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A mixed-methods approach to understanding barriers and facilitators to healthy eating and exercise from five European countries: highlighting the roles of enjoyment, emotion and social engagement

Sarah Snuggs[a], Sophie Clot[b#], Daniel Lamport[a#], Anumeha Sah[a#], Joseph Forrest[a#], Agnes Helme Guizon[c], Amanpreet Kaur[a], Zara Iqbal[a], Cindy Caldara[c], Marie-Claire Wilhelm[c], Camille Anin[c] and Julia Vogt[a]

[a]School of Psychology and Clinical Language Sciences, University of Reading, Reading, UK; [b]Department of Economics, University of Reading, Reading, UK; [c]Univ. Grenoble Alpes, Grenoble INP, CERAG, Grenoble, France

ABSTRACT

Healthy adults are consistently falling below national and international recommendations for physical activity and dietary intake across Europe. This study took a co-creative approach with adult samples from five European countries to qualitatively and quantitatively establish motivators, barriers and sustaining factors for positive health behaviour change. Stage 1 delivered a newly-designed online programme, creating a community who identified challenges, motivators and solutions to sustaining positive healthy eating and physical activity behaviours. Stage 2 administered an online survey (developed from Stage 1 findings) to a larger sample to quantify the relative importance of these motivators and barriers. Results from both stages indicated enjoyment, positive emotions, and reward as key motivators for both behaviours across all five countries. Barriers included habit-breaking difficulties, temptation and negative affective states. Those with a high BMI placed more importance on social pressure than those with healthy BMI. Participants' reports of motivators and barriers reflected relevant approaches from consumer science, behavioural economics, and psychology. Interventions supporting adults who are not chronically ill but would benefit from improved diet and/or physical activity should not focus exclusively on health as a motivating factor. Emphasis on enjoyable behaviours, social engagement and reward will likely improve engagement and sustained behaviour change.

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CONTACT Sarah Snuggs sarah.snuggs@reading.ac.uk School of Psychology and Clinical Language Sciences, University of Reading, Reading, UK.
[#]Joint second authors.

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Background

Obesity continues to present a substantial problem in adult populations (GBD 2015 Obesity Collaborators, 2017). This is principally attributed to negative health behaviours such as poor diet, insufficient physical activity and sedentary behaviour (Wright & Aronne, 2012). All of these behaviours are also associated with an excessively high prevalence of chronic health conditions, for example cardiovascular diseases and cancers (Huijts et al., 2017). Even individuals with a healthy weight are falling below national and international guidelines related to diet and exercise (e.g. NHS, 2016) which will likely have negative long term impact on their health. Increasingly, disease prevention is as important, if not more so, than disease management. This study aimed to co-create ideas around increasing healthy eating and physical activity with a sample of adult participants from five countries (UK, France, Italy, Ireland and Germany) who did not immediately present as having vulnerable health conditions, to inform interventions and policies. Specifically, drawing on literature which emphasises the need to identify motivating factors to induce and maintain health behaviour change, the study aimed to qualitatively and quantitatively establish which motivators (and barriers) featured as most important in this context for our sample.

Over the last few decades, several theory-based approaches and models have been developed to assist with health behaviour change intervention development. All these models are unique, but they share several central ideas (e.g. *transtheoretical model of change,* Prochaska & Velicer, 1997*, theory of planned behaviour,* Ajzen & Madden, 1986*, self-determination theory* Deci & Ryan, 2012 and *social cognitive theory,* Bandura, 1998, *protection motivation theory,* Maddux & Rogers, 1983). For instance, they emphasize that individuals need to be motivated by a desire to improve their health (see Teixeira et al., 2020). Further, between them, they attempt to address internal factors such as forming a behavioural intention and motivation to change and regulating the pursuit of it. They also address external factors, such as environmental and social elements including the support of others that can facilitate health behaviour change. Over time, perception in the literature has been that some of these theories have become out-dated (e.g. Sniehotta et al., 2014) and more thorough guidelines have been designed to ensure that behaviour change interventions can be systematically designed, evidence-based, and acceptable to the target audience. The most commonly used of these guidelines in psychological research is the *Behaviour Change Wheel* (Michie et al., 2011). This approach concentrates on capability, opportunity and motivation (COM-B), positing that all three elements need to be present to facilitate effective behaviour change.

These theoretical approaches to behaviour change appear to have had some success in individual intervention studies, but systematic reviews indicate inconsistent outcomes (Mastellos et al., 2014; Raber et al., 2021; Timlin et al., 2020). The evidence also points towards small effect sizes (Baker et al., 2011; Borek et al., 2018). Moreover, support for the effectiveness of theory-based behaviour change interventions in 'real world' settings is, at best, limited; laboratory-based methods are often inapplicable to other settings and lack transferability (Hagger & Weed, 2019). Studies in the areas of both physical activity and healthy eating indicate difficulty around converting academically developed trials into large-scale, appropriate interventions that can be

applied to public health (Beedie et al., 2014; Primack, 2018). Additionally, these interventions have historically focussed on education but increasingly, evidence indicates that most people know what they *should* do to maintain a good health status (e.g. Sugden, 2017), and that the barriers to doing so are therefore more complex than lack of knowledge or understanding.

In addition to these approaches in psychology, other fields have examined what can help people to adopt a healthier lifestyle, including behavioural economics and broader self-regulation and motivation research (see Duckworth et al., 2019; Mann et al., 2013; Kopetz & Woerner, 2021 for overviews). Motivation and self-regulation research emphasizes, similar to the accounts above, that successful behaviour change begins with setting a goal to change, pursuing this goal, and maintaining the change (e.g. Mannet al., 2013; Fishbach & Woolley, 2022). Factors that contribute to success are setting an attractive goal, planning and ensuring the behaviour is executed which can, in time, result in building new habits that often ensure successful maintenance of the behaviour (e.g. Lin et al., 2016). Additionally, they emphasize the importance of understanding competing demands and goals and emotional states that might hinder the pursuit of the health goal such as spontaneous (and therefore difficult to control) desires to reward oneself or to avoid negative feelings, and the need to save time or money (see Duckworth et al., 2019). Indeed, competing demands may provide an additional challenge for many people. For example, families with two working parents are more common in the UK than they were at the turn of the century (Office of National Statistics [ONS], 2019). From this perspective, it is important to identify ways that individuals can pursue health goals in the presence of competing and often more attractive or pressing options for food choice or actions (Pettigrew, 2016). A pragmatic solution for this conflict is to make the healthy food or exercise option (i) the easiest option such as when healthy food items are presented in the front row of a display and thus easiest to grab for a time-scarce consumer; or (ii) the most attractive option such as when rewarding people for attending the gym (see Duckworth et al., 2019; Milkman et al., 2021; Woolley & Fishbach, 2015).

This approach resonates with research from behavioural economics (Mertens et al., 2022, Thaler & Sunstein, 2021) which posits a range of tools besides traditional enforcement strategies to foster behaviour change, such as social norms (e.g. Allcott, 2011), commitment strategies (e.g. Ashraf et al., 2006) and habit creation (e.g. nudge theory, Sunstein, 2014). This can be achieved by choosing healthy food that one likes instead of food that provides the greatest health benefits (Woolley & Fishbach, 2015) and by combining a less liked behaviour such as a less liked exercise with an attractive behaviour such as meeting a friend in an exercise class or watching one's favourite TV show (Kirgios et al., 2020). Therefore, this approach suggests that a range of rewards could be used to motivate the individual. For instance, health behaviour could be experienced as rewarding because it improves physical appearance (Ashton et al., 2015) or mood (Fotopoulos et al., 2009). Interestingly, more traditional health behaviour change interventions do not typically seek to enhance these aspects of motivation. The present study therefore aimed to understand which factors consumers report as motivating them to eat healthier and exercise more, and which obstacles need to be addressed.

To ascertain which motivating factors and obstacles people identify, we implemented a co-creation approach. In clinical research, one line of ensuring that professional interventions do not presume to understand patients' motives and goals that has developed is patient and public involvement (PPI). This approach is less common in communities that are not considered clinically vulnerable and for disease prevention interventions. Arguably, for intervention development to be genuinely applicable to real-life settings, it is necessary to go beyond consultation with members of the target audience and facilitate a co-creative process, allowing individuals to collectively come up with solutions to behaviour change challenges themselves. Defined as the 'enactment of creation through interactions' (Ramaswamy & Ozcan, 2018), co-creation enables groups of interested parties to exchange thoughts with the specific purpose of extending beyond 'ideas' and instead creating 'value', often in the form of solutions or plans that are 'designed by, and not for people' (Rundle-Thiele et al., 2021). According to MacInnis (2011), this process can make us aware of what has been missing, and why this is important.

Although co-creative behaviour change intervention design is in its infancy, the methodology has been applied in several healthcare areas including health literacy (Boonstra et al., 2021), sedentary behaviour (Leask et al., 2017), disease management (Lazo-Porras et al., 2020) and service engagement (Mashamba-Thompson et al., 2022). As the approach grows in this field, structured frameworks are emerging and there are indications both that co-creators value the process and that participants at the intervention user-end appreciate the co-creative input (Leask et al., 2019). Co-creation has historically been used in marketing more than healthcare, and evidence from market research further supports the concept that customers value co-created products (Roser et al., 2009). This might become increasingly important as the digital healthcare industry continues to expand (Abernethy et al., 2022). The methodology allows researchers to find solutions *with* and not *for* citizens and carries the advantages of increased awareness of contextual factors and taking into account existing knowledge (Rundle-Thiele et al., 2021). In turn, this can allow for a pragmatic and realistic approach to behaviour change. Not only does co-creation allow for citizen engagement, there is emerging evidence that interventions developed with this approach may be more effective (see Brandsen et al., 2018 for a comprehensive summary of the methodology).

This changing landscape supports the development of an adjusted approach that is up to date and suits people's everyday needs and requirements. Before the development and implementation of any such intervention, it is essential that we re-assess consumer demand and requirement. This will ensure that any support systems developed will be both acceptable and attractive, as well as robustly based on sound, up to date, behaviour change theory. With this in mind, the objective of this research was to co-create ideas and solutions for improving healthy eating and physical activity with a group of participants from five countries who were not clinically vulnerable but would benefit from improving health behaviours. Specifically, the study had three aims:

1. To co-creatively identify the motivators and barriers to setting up both healthy eating and physical activity behaviours
2. To co-creatively identify the motivators and barriers to maintaining these behaviours
3. To quantitatively capture the relative perceived importance of these factors by a different sample

Methods

The study was given ethical approval by the University of Reading Ethics Committee in October 2020 (reference 2020-055-JV).

Design

The study had a mixed methods design with a co-creative approach. This involved participants leading the discussion with the support of a moderator. The first stage of the research, intended to address research aims 1 and 2, collected qualitative data by engaging an online community to co-creatively identify motivators and barriers to physical activity and healthy eating, and to explore ideas and solutions for maintaining these behaviours. Data were necessarily collected online because the timing meant that collection occurred during lockdown periods in some countries. This approach also allowed for a wider geographical spread of participants, has been advocated as a valuable method of data collection for marketing and research purposes (Shau et al., 2009, Fry, 2014), and for leveraging change for socially desirable ends (Pechmann et al., 2015, 2017). The authors recognise that interaction might have been limited due to not meeting other participants physically, and efforts were made to ensure that they built up a rapport with shared activities and group chats. The platform that was utilised (Krealinks, www.krealinks.com/platform/) specifically focusses on building online communities and its organisers are experienced in co-creation. All members of the research team underwent training to understand the software and one member of the research team was trained specifically as a moderator. This moderator was dedicated full time to the delivery of the community materials for the duration of the project and took steps to ensure active communication (for example thanking people for contributions, sending daily messages and prompts) whilst avoiding any manipulation (e.g. praising suggestions). Participants were encouraged to vote for others' suggestions if they liked them and this added a competition element to the community (see Procedure for further details of programme content).

The second, quantitative stage used information from stage 1 to create an online survey to address research aim 3; specifically, to characterize facilitators and barriers and to quantify the relative importance of these factors.

Stage 1: co-creation activities

Participants

Purposive sampling was employed to recruit a mix of male and female adults across a broad age range, who experienced conventional day to day challenges and represented varying BMI, household structures and countries (see Table 1). Participants were recruited through a recruitment company, Lucid (https://luc.id/). All 27 participants in this stage of the research lived in the UK ($n=17$, 63%) or the Republic of Ireland (ROI, $n=10$, 37%)[1] and were aged between 25 and 55 years old. Prior to taking part in the co-creation activities, participants completed a screening questionnaire to establish that they lived in the UK or ROI and had reliable and frequent access to a smartphone or laptop. They also provided demographic details (Table 1). There were no further inclusion or exclusion criteria.

Table 1. Participant characteristics for co-creation activities.

	n (%)
Female	14 (51.9)
35–50 years	12 (44.4)
25–35 years	15 (55.6)
Single	9 (33.3)
Co-habiting	7 (25.9)
Dual parent household	9 (33.3)
Single parent household	2 (7.2)
Total	27 (100)

Procedure

Participants were recruited to take part in a 14-day online programme hosted by the co-creation platform, Krealinks (www.krealinks.com/platform/). This allowed us to communicate with our participants in a variety of ways to enable optimal co-creation such as chats, sharing of written messages and images, bulletin boards, challenges and competitions. All participants were asked the same questions and offered the same activities. The programme comprised daily activities and questions, which participants were asked to respond to in an open-ended manner. Broadly, these questions aimed to elicit ideas about motivators and barriers for health behaviours, as well as methods employed to sustain these behaviours and thoughts about what can make sustainability challenging. Participants were encouraged to build on these ideas and to engage with each other to facilitate evolution of the proposed solutions over the course of the programme, initially through the information they were given ahead of starting the project, and then intermittently by the moderators and task instructions. For example, participants were encouraged regularly to take advantage of the group chat function available, and some of the tasks specifically requested that participants built on others' answers to previous questions. A rapid (unpublished) literature review following PRISMA guidelines (Page et al., 2021) was conducted prior to the start of the study to identify key concepts including motivators and obstacles to goal-setting and maintenance. Of the papers included in the review which described relevant theory base (20 of 33 papers), four key behaviour change models were supported: Transtheoretical model (Prochaska & Velicer, 1997), Theory of Planned Behavior (Ajzen & Madden, 1986), Social Cognitive Theory (Bandura, 1998) and Self Determination Theory (Ryan & Deci, 2000). We drew on these models to create the tasks, scripts and activities to ensure that they were based on sound evidence-base. For example, participants were frequently encouraged to identify motivating factors (for themselves and others), to consider why intentions did not always translate to behavior (i.e. the 'intention-behavior' gap, see Sultan et al., 2020) and to consider differences in motivation according to whether a person was 'ready to change' or not.

The co-creative activities and questions were based on these review findings; Table 2 shows an outline of the daily timetable (a more thorough description of the moderator-led activities is available in the supplementary information). The aim was to craft an online community that is able to generate creative solutions that take into account the various perspectives and experiences. According to Human-Centred Design Principles (Biroscak et al., 2018; Ideo, 2013), it was organized along three creativity phases: Inspiration (days 1–3), Ideation (days 6–10) and Implementation (days 13–14), with breaks at weekends. Data collection for this stage of the study took place between 27/05/2020 and 10/06/2020.

Participants provided informed consent and agreed to respect a *Charter of Good Conduct* that they approved at the beginning. They were encouraged to collaborate and build on one

Table 2. Breakdown of daily programme activities.

Day 1	Introductions: participants asked to describe what being healthy means with text and picture wall activities & given a sentence completion task
Day 2	Eating Habits: Participants asked to personally reflect on their eating habits in the group chat, to think about positive and negative habits, changing habits and motivators for change. Invited to create a character and story exploring healthy eating behaviours and challenges.
Day 3	Physical Activity Habits: Sharing of photos representing their everyday physical activity, followed by discussion activity on physical activity habits and changing habits, story activity as above
Day 4	Day off
Day 5	Day off
Day 6	Food Creativity: Individual and then group challenge to come up with ideas for healthy eating motivation. Mutual (moderator-led) discussion, sharing tips. Further conversation about planning for 'mistakes'
Day 7	Food Creativity: Game to consider how they would approach healthy eating with no constraints (e.g. money, time). Considering ways to maintain healthy behaviours in the chat. Brainstorm activity: sharing lists of words associated with healthy eating, then exchanging word lists and developing further ideas
Day 8	Revisiting Day 7 ideas: considering which ideas (from all contributors) stand out and which are favoured. Finding solutions to the earlier identified challenges, using the previous day's ideas (using chat activities and answering moderator-led questions)
Day 9	Physical Activity Ideas: Goals, monitoring & commitment discussion, brainstorming challenge – PA ideas if there were no constraints, exchanging ideas
Day 10	Revisiting Day 9 ideas: considering which ideas (from all contributors) stand out and which are favoured. Finding solutions to the earlier identified challenges using chat activities and answering moderator-led questions
Day 11	Day off
Day 12	Day off
Day 13	Moderator-led discussion around the challenges specific to combining healthy eating and physical activity
Day 14	Conclusions and idea exchange for solutions to challenges. Specific activities to consider what a useful health app might look like in the context of the previous two weeks' activities.

another's ideas whilst maintaining respectful relationships. A moderator working on the project was available to answer questions; the moderator specifically welcomed, addressed questions and set tasks for the participants but did not comment on contributions beyond thanking participants and encouraging participation in order to remain neutral. Participants maintained anonymity throughout with the use of pseudonyms as usernames on the online software. All comments were therefore anonymous but identifiable to unique individuals and data were stored securely.

Analysis

Thematic analysis was employed to identify and analyse patterns of meaning in the dataset. This technique is not bound to any theoretical perspective or constraints of experimental method. As such, it is a flexible approach because it does not require a specific research design, unlike some other qualitative analytic techniques which require specification of the theories that have guided research questions. Given the exploratory nature of this research, thematic analysis was deemed appropriate.

Data organisation and coding took place using Nvivo software. Data comprised written answers to the online questions. In this context, the data were treated as interview transcripts. Three researchers (AS, AK & ZI) were involved in the analysis. Following Braun and Clark's six stage approach to thematic analysis (Braun & Clarke, 2006), the researchers first familiarised themselves with the data through reading and re-reading the dataset. In the second stage, they conducted initial line by line coding to organise the data. These initial codes were then combined to consider potential themes (stage 3), followed by reviewing of all the codes and themes (stages 4 and 5) by all three

researchers as recommended (Saldana, 2015). The final stage (6) involved agreeing the themes across the research team and extracting quotations to illustrate these.

Stage 2: survey administration

Participants

Participants were recruited through Prolific Academic from four countries: UK, Germany, France and Italy to present a variety of European countries in different geographic locations. A total of 212 participants took part but five participants' data were removed due to implausible answers, leaving a sample of 207. One third (70, 33.8%) had children and 114 (55%) reported that they had a partner. Mean BMI across the sample was in the normal weight category (24.97) with a range of 16.40 – 46.30, meaning that participants represented a diverse array of BMI categories from underweight to extremely obese (NHS, 2021). The majority of participants, however, reported measurements in the healthy or overweight categories. Further participant characteristics are in Table 3. Inclusion criteria required that they could read and understand the

Table 3. Participant characteristics for quantitative stage.

	UK		Germany		France		Italy		Total	
	M	SD	M	SD	M	SD	M	SD	M	SD
Age	35.59	7.1	34.17	6.39	35.92	8.02	34.49	6.78	35.03	7.08
Household n	2.67	1.14	2.57	1.45	2.73	1.42	2.55	1.1	2.63	1.28
Children n	1.72	0.79	1.83	0.72	1.87	1.14	1.4	0.52	1.74	0.88
BMI	27.78	5.81	24.88	3.69	22.98	4.86	23.79	4.45	24.89	5.05
	n	%	n	%	n	%	n	%	n	%
Female	27	52.9	28	51.9	26*	51	25	49	106	51.2
Education**										
Less than high school	1	2	0	0	1	2	0	0	2	1
High school / A Levels	12 9	23.5 17.6	2 1	3.7 1.9	0 2	0 3.9	0 22	0 43.1	14 34	6.8 16.4
Bachelor's degree	23	45.1	25	46.3	14	27.5	18	35.3	80	38.6
Master's degree	4	7.8	24	44.4	26	51	9	17.6	63	30.4
Doctoral degree	1	2	1	1.9	4	7.8	2	3.9	8	3.9
Other	1	2	1	1.9	4	7.8	0	0	6	2.9
Income***										
Under 30,000	22	43.1	12	22.2	15	29.4	26	51	75	36.2
30 – 39,000	6	11.8	6	11.1	8	15.7	11	21.6	31	15
40 - 49,000	11	21.6	6	11.1	7	13.7	5	9.8	29	14
50 - 59,000	3	5.9	9	16.7	6	11.8	1	2	19	9.2
60 - 69,000	2	3.9	9	16.7	6	11.8	2	3.9	19	9.2
70–79,000	2	3.9	3	5.6	1	2	0	0	6	2.9
80–89,000	3	5.9	2	3.7	2	3.9	0	0	7	3.4
90–99,000	1	2	2	3.7	0	0	1	2	4	1.9
100–150,000	1	2	3	5.6	2	3.9	0	0	6	2.9
150,000 +	0	0	2	3.7	0	0	0	0	2	1

*1 Participant in France declined to state their gender.

**Participants were presented with education options appropriate to their country and these were subsequently recoded to the appropriate equivalent British qualification on the list.

***Income is in pounds sterling for the UK and Euros for all others.

9 Participants declined to state their income.

One-way ANOVA tests revealed no significant between-countries differences for age, household n or child n. There was a significant difference for BMI such that participants in the UK had a higher mean BMI than any of the other three countries ($F(3,199)=11.20$, $p < 0.001$).

relevant language for their country and were over 18 years of age. There were no further inclusion or exclusion criteria.

Procedure

After reading the participant information and providing informed consent if they wished to take part, participants were invited to complete the questionnaire. This comprised four sections: motivation to live a healthy life, barriers to living a healthy life, methods of sustaining health behaviours, demographics (see supplementary information for full questionnaire). Participants were also asked questions regarding what features they would like to see in a mobile health application designed to support health behaviour change as part of a wider study, reported elsewhere (in prep).

Questions were developed to capture the themes that were generated during Stage 1; to complement the co-creation procedure, items were developed by the research team after analysing, sharing and discussing the qualitative data before refinement and addition phases. With the exception of the demographic questions, all the questions were presented as statements on a 7-point agreement Likert scale (1 = strongly disagree, 7 = strongly agree), in line with other similar psychological research (Joshi et al., 2015). The questionnaire was initially developed in English and then translated into French, German and Italian, followed by a 'back translation' process to ensure meaning was maintained.

Results

Stage 1: co-creation activity results

Healthy eating and physical activity motivators: overview of themes

Participants' motivations were captured in seven principle themes: *Enjoyment of health behaviours; Goal-setting; Beauty & wellbeing; Emotion; Preventing negative outcomes; Reward; Environmental & social influences* (see Figure 1). These themes captured unique motivators, but in many cases, participants combined the motivators when describing what encouraged them to engage in healthy eating and physical activity.

Enjoyment of health behaviours. Across participants, there was a strong emphasis on how important it was to enjoy health behaviours to fuel motivation. For physical activity, people described how they chose specific exercises or activities because they loved doing them. Others highlighted the importance of fun.

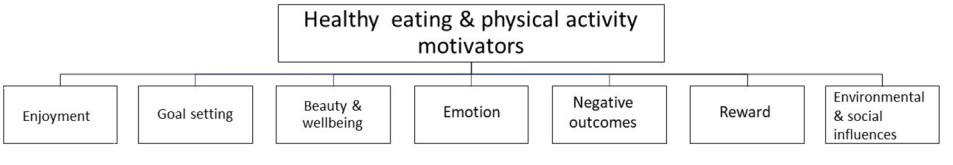

Figure 1. Overview of motivators.

> I enjoy exercise where I feel that my body and my mind connect and particularly enjoy spending time outside, be that in a park, by a canal, in the woods or by the sea…exercising in natural surroundings is far more therapeutic for me, P25

> I'm pretty sure that if you can find the right song, you can make everyone exercise for at least five minutes. You've got to make it fun to exercise, P3

Fewer participants claimed to enjoy healthy eating, but pleasure was nonetheless important. Those who did like healthy food, also reported that they didn't find healthy eating difficult.

> I don't really even think of it as eating healthily, I look at it as trying to make myself happy. I am lucky I suppose that I genuinely enjoy fruit and vegetables, P5

Individuals recognised that the enjoyment of physical activity in itself could provide motivation for healthy eating because eating healthily facilitated easier exercise.

> What motivated me was finding a physical activity that I enjoyed…to continue doing the activities that I love, I started to eat less baked goods and less processed sugars, P23

Goal setting. Participants consistently reported goal setting as a strategy to motivate themselves. There was emphasis on having modest, sustainable goals ('setting small, achievable goals, taking things at a steady pace and changing things slowly', P27). The nature of these goals usually centred on weight loss or specific exercise achievements.

> In my case, working towards a set goal helps me to both eat healthily and exercise. I know by keeping track of what I eat and my run times, that in order for me to see improvement in my run times, I need to be eating healthily as well, P9

For some, the achievement of the goal was motivation enough. For others, the promise of a 'treat' or prize upon completion served as the motivator (see later theme of 'Reward').

> I think I would have a star chart and set goals. When I achieve a goal I award myself a star and when I get to a certain amount of stars I treat myself to something I have been wanting. That keeps the motivation going over the weeks, P27

Beauty & wellbeing. In many cases, the examples provided within this theme related to weight loss and body shape but the role of 'beauty and wellbeing' as a motivator extended beyond this. Participants cited improved skin and feeling healthier and better overall. In turn, these elements motivated them further as they continued to maintain health behaviours. On the other hand, they reported feeling sluggish and sleepy when they did not eat well.

> It's seeing and feeling the benefits, no matter how small. More stamina, breathing better, improved body shape, fitting into clothes better, improved sleep, a positive feeling about more things. These are all early signs. The more you continue, the more noticeable these improvements are, P17

> When I eat well, I do feel a lot more energetic, so it does help to motivate me. I don't really feel sluggish, tired and drained. I also feel like I can be more productive throughout the day and that gives me a lot of confidence, P21

Participants also gave practical examples of how they applied these ideas, such as aiming to fit into old clothes they loved or looking at a photograph of themselves when they were slimmer or healthier ('Putting an old photo on your fridge that reminds you every time you go to eat…there is a lot of motivation in trying to impress other people and looking good', P12).

Emotion. Emotion motivated individuals in two ways. As demonstrated with the *enjoyment* and *beauty & wellbeing* themes, feeling happy or satisfied helped encourage some people to work harder to achieve their goals. In other instances, negative emotions motivated individuals to make a change.

> I love horse riding and went to my local centre. Turns out I was over the max weight and I was gutted, ashamed and embarrassed. That motivated me to lose weight, P21

This was a fine line for many though, and negative emotion was often perceived to de-motivate, as described in barriers later.

Negative outcomes. Broadly, perceived negative outcomes of unhealthy eating and physical inactivity were health-related; disease prevention was the motivator, but this was usually articulated as fear of disease ('I eat healthily because I want to…not develop an illness', P9). Other negative health-related consequences were less serious, but more imminent ('I try to eat healthily for my body's sake; eating bad food makes me sleepy sometimes and I get bad headaches', P8). Further examples included stress, anxiety and weight gain.

> Another motivator would be wanting to do something but not being able to because of health and needing too much medication, or not being able to travel on a plane because you are too big for the seats, P12

Reward. As captured in the *goal setting* and *enjoyment*, reward was often, though not exclusively, linked to achieving targets that individuals had set themselves.

> What keeps me going…is remembering the goal was a treat that I have set myself, a bit like the pot of gold at the end of the rainbow. And keeping focussed on that and making sure that I follow through, P13

Participants emphasised the importance of planning the reward within a reasonable timespan so that it felt within reach ('this way there is a tangible incentive, it is not too far in the distance not to make it worth fighting for', P6).

Some individuals chose to reward themselves with 'unhealthy' food ('eat healthily during the week, it earns you an unhealthier treat at the weekend', P17). On the other hand, several participants indicated that this was somewhat counter-intuitive ('I think it would defeat the purpose of exercising if you go for the Ben and Jerry's!', P8). A

number of participants proposed non-food rewards that were personal to them that they felt would be particularly helpful for motivation.

> I'll set myself a goal and if I reach it I will treat myself…the last time I did this I said I would buy a collector Lego set, so I challenged myself to lose 5 lb in a week, and I did, P22.

Environmental and social influences. Participants cited social support as a motivator for both healthy eating and physical activity, especially for the latter; a supportive partner was perceived as particularly helpful in this sense. Some participants identified themselves as the supportive partner ('I have been trying to get my husband to lose weight, and find that without my encouragement, he won't bother', P12), although it was sometimes unclear whether this amounted to social pressure. Sometimes children and family serve as motivators ('I'm not the healthiest person, but I do try to keep healthy for my kids and family', P21); participating in activities as a whole family was suggested as a strategy to increase motivation.

> In a family situation, you could all play games together and set targets on who is eating best. There could be some small rewards, P25

Like-minded community was identified as another source of motivating support, for example slimming groups.

> I think it's important to have a support network of either a healthy eating programme such as Weight Watchers, or having a buddy where you motivate each other to eat better and exercise, P12

The reason this was motivating centred on the idea that friends and family would both encourage and 'push' individuals to engage in their chosen health behaviours. One participant further identified that individuals might feel more obliged to stick to their plans if they had previously agreed to join someone in an activity, serving as a commitment device to support goal achievement.

> It really helps to have someone along with you, so have a friend or partner…joining with you if you can because it means that [you're] more likely to stick to it if you do it together, P13

Healthy eating & physical activity barriers: overview of themes

Six unique themes were identified when exploring barriers to healthy eating and physical activity. Some of these reflected the motivating themes earlier reported when channelled in a more negative way (e.g. *environmental and social influences, emotion)*. Three themes captured an absence or lack of resource (*lack of capability, lack of knowledge, lack of self-control/self-regulation)*. The remaining theme was *habit*. As with motivation, participants often perceived a 'cycle' which connected the themes (Figure 2).

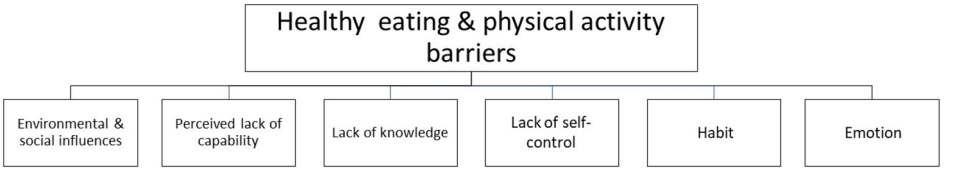

Figure 2. Overview of barriers.

Environmental and social influences. In addition to the positive influence that other people can have, participants also felt this influence could be negative, in the context of peer pressure. Other people offering, or even pressuring with unhealthy food was unhelpful.

> A work colleague has a birthday so everyone is eating cake and you feel you have to too, to be sociable, polite etc., P1

The impact of no social support was also noted in the sense of loneliness ('Going it alone is tough', P1). This related to both eating and exercise. This was particularly pertinent due to the lockdown restrictions that were ongoing at the time of data collection. Indeed, lockdown more generally was cited as a barrier to both types of behaviour.

> They tried to do home workouts but not having anyone around to tell them to do it, they fell back into old lazy habits, P1

> I am disappointed with the lack of workouts I have done since lockdown and the closure of my gym, P10

Perceived lack of capability. Lack of capability covered two principlel domains: time and money. General busyness was also mentioned as a challenge to both physical activity and healthy eating, and this sometimes fed into a further barrier of tiredness or lack of energy ('Tiredness and being busy. I often don't have time to cook or do anything other than work', P15). This combination of time and tiredness also led to 'lazy' or 'easy' food choices, which were perceived to be less healthy.

> Time is a killer. Life's so busy nowadays that you end up reaching for the easy option, the lazy option. And there's a whole lot more of them than there is healthy ones, P17

Lack of money was also perceived as a barrier to both health behaviours. When asked how they would approach these elements of their lives if 'money was no object', several participants stated that they would hire a personal trainer. There was also a belief from some members of the group that healthy food was noticeably more expensive than unhealthy, convenience food.

> For me one of the big things is time energy…and usually healthy ingredients and healthy foods cost more money, P13

Lack of knowledge. Lack of knowledge related to both informational knowledge (e.g. nutritional information) and skills-based knowledge (e.g. knowing how to cook). For some, lack of skills also facilitated 'lazy' decisions ('A lack of knowledge on how to cook…could lead to a reliance on overly processed prepared foods', P25). Reflecting the difficulties around 'lack of resources', some felt that bringing in professional expertise and skills would address several barriers at once ('I would hire personal trainers and cooks, and keep the training process easy', P5).

> I think if you can learn about different foods and nutritional value then you are more likely to eat them, P1

Lack of self-control. Lack of self-control related to a general absence of self-discipline ('willpower'). For the majority, this theme referred to eating behaviour, although a few individuals also commented that it was difficult to be disciplined about exercise. Many participants mentioned 'cravings' and the idea of giving into temptation ('I lack the discipline to stop myself from consuming [high sugar, high fat] food types', P9). Some considered that they could be impulsive in their decision making ('impulse buying of unhealthy things', P20) and many suggested that for this reason, it was sensible to avoid grocery shopping when hungry. The challenge of temptation further contributed to the 'lazy' and 'convenient' choices covered in earlier themes.

> There can be many reasons, like lack of time, being lazy, not having enough motivation, temptations are far too big, P14

Emotion. As mentioned with motivators, positive emotions often performed as facilitators to positive health behaviours. Conversely, participants' negative emotions served to discourage healthy choices. Individuals referred to being in a 'bad mood' or feeling depressed, tired and stressed.

> The bad days are usually the ones where I was lazy all day, am in a bad mood and too lazy/down to cook something, P10

> I lived on processed foods and didn't care about the consequences until they hit me and I couldn't fit in no clothes. My depression took over, P7

Some people also related this negative emotion to a lack of self-efficacy ('lacking confidence affects his ability to force himself out of his static routine', P17). Several individuals considered that mood contributed to a cycle, whereby negative emotion led to unhealthy choices, which further demoralised, leading to more unhealthy choices.

> I find that having a stressful day brings down my mood and then I crave junk food, once I have done this, I feel guilty and the cycle starts again, P12

Habit. Consistently, people spoke both of finding it difficult to break habits and difficult to form new ones. Participants often felt that routine was essential to the maintenance of healthy eating and physical activity; it was challenging but necessary both to escape the 'old routine' and to build a new one.

> You need to make a routine, make a list before you go shopping and always stick to it so there's no unhealthy food in the house, P14

> Understand it will take time to get into a new habit and will not always be easy, P1

Some participants made this connection themselves and proposed using habit as a mechanism for motivation.

> We all know habits are hard to break, so why not form good healthy eating habits!, P9

Healthy eating and physical activity maintenance: overview of themes

When asked for ideas about how to sustain health behaviour change, most solutions mapped onto the motivators and barriers outlined. Seven themes were identified when examining these ideas: *Goals and planning; Identity; Knowledge and learning; Self-regulation; Reward; Social influence; Enjoyment* (Figure 3).

Goals & planning. The *goals and planning* theme also captured a common view that participants felt goals should be small in the first instance to keep them realistic and achievable. Some participants also visualised their results as part of the planning process. Long-term goals were distinguished from shorter term goals. The support of and commitment to family members or like-minded community when planning was also considered important for sustaining the goal.

> Simple exercises (and goals) first, and then you build up to more if you so wish, P16

Personal identity. The theme of personal identity captured the idea that people used the images or ideals that they sought for themselves to motivate their current behaviour. That is, by focussing on their body image, or the idea of a 'healthy mind', they could maintain motivation for the health behaviour in question.

> Document the changes, e.g. measuring their waist or taking selfies every 2 weeks and compare these, P2

> …write motivational messages or inspiration about how good you feel after exercise which you can write at good times to motivate you for the bad times, P14

External resources. Some participants emphasised the importance of 'monitoring by a professional' (P18) for maintenance of health behaviours, in the context of both nutrition and physical activity. Further sources of monitoring and improving knowledge around healthy eating included recipe books and food labels as well as sharing this type of information with others. As with several other themes, a common suggestion was to use online resources to achieve this.

> I'm suggesting an online community board that educates you, motivates you, rewards you, and supports you!, P1

Self-regulation. Self-regulation, self-control, willpower and discipline were all considered important to initiate behaviour change and also to maintain it. Several participants commented that the start of a health change was the most challenging and that this was when self-control became important for maintenance ('I'm not

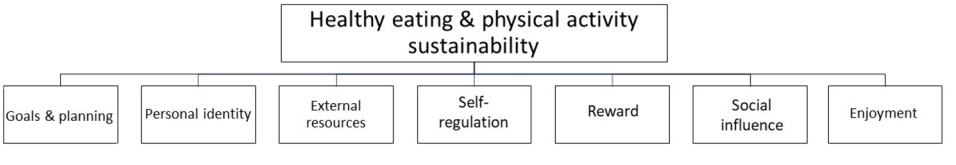

Figure 3. Overview of sustainability factors.

saying in the first few weeks you don't want [cakes] but avoid temptation by not having them…now I don't buy them at all' P27). Some also had a cyclical perspective; the self-control or discipline facilitated the ability to change, and the impact of this change further fuelled the discipline.

> I think it is mostly down to self control and discipline. We are all tempted by the sweets and chocolates but you just have to be strong minded and once you see your body shape change in the right direction, it helps, P24

Reward. As well as being an initial motivator, continued reward was reported as an ongoing encouragement to continue with the behaviour change. As before, the reward could take various forms but crucially should be attractive to the individual.

> Know exactly what you are aiming for, set small but achievable goals, try to keep up your motivation throughout and reward yourself for doing well!, P1

> Financial incentives…could motivate someone to increase their effort and sustain their commitment over time, P25

Social influence. As with motivation, social influence to maintain behaviour change could come from friends, family or likeminded community (in person or online). Participants indicated that the mechanisms behind this as a maintenance factor included continued social motivation and the fear of letting someone else down.

> I think making a commitment by signing up to programmes/weight loss classes or fitness classes would encourage you to sustain a healthy way of life, P12

Enjoyment. The final theme for maintenance was 'enjoyment'. It was important to participants that the changes they made to their lives were not only achievable but also enjoyable, especially if new habits were to be maintained. This applied to eating and physical activity.

> Try out different exercises until [you] find one you like, P23

Again, this theme fed into the idea of small sustainable changes, keeping things enjoyable and 'doable instead of intimidating' (P21).

> It does not matter what you do to stay active, as long as you enjoy it, P14.

Stage 2: survey administration

Demographics

Participant characteristics are available in Table 3.

Motivational factors

Tables 4 - 6 indicate the mean ratings (higher score indicates stronger agreement) for each of the motivators, barriers and maintenance actions for healthy eating and physical activity in the questionnaire as well as rank for the whole sample. For healthy

Table 4. Motivators.

Motivators to eat healthily			
	M	SD	Rank
Feel healthy	6.1	0.88	1
Take care of myself	5.81	1.07	2
Looking fit	5.54	1.26	3
Setting health goals for myself	5.24	1.32	4
Enjoyment from eating healthy food	5.12	1.45	5
Seeing and tracking progress	5.05	1.46	6
Weight loss	4.91	1.7	7
So that I can celebrate my success/result from healthy eating	4.67	1.53	8
Take care of my close ones	4.61	1.7	9
Medical advice or illness	4.07	1.89	10
Constant reminders keep me motivated to eat healthily	3.97	1.81	11
Support from close ones	3.96	1.71	12
Guilt after eating unhealthy food	3.96	1.8	12
Encouragement from close ones	3.91	1.75	14
Shame from current state of health	3.58	1.9	15
Impress others	3.26	1.74	16
Pressure/ comments from close ones	3.04	1.7	17
Motivators to do physical activity and exercise			
Feel healthy	5.91	1.05	1
Take care of yourself[a]	5.68	1.1	2
Looking fit	5.51	1.31	3
Seeing and tracking progress	5.17	1.34	4
Setting health goals for myself	5.16	1.24	5
Enjoyment from physical activity/exercise	5.06	1.58	6
Weight loss	5.03	1.69	7
So that I can celebrate the results of exercising	4.58	1.67	8
Constant reminders keep me motivated to eat healthily	4.13	1.71	9
Medical advice or illness	4.05	1.81	10
Support from close ones	3.85	1.77	11
Encouragement from close ones	3.8	1.71	12
Guilt after eating unhealthy food	3.73	1.81	13
Shame from current state of health	3.6	1.79	14
Impress others	3.49	1.83	15
Pressure/comments from close ones	2.78	1.63	16

[a]Participants in the UK and Germany were not presented with the item 'take care of yourself' due to a coding error.

[b]All scores rated on a scale of 1–7 where higher scores indicate stronger agreement. See supplementary information for full questionnaire. $N = 212$.

eating, across all four countries, *feeling healthy* was the most popular motivator, followed by *taking care of myself* in all but the UK (who rated this as the third motivator). Less popular motivators systematically included those that referred to other people's involvement (e.g. *pressure/comments from close ones, impress others, encouragement from close ones)* For physical activity and exercise, *feeling healthy* was consistently highly rated across counties and items pertaining to other people (*pressure/comments from close ones, impress others)* were low across all countries. Table S1 in the supplementary information provides a breakdown of these results by country.

Barriers

Consistently, the two highest rated barriers to healthy eating were: *I give into temptation* and *it's difficult to change my habits.* Participants gave less support to the barriers *I don't have the skills, I don't have the support of people close to me* and *I don't care about eating healthily* Table 5.

Table 5. Barriers.

Barriers to healthy eating			
	M	SD	Rank
I give in to temptations	4.42	1.84	1
It is difficult to change my habits	4.34	1.78	2
I lack self control	4.07	1.91	3
I am in a bad mood	3.74	1.85	4
I lack a routine	3.72	1.86	5
I'm too stressed	3.62	1.89	6
I think it takes too much effort	3.6	1.75	7
I don't have the time	3.17	1.73	8
I don't have the money	3.14	1.86	9
Lack of professional guidance	3.02	1.81	10
I don't know how to go about it	2.87	1.72	11
I don't have the skills	2.62	1.57	12
I don't have the support of people close to me	2.62	1.57	13
I don't care about eating healthily	2.49	1.48	14
Barriers to living an active life/doing regular exercise			
It is difficult to change my habits	4.41	1.8	1
I am in a bad mood	4.11	1.78	2
I lack a routine	4.04	2.05	3
I give in to temptations	4.01	1.76	4
I lack self control	3.97	1.93	5
I think it takes too much effort	3.86	1.79	6
I don't have the time	3.78	1.73	7
I'm too stressed	3.53	1.85	8
I don't care about exercising	3.25	1.86	9
Lack of professional guidance	3.1	1.76	10
I don't know how to go about it	3.04	1.77	11
I don't have the money	2.86	1.79	12
I don't have the skills	2.8	1.72	13
I don't have the support of people close to me	2.57	1.67	14

[a]All scores rated on a scale of 1–7 where higher scores indicate stronger agreement. See supplementary information for full questionnaire. $N = 212$.

Barriers to living an active life and exercising were more varied across the countries. For example, *I am in a bad mood* was the second highest rated barrier across the sample (and the top for France), but was only the sixth most strongly agreed with statement in the UK. Nonetheless, similar trends to the earlier questions can be seen; barriers around routine and habit (i.e. *it is difficult for me to change my habits,* and *I lack a routine*) tend to be more highly scored across the sample, while *I don't have the support of people close to me* is consistently at or near the bottom of the list for all countries Table 5.

Maintaining motivation

Participants were asked how likely they would be to engage in specific activities to maintain motivation. In order to do so for healthy eating, participants across the board agreed most strongly with the statement '*pick healthy food I like*'. They were least likely to *keep a diary, share recipes with an online community* and *seek advice from a professional* Table 6.

The findings regarding maintenance of motivation for physical activity mirrored that for healthy eating; participants consistently agreed the most with *pick exercises that I like* and *make exercise enjoyable for myself.* At the bottom of the list of things they would be likely to do to maintain motivation were *keep a diary, share my exercise routine with an online community* and *seek help from a professional* Table 6.

Table 6. Maintenance actions.

Actions to maintain motivation for healthy eating			
	M	SD	Rank
Pick healthy food that I like	6.17	0.88	1
Make healthy eating enjoyable for myself	5.71	1.12	2
Set realistic expectations	5.59	1.05	3
Practice self control/willpower	5.25	1.25	4
Set small goals	5.23	1.24	5
Track my progress	5.1	1.53	6
Make flexible plans	5.05	1.23	7
Make meal plans	4.99	1.66	8
Set regular goals (daily/weekly/monthly)	4.99	1.50	9
Avoid temptation	4.89	1.42	10
Choose foods that provide quick results	4.74	1.61	11
Reward myself or close ones	4.59	1.66	12
Set constant reminders	4.07	1.76	13
Install/Use a health app	3.93	2.00	14
Seek support from similar people	3.88	1.79	15
Practice mindfulness (yoga/meditation)	3.86	1.94	16
Share my recipes in a community (online/with close ones)	3.68	2.03	17
Seek professional advice (dietician)	3.65	1.91	18
Keep a diary	3.45	1.83	19
Actions for maintaining motivation for keeping an active lifestyle/exercise			
Pick exercises that I like	5.89	1.21	1
Make exercise enjoyable for yourself	5.76	1.11	2
Set realistic expectations	5.63	1.04	3
Track my progress	5.37	1.34	4
Set regular goals (daily/weekly/monthly)	5.22	1.31	5
Set small goals	5.2	1.32	6
Pick exercises that are most efficient	5.11	1.36	7
Make flexible plans	4.99	1.32	8
Practice self control/willpower	4.97	1.49	9
Make exercise plans	4.83	1.61	10
Choose activities that provide quick results	4.47	1.62	11
Reward myself or others	4.41	1.67	12
Avoid temptation	4.32	1.47	13
Use/Install a fitness app	4.23	2.03	14
Set constant reminders	4.15	1.67	15
Seek support from similar people	3.93	1.83	16
Mindfulness (yoga/meditation)	3.91	1.96	17
Seek professional advice (fitness coach)	3.6	1.85	18
Share my exercise routine in a community (online/with close ones)	3.54	1.92	19
Keep a diary	3.43	1.89	20

[a]All scores rated on a scale of 1–7 where higher scores indicate stronger agreement. See supplementary information for full questionnaire. $N = 212$.

Between groups differences

Comparisons were made between female and male participants on all the questionnaire items, with the Bonferroni correction applied. There were no gender differences on any of the motivators or barriers. There was one gender difference on maintenance, in that women reported that they would be more likely to *make flexible plans* ($p < 0.001$) to maintain physical exercise than males.

Comparisons were made between participants with BMI in the overweight or obese categories (high BMI, $n = 84$) and participants who did not report being overweight (healthy BMI, $n = 119$) with the Bonferroni correction applied (only four participants reported being underweight and in all cases were less than one unit away from the 'healthy weight' category so this group was not analysed separately). When considering motivation for eating healthily, participants in the high BMI group rated *pressure/comments from close ones, weight loss* and *shame from current state of health* higher

($p < 0.001$ in all cases) and *feel healthy* lower ($p = 0.003$) than the other group. Similarly, when considering motivation for physical activity, participants with high BMI rated *pressure/comments from loved ones, weight loss,* and *shame from current state of health* higher than those with healthy BMI ($p < 0.001$ in all cases).

For barriers to healthy eating, the high BMI group rated the following statements higher than the healthy BMI group: *I think it takes too much effort, I lack self control, I give into temptations, I lack a routine*, *it is difficult to change my habits* (all ps < 0.001) and *I don't have the support of people close to me,* ($p = 0.003$). There were no significant differences between BMI groups on barriers to active lifestyle. There were also no differences between BMI groups on any of the maintenance ideas.

Discussion

This study sought insight into current facilitators and barriers to health behaviour change in a sample of European adults. We actively recruited adults who experienced conventional day-to-day challenges and represented a range of ages, BMI, household structures and countries. Specifically, the study aimed to: co-creatively identify the motivators and barriers to setting up healthy eating and physical activity behaviours; co-creatively identify the motivators and barriers to maintaining these behaviours and quantitatively capture the relative perceived importance of these factors by our sample.

The qualitative, co-creative phase of the research identified the sample's principle motives and barriers to health behaviour change. As anticipated, motives for healthy eating and physical activity extended beyond the simple concept of 'health'. Internal influences that participants identified as motivators included enjoyment of health behaviours, beauty & wellbeing, various emotional states and a fear of negative outcomes. External factors that they used to motivate themselves included social and environmental influences, goal setting and reward. Barriers reflected some of these ideas (e.g. emotion & environmental/social influences) and also covered a lack of resources (e.g. knowledge, time, money) and difficulty changing habits. Unsurprisingly, suggestions around how to sustain change incorporated addressing these barriers and ensuring that motivating factors were enduring. These findings support previous research that has found that individuals have many different motivators for (Hoare et al., 2017; Steptoe et al., 1995) and barriers to (Chang et al. 2018; Pinho et al., 2018) positive health behaviour implementation. Our findings suggest additional influential factors beyond typical motivations and barriers, providing an evidence base for further exploration.

The second, quantitative stage of the study identified which of the facilitators and barriers participants placed most importance on. The theme of enjoyment was prominent throughout the qualitative stage and this was supported in the quantitative analysis; enjoyment and picking exercise or healthy food that the individual liked were consistently rated as the most important factors in maintaining motivation across all four countries. This result aligns with recommendations to develop product-related strategies to increase the pleasure associated with healthy food consumption (Woolley & Fishbach, 2015). Recent psychological evidence also identifies a relationship between enjoyment of food and *lower* food consumption, which questions previous findings that enjoyment leads to overconsumption of unhealthy food (see de Ridder & Gillebaart,

2022). The same research suggests that strategies such as intuitive eating and social eating might rely on enjoyment as a mechanism to underly positive health outcomes. The theme of beauty and wellbeing was also supported in the second phase; feeling healthy, taking care of oneself and looking fit were the top three motivators for both physical activity and healthy eating. An essential line of enquiry now is to establish whether a behaviour change intervention that focuses on enjoyment and wellbeing has greater levels of success than current interventions (Pettigrew, 2016).

A striking pattern within the data was that participants frequently described solutions to maintenance challenges which are reflected in academic behaviour change theory. For example, goal setting (McEwan et al., 2016), addressing the intention-behaviour gap with active planning (Gonzalez Salas Duhne et al., 2020), temptation bundling (Milkman et al., 2014) and motivating techniques (Morton et al., 2015) were all consistently mentioned as strategies to maintain momentum. Plausibly some participants may have come across these concepts before, but this nonetheless provides insight into potential theory-driven strategies which are implementable and which members of the public find feasible. Participants often mentioned 'small sustainable' changes, which reflects public health advice (e.g. Change4Life, see Lamport et al., 2021) and many goal accounts (e.g. see Mann et al., 2013; Hills et al., 2013). It is plausible that this strategy is more effective in a healthy population, acting as a protective factor against overweight health consequences, than it might be in a clinically at-risk population, who need to lose more weight to obtain medical benefit (Magkos et al., 2016). Conversely, however, individuals in this study often set themselves ambitious goals; for example, people commonly mentioned a goal being to look like photographs of themselves when they were substantially younger. A number of people also mentioned that they thought it was better to attempt healthy eating and physical activity changes at the same time which, again, does not represent a small change. The evidence base is unclear for this type of combined change, and although there are numerous intervention studies which mix physical activity and healthy eating elements into one intervention, to our knowledge there is no meta-analytic review or comparison to 'single-behaviour' interventions. Furthermore, study authors often do not unpick the theoretical underpinnings or behavioural outcomes of multi-modal studies (Samdal et al., 2017). This is important because it remains unclear whether the current findings represent unrealistic targets or simply a more holistic, achievable approach. For instance, different health activities have been shown to complement and facilitate each other in experimental research (for an overview, see Eskreis-Winkler & Fishbach, 2018) calling for more applied research testing when different behaviours obstruct versus facilitate each other.

Some significant differences were found across different BMI categories. Specifically, individuals with a high BMI indicated that other people's involvement and opinion was more important than for those with a healthy BMI. They rated items such as 'impress others', 'shame from current state of health' and 'pressure/comments from loved ones' as more important than the rest of the sample, even though these items did not score highly across the whole sample. One interpretation of this data is that interventions for individuals with obesity or overweight may be more effective if they focus on motivational factors linked to social evaluation. However, clearer further research is required to explore this. It is important to be cautious about these findings

because of the well-documented difficulties with self-report in health behaviour research (Althubaiti, 2016) and the fact that there are significant differences in BMI across countries in this sample. Furthermore, stigmatisation around weight is also associated with detrimental health outcomes (Meadows & Higgs, 2022). A sensible next step would be to seek replication with a larger, more representative sample.

Strengths and limitations

The mixed method approach allowed us to explore motivations and barriers in detail and also to quantify these elements with a large European sample. In particular, the novel choice of co-creation as a support to intervention design allowed participants to contribute behaviour change approaches that have genuinely worked for them or their families in the past. This has the potential to increase the accessibility, attractiveness and sustainability of interventions developed from these findings. Pragmatic solutions to behaviour change challenges could credibly emerge from these processes with the benefit of additional social learning (Kendal et al., 2018).

Although we took care to recruit a broad weight and age range, specifically including middle-aged individuals (who might feasibly be closer to being at risk of negative health consequences from physical inactivity and unhealthy eating), our sample was not representative of the wider general population. There were also strengths and weaknesses to the use of participants' native language in the questionnaires; this meant that they were not being forced to answer questions in English if this was not their first language, which can lead to misunderstanding (Hunt & Bhopal, 2004). On the other hand, different translations may have differed in meaning. It is difficult to be confident, therefore, that between-country differences are due to genuinely different motives and barriers, despite the rigorous procedure implemented for translating the questionnaire from English to other languages.

Implications for theory & practice

It is encouraging that participants volunteered ideas for positive health behaviour maintenance that complement current behaviour change theory. This suggests that current research is going in the right direction for providing appropriate and acceptable support to individuals who wish to change their health behaviours. It remains unclear whether some individuals might be held back by ambitious targets. The data from this study provide a helpful starting point to consider what resources or programmes could be created which align with our sample's motivations, barriers and sustainability ideas, while also being realistic and practical.

Future lines of enquiry include considering a more in-depth investigation into what types of support adults who are not clinically unwell would find helpful and larger scale quantitative work to establish whether the current sample's priorities are consistent for other demographic groups of European adults. This would also allow for more complex sub-group comparisons enabling researchers to identify groups with differing motivations who might benefit from tailored types of support.

Further lines of enquiry from a methodological perspective should evaluate effectiveness of interventions designed from co-creative approaches. The technique has been applied in a number of health settings, but intervention trials explicitly assessing the utility of co-creation in health behaviour change have yet to be published. Furthermore, co-creative approaches might allow for more synthesis between developing, evaluating and refining interventions, offering a more cohesive approach to intervention development more broadly.

Conclusions

The current study demonstrates the utility of a co-creative approach to health behaviour change. Findings indicate that, rather than taking a traditional exclusively health-focussed approach to intervention development, individuals who are not currently experiencing chronic health consequences of poor diet or inactivity place importance on enjoyment of behaviours and the relevance of (positive) emotional states in general, social engagement and installing reward. These elements should therefore be incorporated into the relevant support systems offered. The clear overlap between community perspectives and theoretical approaches can provide practitioners and academics with future lines of enquiry for sustainable health behaviour change which should be practical and acceptable to members of the general public in several countries. Co-creation approaches can enhance conventional intervention development by ensuring participants' priorities, motivators and goals are captured and up to date. Importantly, combining insights from the wider literature on behaviour change, including consumer science, psychology, and behavioural economics would allow to guide such a development and would be useful both for practitioners and theorists.

Note

1. A separate French-speaking pilot was delivered in France and Belgium. This co-creation study produced similar results which are beyond the scope of this paper to describe. Details are available from the authors on request.

Authors' contributions

SS, SC, DL, AS, JF, ZI, AHG, & JV contributed to writing the final draft of the manuscript. SC, DL, AS, AHG, CC, MW, CA, & JV were involved in the conception of the study and the original funding application. SC, DL, AS, AHG, CC, MW, CA & JV ran the study and collected data. SS, DL, AS, JF, AK, ZI & JV contributed to data analysis.

Disclosure statement

The authors report there are no competing interests to declare.

Health & safety

All data were collected online; health and safety concerns were not deemed relevant.

Data availability

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

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