to promote positive emotion related to physical activity.

22 of the 24 interventions focused on promoting intentions to be physically active, using goal setting of the behaviour to help form these intentions. Participants in the interviews discussed how they struggled to translate intentions into behaviour, and we know from research across other health behaviours (including physical activity) that there is an 'Intention-Behaviour Gap' which people struggle to overcome. Therefore, promoting intentions alone may not be sufficient to address a person's motivation to be active.

Two BCTs which were not used in any intervention were Demonstration of behaviour (BCT 6.1) and Behavioural practice/rehearsal (BCT 8.1). The qualitative insights highlighted that some participants were unsure what or how they were meant to be physically active, which is a barrier that needs addressing to support a person to be active and develop their skills and motivation to be active.

Goal setting of physical activity was frequently used alongside Self-monitoring to encourage participants to become active. Although there is evidence to support the effectiveness of these BCTs, in the review the focus is on the behaviour (i.e. physical activity), whereas the findings from the interviews indicate that outcomes to being active related to other aspects e.g. positive mood from being active. Goal setting and monitoring might be better placed to focus on other aspects such as emotion and mood to reinforce these positive experiences, rather than solely on the behaviour of physical activity.

Intervention recommendations

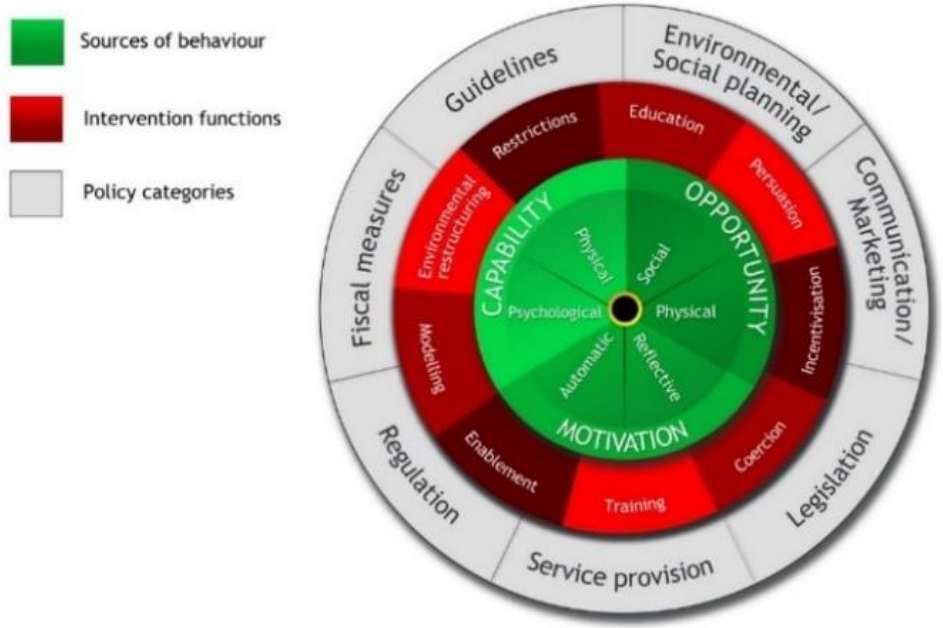
We used the Behaviour Change Wheel [2] to make theory-informed intervention recommendations for supporting residents to be physically active.

We have matched the types of intervention functions (red circle) that are likely to address the identified barriers and facilitators for physical activity (green circle).

We have also matched the types of policy categories that can help to deliver those identified interventions (grey circle).

We describe the content of the intervention recommendations in terms of its Behaviour Change Techniques (BCTs), which are the 'active ingredients' of the intervention [10].

Using the APEASE evaluation criteria [2], we have explored the likely acceptability, practicality, effectiveness, and affordability of the interventions (both from the perspective of the resident, and those who would deliver the intervention), and explored whether receiving and/or delivering these interventions are likely to result in unintended consequences or impact on inequalities.



Behavioural Targets

- There are a wealth of physical activity programmes and services available in Cambridgeshire targeting different population groups (i.e., older adults, children and young people) and different contexts (i.e., those living with a health condition), different activities (i.e., skateboarding, running groups, wellbeing walks), and different outcomes (i.e., weight management, falls prevention).

- In our survey, we found that **73%** (393) of residents who were inactive and had not previously accessed Healthy You services (n=539) were **willing** to access Healthy You services in the future.

- Our qualitative insights work has also identified two key groups of residents who would benefit from targeted interventions:
  - Those who are physically inactive and unwilling to be active
  - Those who are physically inactive and willing to be active

- This suggests that there are two key behavioural targets for interventions that seek to increase physical activity amongst residents who are (1) physically inactive and unwilling to be active and (2) physically inactive and willing to be active in Cambridgeshire.

Behavioural target 1: Supporting uptake of existing physical activity services for those who are willing to access services

For those who are willing to access services, interventions should focus on increasing uptake of existing physical activity services. Interventions need to be tailored to those who are (1) physically inactive and unwilling to be active and (2) physically inactive and willing to be active.

Behavioural target 2: Supporting self-directed physical activity for those who are unwilling to access services

For those who are unwilling to access services, interventions should focus on supporting residents to be more physically active as part of their everyday life. Interventions need to be tailored to those who are (1) physically inactive and unwilling to be active and (2) physically inactive and willing to be active.

Intervention Recommendation 1: *Addressing behavioural target one*
A behavioural science toolkit for physical activity service providers

We suggest a behavioural science-informed toolkit that sets out simple steps and provides design briefs for physical activity service providers. These design briefs will guide physical activity service providers in how to use behavioural science to design or tailor their messages/ communications/ resources about their physical activity programme to address key barriers to resident's uptake and engagement with those services [4]. This toolkit will help providers create:

- Resident facing communications (posters, leaflets, social media posts)
- Professional facing resources to support referrals
- Video resources for residents and professionals

The toolkit will address the following targets for increasing uptake and engagement with available services.

- Capability (knowing what the service is and where, when, how to access; making it easy to sign up to)
- Opportunity (accessing referrals, hearing from others who have taken part in the service, having access to video resources about the service)
- Motivation (believing the service is of value, believing that other people like them access and enjoy the service, addressing concerns)

APEASE evaluation criteria:

Most physically inactive residents are willing to access services and so an intervention that increases uptake and engagement with existing services is likely to be **acceptable** and **effective**. Given a range of services already exist across Cambridgeshire, an intervention which seeks to boost uptake and engagement with those services to increase physical activity across the population is likely to be **practical** to implement with no unlikely **unintended negative consequences.** This intervention could be expensive, as it requires physical activity service provider time/cost to engage with the toolkit and design or amend their resources (**affordability**). There would need to be separate interventions to increase physical activity amongst those who would prefer self-directed physical activity to ensure that interventions are **equitable** for people with different needs (see later recommendations).

BeST Engage toolkit for physical activity service providers

BeST Engage

Behaviour Change Wheel

Policy categories:

Communications/ marketing

Intervention functions:

Education

Persuasion

Enablement

Key BCTs:

3.2 Social Support (Practical)

4.1 Instructions on how to perform a behaviour

5.1 Information about health consequences

6.1 Demonstration of behaviour

7.1 Prompts/ Cues

9.1 Credible source

Identified need

Providing information about how & where to be active

Making residents aware of services & opportunities available to them in their area

Promoting the value of physical activity & services to residents

Informing residents about the benefits of physical activity

BeST Engage is a behavioural science toolkit which seeks to support uptake and engagement with available services [4].

Intervention Recommendation 2: Addressing behavioural target two

Turning Intentions into Action

Behaviour Change Wheel

Identified need

Some residents reported a willingness to be active but had not yet translated these good intentions into action. These residents would benefit from further support to take the next step and to translate those good intentions into physical activity behaviour. Research supports the need for techniques such as **Coping Planning** or **'What-If' strategies** to be implemented to help a person turn their intentions to be active, into behaviour [15]. An intervention could provide an individual with resources and support to develop these Coping Plans to overcome any barriers they may face. The intervention should include:

- The opportunity for a person to consider what barriers they may face when trying to be active (e.g. having competing priorities).
- Encouraging a person to develop strategies to overcome these potential barriers or to provide individuals with a list of strategies that could work (e.g. exercising at home, if a person does not want to go outside in bad weather).

The resources could be self-directed or completed with the support of a Healthy You advisor or peers.

Policy categories:

Service Provision

Intervention functions:

Education

Enablement

Training

Key BCTs:

1.2 Problem Solving

1.4 Action Planning

4.1 Instructions on how to perform a behaviour

4.2 Information about antecedents

Increase a person's beliefs about being able to be active when faced with barriers

Help to turn intentions into behaviour

Ensure that a person is planning on doing an activity that they enjoy and is important to themselves

APEASE evaluation criteria:

This idea is **acceptable** to professional stakeholders. This could be **practicable** to be implemented, as the tools could be added to current materials that are being used to promote physical activity. Previous research has found that individuals can **effectively** complete coping plans individually without support [16], but work would be needed to explore the **effectiveness** of people doing these coping plans without support. The need for support would influence the **cost-effectiveness** as self-guided planning would use fewer resources. Positive **side-effects** could include a person also considering how other health behaviours influence their physical activity levels. How this intervention is delivered would impact **equity**, for instance if online it may exclude certain individuals (i.e., those without digital access), so a variety of modes of delivery would need to be considered.

Intervention recommendation 3: Addressing behavioural target two

Demonstration of physical activity locally

Participants that were inactive highlighted how they lacked knowledge of what and how they could be active. It was also discussed how there were facilities available in a person's local area but that these may not have been maintained. Resources could be created which would **educate residents about how they could be active and where they could be active**. Resources could look to:

- Provide advice and guidance on what activity or exercises a person could do.
- Inform individuals how they could use the facilities and environment around them to be active (e.g. local walking routes, parks) as well as services and classes that are already being run.

Demonstration of activities and behaviours could be done by local people in local areas, making the information more relatable to residents and providing them with **role models**.
The mode of delivery would need considering but could be delivered online using videos or via leaflets/posters in accessible areas (e.g. libraries, newsletters).

APEASE evaluation criteria:
Professional stakeholders indicated that this intervention would be **acceptable**. If implemented online this intervention would be easy to implement and reach a wide range of people (**practicable)**. However, if online it may exclude some groups (e.g., those without digital access), reducing the **equity** of the intervention. Work would need to be done to understand how to support residents who could not access the resources online. As this intervention is primarily information sharing, it would be able to reach many residents who would be able to **effectively** engage with the resources. Online demonstrations of health-related behaviours and physical activity has been found to **effectively** increase a person's physical activity levels [17]. Depending upon the type resources developed, this could impact on the **cost-effectiveness** of the intervention (e.g. videos potentially being more expensive), but once resources are developed, they could be adapted and used in different ways. **Side-effects** may include people not following instructions correctly, leading to injuries, but work would need to be completed to ensure the instructions are clear and safe for different populations.

Behaviour change Wheel

Policy categories:
Communication/ Marketing

Intervention functions:
Education
Training
Modelling

Key BCTs:
4.1 Instructions on how to perform a behaviour
6.1 Demonstration of behaviour
7.1 Prompts/ Cues
8.1 Behavioural practice/ rehearsal
9.1 Credible source
13.2 Framing/Reframing
16.3 Vicarious consequences

Identified need

Increase a person's knowledge about what they can do and how

Develop beliefs in a person's capabilities to be active

Encourage a person to perceive their physical environment differently

Use relatable people to encourage a person to be active

Intervention recommendations

There are some overarching factors and recommendations that should be considered when developing an intervention to promote physical activity for individuals living in Cambridgeshire:

- Physical activity is a complex behaviour and factors influencing it vary depending upon the current amount and intentions that a person has to be active.
- Intervention recommendations 2 and 3 could be developed as one intervention, and this would ensure an individual initiate's the behaviour and plans how to be active and overcome barriers. However, the resources available would influence the practicability of doing this as one large intervention.
- Resources would also impact upon how these interventions are delivered, as providing residents with 1-to-1 support and advice would ensure they understand what is expected of them and promote accountability. Nevertheless, this would be more expensive than developing resources that could be completed by the individual at their own pace.
- Although there are physical activity guidelines of 150mins per week, guidance on how a person can be active will vary depending upon their circumstances. For example, people living will long-term health conditions may need to be active in different ways and 150mins per week may be unachievable. Therefore, support and information on how different populations can be active should be gained from other professionals.
- It is important to remember that for some people, being active is not a priority, and these people are sometimes those that would benefit the most from being active. Taking a person-centred approach is important in firstly understanding the challenges that they face, to then be able to take the steps to support an individual to make meaningful changes to their life. Supporting the immediate needs of a person, may in turn lead to a person having the capacity to focus on becoming more physically active.
- Consideration needs to be given to the fact that people prefer to be active in different ways, some prefer structured sessions, whereas others prefer to participate in their own unstructured activities – this is reflected in the survey findings that approximately 30% of inactive people were unwilling to access a Healthy You service. This needs considering when implementing the proposed interventions and ensuring that a person has a choice and are able to be active in the way that works for themselves.

Conclusions

This mixed-method research has identified key Capability, Opportunity, and Motivational barriers and facilitators for physical activity. Factors influencing a person's physical activity levels are wide-ranging and complex and will vary between individuals. A range of interventions are needed to encourage a person to be more physically active, and the current physical activity level and intentions to be active need considering before implementing an intervention.

We have made a series of recommendations about how to support Cambridgeshire residents to be more active. These recommendations include developing a behavioural science 'toolkit' for service providers to support uptake and engagement with existing physical activity services and programmes, demonstrating to individuals how and where they can be active, and turning intentions to be active into behaviour.

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