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Is sports-branded screening effective in identifying adults at greatest risk of developing cardiovascular disease: a convergent parallel mixed-methods design to identify adults at greatest risk of developing cardiovascular disease using an opportunistic sports-branded health screening approach in the community

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ABSTRACT

Objectives To establish whether sports-branded screening is effective in identifying adults at risk of developing cardiovascular disease (CVD); to determine whether the public would engage with sports-branded health screening and what their experiences were.

Design Convergent parallel mixed methods.

Setting Mass screening at Liverpool Football Club Foundation events at four community centres.

Participants 100 participants (mean age 46.6 years (SD 14.7), range 20–84 years) were recruited, and their risk factors were identified. Of these, 62 were screened for their SCORE 2 CVD risk. Men and women were equally represented. Participants were predominantly white British (93%).

Interventions A dedicated screening area was established at each venue. Data to calculate SCORE 2/OP risk scores were captured (gender, smoking status, age, blood pressure and lipids). Additional risk factors (glucose, incident atrial fibrillation and body mass index (BMI)) were measured to assess wider heart health. A purposive sample of 12 participants participated in a semistructured, one-to-one audio recorded interview about their experience.

Primary and secondary outcome measures Outcomes were the SCORE 2 and SCORE 2/OP risk tool; ability to recruit participants and whether sports-branded screening was acceptable to participants.

Results Participants ranged from 20 to 84 years with a mean age of 46.6 years. Men and women were equally represented. Participants were predominantly white British, with 41% and 40% recording a higher than normal total cholesterol and low-density lipoprotein cholesterol (LDL-C) level, respectively, and 36% recording lower than normal LDL-C level. 20% of participants recorded a blood pressure greater than 140/90 mm Hg and 21% of participants were smokers. Mean BMI was 29, ranging from 17.8 to 51, with 70% of the participants classified as overweight or obese. CVD risk ranged from <1% to 15%. 21 participants had a 10-year risk of fatal and non-fatal CVD events greater than the estimated risk for their age. Participants reported

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The affiliation of a specific sports brand potentially acted as both a strength (for supporters of the team) and limitation (for those with no affiliation to the team or no interest in football) which may have affected engagement levels of the study.
⇒ Recruitment was undertaken in areas of high deprivation, and while it is generally acknowledged that those from a lower socioeconomic background are less likely to engage with health screening initiatives, the ability to recruit to this study was a key strength.
⇒ To encourage participants to engage with local services suitable for their needs, a strength of the study was that Quick Response codes providing direct access to those resources were given to participants.
⇒ A limitation of the study was that participants were not followed beyond the life of the study, and we can therefore not report if they accessed local services.
⇒ A further limitation is the lack of ethnic diversity within the study population, which may limit the generalisability of the findings.

that they would not have organised a GP health check or had struggled to book a GP appointment and found mass testing to be convenient, quick and easy.

Conclusions Sports-affiliated branding was well received and identified a significant number of people with high 10-year risk of CVD plus additional risk factors. All participants interviewed spoke positively about the experience. Immediately providing results, alongside individualised health promotion, allowed participants to understand their risk of CVD and the need for a change of lifestyle.

INTRODUCTION

Cardiovascular disease (CVD) is an umbrella term describing a group of heart and circulatory diseases including coronary heart disease, stroke, aortic and peripheral arterial diseases.[1] CVD accounts for around 17.9 million deaths globally[1] and more than 170 000 deaths in the UK.[2] The likelihood of developing CVD is associated with numerous modifiable risk factors such as obesity, lack of physical exercise, high cholesterol levels, high blood pressure and tobacco smoking.[3] However, with early detection and targeted lifestyle and medical intervention, these risks can be substantially reduced, and lives saved.[3]

Health screening can be systematic (also known as selective or targeted) where a population that fulfils a predefined criterion is targeted; opportunistic, where patients who present to clinical practice for some other health conditions are screened; or mass screening, which adopts a population-based approach.[4 5] Systematic screening has demonstrated improvements in risk factor profiles[6] but has had no impact on long-term CVD outcomes.[7] Among the three forms of health screening, researchers have used opportunistic screening to investigate health conditions of the 'hard-to-reach' population.[8 9] Although opportunistic screening has been found to be effective in increasing detection of risk factors, its impact on long-term CVD outcomes is unclear.[4 10]

The term 'hard-to-reach' or 'marginalised/hidden population' varies among and within disciplines but is commonly used to describe populations that experience discrimination and stigma, which potentially imperil their uptake of healthcare services for fear of healthcare providers exacerbating stereotyping.[11] The term is commonly attributed to the lesbian, gay, bisexual, transgender and queer communities,[9 12 13] diverse ethnic communities,[14] traveller families,[15] asylum seekers, disabled people, lower socioeconomic groups, children and young people, and older people.[8 16] People described as 'hard-to-reach' populations report discriminatory encounters from healthcare providers that result in unmet needs and their reluctance to re-engage with health services.[17 18] In one study conducted to assess routine healthcare access and the risks of readmission in CVD patients among hard-to-reach populations, approximately 15.7% (mostly young, male, non-white with low social support) reported difficulty in accessing routine healthcare services, with the consequence of more hospital readmissions.[19] It would, therefore, suggest that these populations are not hard-to-reach, but they find that healthcare is hard-to-access and are consequently underserved.

There is a rising interest in a shift to proactive, patient-centred approach to healthcare delivery that seeks prevention and promotion of healthy lifestyles from a reactive, treatment-and-prescription centric healthcare delivery system.[20] Researchers have used several health behaviour theories to inform health intervention development and delivery, among which include the theory of planned behaviour,[21] the transtheoretical model[22] and the health belief model (HBM).[23 24] The HBM was developed in the 1950s to investigate why people fail to undertake preventive health measures[24]; it remains one of the most widely employed theories of health behaviour. The HBM posits that a person's decision and motivation to adopt a healthy behaviour depends on three factors: personal perception, moderating behaviours and the likelihood of doing that behaviour.[24] This study is underpinned by the HBM as it sought to unravel individuals' CVD susceptibility, perceived severity and benefits of early screening, potential modifying variables and cues to action.[23 25] By doing so, it was envisaged that the study could identify an alternative approach to delivery of preventive screening that would improve participant uptake by reducing access barriers.

Liverpool Football Club Foundation (LFCF) is the official charity of Liverpool Football Club (LFC) in the Northwest of England. The city of Liverpool has a proud sporting history and LFC is one of the most recognisable sports brands associated with the area. The definition of brand has been explored in different bodies of literature depending on the philosophy and perspective applied. It has been defined by the American Marketing Association[26] as 'a name, term, sign, symbol or design, or a combination of them, intended to identify the goods or services of one seller or group of sellers and to differentiate them from those of competitors'. Muniz and O'Guinn[27] described brand community as a 'specialised, non-geographically bound community, based on a structured set of social relationships among admirers of a brand'. LFCF aims to harness the power and passion of the Club's fans and stakeholders to create life-changing opportunities for young people and families. The Foundation uses an evidence-based approach to identify and work in the most deprived communities both locally and internationally to support people who need it most. LFCF has capitalised on their brand value to undertake several ground-breaking projects within the city, using sport as a means of positively influencing the behaviours and attitudes of the local community. Their community projects supported nearly 123 000 individuals in the 2022/2023 season, with over half (59%) of the registered participants on these programmes living in the most deprived local authority wards in the country in the same period.[28]

Sporting organisations possess an ability to attract individuals in a way that healthcare systems cannot. Collaboration between a recognised sporting brand and a

healthcare provider could offer a novel means of undertaking mass screening for CVD risk factors among underserved populations. The 'power of the (LFC) badge'[29] has been demonstrated to access people and support positive change.

The primary aim of our study was to determine whether the LFC brand could be leveraged to facilitate local health improvement by identifying adults at greatest risk of developing CVD through the provision of sports-branded screening at community-based events. Secondary research aims were to assess whether the public would engage with sports-branded health screening and the provision of information based on the HBM to encourage healthy lifestyle choices, and their opinions regarding the acceptability and effectiveness of this approach.

METHODOLOGY

A convergent parallel mixed-methods design was used to gain in-depth understanding of the topic. This design entails concurrently conducting quantitative and qualitative elements in the same phase of the research process, analysing the two components independently, and giving equal weight to both strands during data integration and interpretations.[30 31]

Mass screening was chosen for this study to enable screening of people who had no prior knowledge about the screening assessments when they attended community sporting events and enabled the researchers to screen some participants from the 'hard-to-reach' population.[8 9]

This study was undertaken within four mass screening events delivered by registered and student nurses in collaboration with LFCF over 5 days in August 2022. Advertising for the screening at one of the events is shown in figure 1.

The study used the SRQR and STROBE reporting guidelines.

Patient and public involvement

A patient and public involvement (PPI) group was established specifically for this project. The group consisted of leads from community organisations that the LFC Foundation support via a Community Well-being 'hubs' model. This model provides both financial support and support to codeliver programmes and activities from different locations in the Liverpool City Region. They were initially approached by staff at the LFCF, and they agreed to meet with the principal investigator (PI). During the meeting, they provided advice on when and where we should undertake the screening, and they advised on how best to seek feedback through short interviews. The guide used during the participant interviews was developed in collaboration with the PPI group who recommended a short interview to be undertaken immediately after the assessment to generate immediate feedback without distracting people from their daily activities.

Eligibility criteria

To be included in the study, participants were required to be over 18 years of age and able to provide written

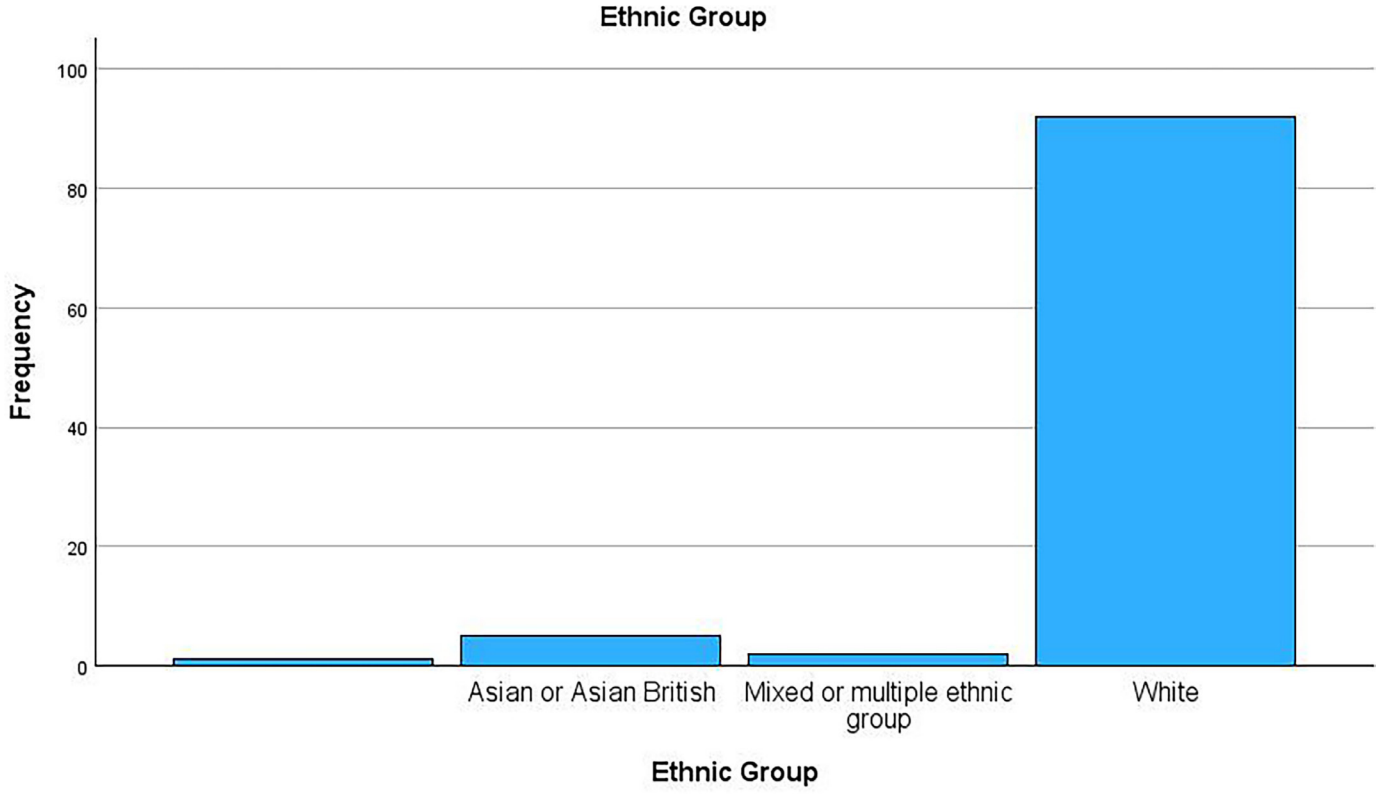

Figure 1 Brand-led advertising from a screening event.

informed consent. Exclusion criteria included those with established CVD or diabetes. People who had participated in the study previously were not permitted to be screened a second time.

Recruitment

Participants were recruited while attending an LFCF event at one of four community centres in Liverpool, Wirral and Knowsley. These events were free to attend and diverse in nature, including, for example, arts and crafts and physical activities aimed at all ages. A total of 100 of 131 participants approached who were attending these events and meeting the inclusion criteria were recruited over a 5-day period. The sample size for the first phase of the study was determined by the number of people attending the events rather than a priori calculation. A purposive sample of twelve participants (five males and seven females) who completed the risk assessment were invited to participate in interviews to explore their experiences of the health screening process and the impact that affiliation with sports branding had on their decision to participate. The sample size was not predetermined for these interviews as Braun and Clarke[32] argue that judgements about 'how many' data items, and when to stop data collection, are subjective and cannot be determined in advance of analysis. Data saturation was deemed to have occurred at this point.

Informed consent

Potential recruits were approached during the event by either registered or student nurses and/or LFCF employees involved in the study who explained the purpose of the study and invited potential participants to meet with a member of the research team. The researchers at the events, all registered nurses, provided the participants with a participant information sheet, clarified any outstanding issues and gained written informed consent. Participants were advised that they could withdraw from the study at any time. Contact details of the PI were provided to each participant.

Prior to conducting the interviews, the 12 individuals who had agreed to participate were asked to provide additional verbal consent to participate in this second stage of the study and for their interview to be audio recorded.

Quantitative data collection

A dedicated screening area was established at each community venue. Several risk factors, detailed below, were assessed in accordance with the SCORE 2 and SCORE 2 OP CVD 10-year CVD risk assessment tool as recommended by the European Society of Cardiology guidelines on CVD prevention in clinical practice.[3] The tool uses an algorithm derived, calibrated and validated to predict 10-year risk of first-onset CVD in European populations and enhances the identification of individuals at higher risk of developing CVD.[33] Results are easily understood and are provided in the form of a percentage and a traffic light system. The UK is classed as a low-risk population and the calculations were undertaken using the algorithm relevant to this group. Those under the age of 40 years were included in the assessments, but their risk was not assessed in line with the SCORE 2 methodology.

Risk factors measured included self-reported gender at the time of birth, smoking status and age. Blood pressure was measured by a student or registered nurses using a calibrated sphygmomanometer in accordance with the British Hypertension Society recommendations for manual blood pressure measurement.[34] Blood lipids and glucose were measured using an Abbott LDX V2 point of care analyser. These data were entered directly into the SCORE 2 and SCORE2 OP online risk algorithm, and their 10-year CVD risk was calculated and discussed with the participant.[33]

Incident atrial fibrillation (AF) was also assessed using a MyDiagnostick sensor. MyDiagnostick is a cylindrical-shaped MDD class IIa medical device, intended to discriminate AF from normal rhythm. MyDiagnostick has been shown to be highly sensitive in detecting AF, with sensitivity levels ranging between 94% (95% CI 87% to 98%)[35] to 100% (95% CI 93% to 100%).[36] In addition, high specificity values of 93% (95% CI 85% to 97%)[35] to 95.9% (95% CI 91.3% to 98.1%)[36] were also reported in the same datasets. The detection threshold is already embedded in MyDiagnostick and was not modified for this study. AF does not feature in the SCORE2 assessments but given the prevalence of undiagnosed AF and the increased risk of morbidity and mortality associated with the condition, it was felt that it would be remiss not to assess participants' heart rhythm. Students and registered nurses had been trained to use the kit prior to study commencement. Each person was asked to hold the MyDiagnostick sensor using both hands for 60 s in a static position in line with the manufacturer's guidelines.

While body mass index (BMI) was also not required for the SCORE 2 calculator and, therefore, did not feature in the overall risk score, each person's height and weight and BMI level were recorded to provide feedback and health promotion advice to participants. A BMI between 25 and 29.9 kg/m^2 was categorised as overweight and a BMI >30 kg/m^2 was categorised as obese in line with the National Institute for Health and Care Excellence guidance.[37]

Consideration was given to maintaining dignity and privacy for participants, so private rooms were used, and screening took place away from the main activity hives of the community hubs.

Data were input by the research team and cross-checked for completeness. Risk scores were calculated independently by two researchers.

Delivery of health promotion

Underpinned by the theory of the HBM,[23–25] results of the SCORE 2 assessment were discussed with each participant by a registered nurse who delivered targeted health promotion advice. This was done to ensure that participants appreciated their susceptibility to CVD and

were given the opportunity to mitigate potential risks by adapting individualised healthy behaviours.

All participants were provided with a paper record of their health assessment results, and they were advised to discuss their results with their practice nurse. Quick response codes (QR codes) were created for each community hub which provided information about local smoking cessation, weight loss, physical activity and mental health services, alongside direct links to websites and contact information for support groups.

Qualitative data collection

Participants who agreed to be interviewed about their experiences after completing their screening and being provided with their health promotion advice were invited to be interviewed in a quiet room by a researcher who was not involved in the risk assessment. The interviews were conducted by the male PI (IDJ), a senior cardiac nurse specialist and highly experienced academic researcher. No prior relationship was established with participants prior to the interviews. The investigator introduced themselves and explained their role in the study. The interviews were recorded on a digital audio recording device. At the earliest opportunity after the interview, the recording was uploaded onto a secure server at the university and the audio recording on the device deleted. To reduce any opportunity for bias and ensure responses were based on the participant's reflection on their experience, an interview guide was developed (online supplemental file 1) and, along with recruitment and content, tested with the PPI panel prior to conducting the interviews. The interviewer used open-ended, short, semistructured interviews to elicit spontaneous and individualistic responses from the participants regarding their experience of the screening programme, the results of the screening and how participants felt about them, whether attending the programme had changed their views on their health future, whether the participant felt there should be any changes to the programme and if so, why this was the case. To elicit the broadest range and depth of responses to achieve data saturation, the interviewer asked probing questions during the interview. The interviews lasted between 2 and 7 min and were audio recorded with prior permission from the participants. No repeat interviews were conducted. Field note annotations from the PI were provided to the research team members (DF and MKM) undertaking analysis of the interviews.

Data analysis

The quantitative data were analysed using descriptive statistics using IBM SPSS V.29 software.

The interviews were transcribed by a researcher, MKM, who had not participated in their completion, and the transcripts were checked against the recording to confirm accuracy. The transcripts were not returned to the participants for comment or correction given the verbatim transcription. Once accurately transcribed, the recordings were deleted and the transcripts were stored on a secure server at the university in a location only accessible to the two researchers conducting the analysis. The transcripts were anonymised by the transcriber, with each given a unique identifying number.

A framework model[38] was used to analyse the transcripts by two researchers (MKM and DF) who had not participated in the interviews. Using an inductive approach, the transcripts were independently coded with coding marked by highlighter on paper transcripts by each coder. The codes were then clustered around identified themes. The two sets of coding were compared and discussed. Very few differences in the coding were noted, and these were typically where two categories applied. The final coding was agreed through discussion with both coders to prevent any potential bias. An Excel workbook was created with a spreadsheet for each participant. This Excel document was located on a secure server with access only for the two researchers conducting the analysis. Participant responses were entered into the spreadsheet with a column for each theme. The framework enabled the researchers to compare and contrast responses by participants within each of the themes. The coded paper copies of the transcripts were subsequently destroyed. No participant checking was conducted after the analysis.

RESULTS

Demographics

Participants ranged from 20 to 84 years with a mean age of 46.6 years (SD=14.7) with 41.5% of the sample aged between 40 and 59 years (table 1). Men and women were equally represented. Participants were predominantly white British (93%) with the remaining participants identifying as Asian or Asian British (5%) and mixed or multiple ethnic group (2%) (figure 2).

Blood lipids

Blood lipid results were not available on all participants due to the limited blood provided. Measurements were available on total cholesterol (n=99), high-density lipoprotein (HDL) (n=98), low density lipoprotein (LDL) (n=87), triglyceride (n=99), non-HDL (n=94) and LDL/HDL (n=79). Of those tested, 41% of the participants recorded a total cholesterol level greater than the recommended normal range (>5 mmol/L) (table 1). 71% of those with high total cholesterol were over the age of 40 years. More than 36% of the participants recorded a HDL below the recommended level of 1 mmol/L for men and 1.2 mmol/L for women (table 1). 53% of those with low HDL were over 40 years. Approximately 40% of participants with data recorded LDL levels above the recommended normal range (<3 mmol/L), 66% of whom were over 40 years of age. LDL/HDL ratio was found to be higher than the normal range in 54% with almost two-thirds (65%) being over 40 years.

Blood pressure

Blood pressure was recorded for 98 participants with a minimum and maximum blood pressure range

Table 1 Participant's age and body mass index (BMI) distribution and blood-related measurements

Age	Percentage of sample
<30	10%
30–39	28%
40–59	42%
60–75	16%
>75	5%
BMI measurement	Percentage of sample (%)
<18.5 underweight	2%
18.5 to <25 normal weight	28%
25 to <30 overweight	32%
30 to <35 class 1 obese	23%
35 to <40 class 2 obese	9%
>40 class 3 obese	6%
Variable	Percentage of the sample with results outside the normal range (%)
Total cholesterol	41.5% High cholesterol (M=4.7621, SD=1.17256)
High-density lipoprotein (HDL)	37% High HDL (M=1.1849, SD=0.36965)
Triglyceride	22% High triglyceride (M=1.7861, SD=1.29174)
Low-density lipoprotein (LDL)	40% Low LDL (M=2.7792, SD=0.94606)
Non-HDL cholesterol	34% High non-HDL (M=3.5952, SD=1.12200)
LDL/HDL ratio	54% High LDL/HD: ratio (M=3.0934, SD=1.78428)
Glucose	2% High glucose (M=5.8121, SD=1.53900)
Blood pressure	20% High blood pressure (BP) Systolic BP M=127.82, SD=12.131 Diastolic BP M=71.93, SD=11.872

90–170 mm Hg systolic and between 46 and 100 mm Hg diastolic. 20% of participants recorded a blood pressure greater than the normal range of 140/90 mm Hg; 60% of which were aged over 40 years.

Smoking

Smoking status was recorded in 100 patients with 21% of participants admitting to being smokers, 6% described themselves as ex-smokers and 6% reported using e-cigarettes. 72% of smokers were over 40 years of age.

Body mass index

BMI was recorded for 82 participants (table 1). Mean BMI was recorded as 29 within a range of 17.8 and 51. 70% of the participants were classified as overweight or obese, and 65% of those overweight/obese were aged over 40 years or older. 38% of participants were classified as obese (class 1, 2 or 3); 23% were class 1 obese, 8.5% were class 2 obese and 6.1% were class 3 obese. Those over 40 years made up 72% of the overweight group, 63% class 1, 50% of class 2 and 60% of class 3 obese groups, respectively.

Cardiovascular risk scores

Date of birth data was missing from 6 participants, and 32 participants were aged less than 40 years of age, so while they participated in the screening, it was not possible to estimate CVD risk using SCORE 2. For the 62 participants screened, CVD risk ranged from <1% to 15%. 21 participants were classed as low risk (<1%) due to their low levels of total cholesterol and HDL cholesterol. 21 participants (33.9%) were reported to have a 10-year risk of fatal and non-fatal CVD events greater than the estimated risk for their age, placing them at high risk.

Incident AF

Only one individual was identified as having an irregular heart rhythm. As the individual had already been diagnosed with AF, no further action was taken.

Qualitative data

12 participants completed interviews with the PI (IDJ) as noted above. Analysis of the interviews identified five main themes:

- The Screening Programme.
- Pre-existing health risks for each individual.
- Presenting health and health behaviour.
- Proposed changes in behaviour following screening.
- GP access and health screening.

Each of these will be discussed in turn.

The screening programme

Four subthemes were identified:

- Location and timing of the programme.
- Perceptions about the targeted health advice.

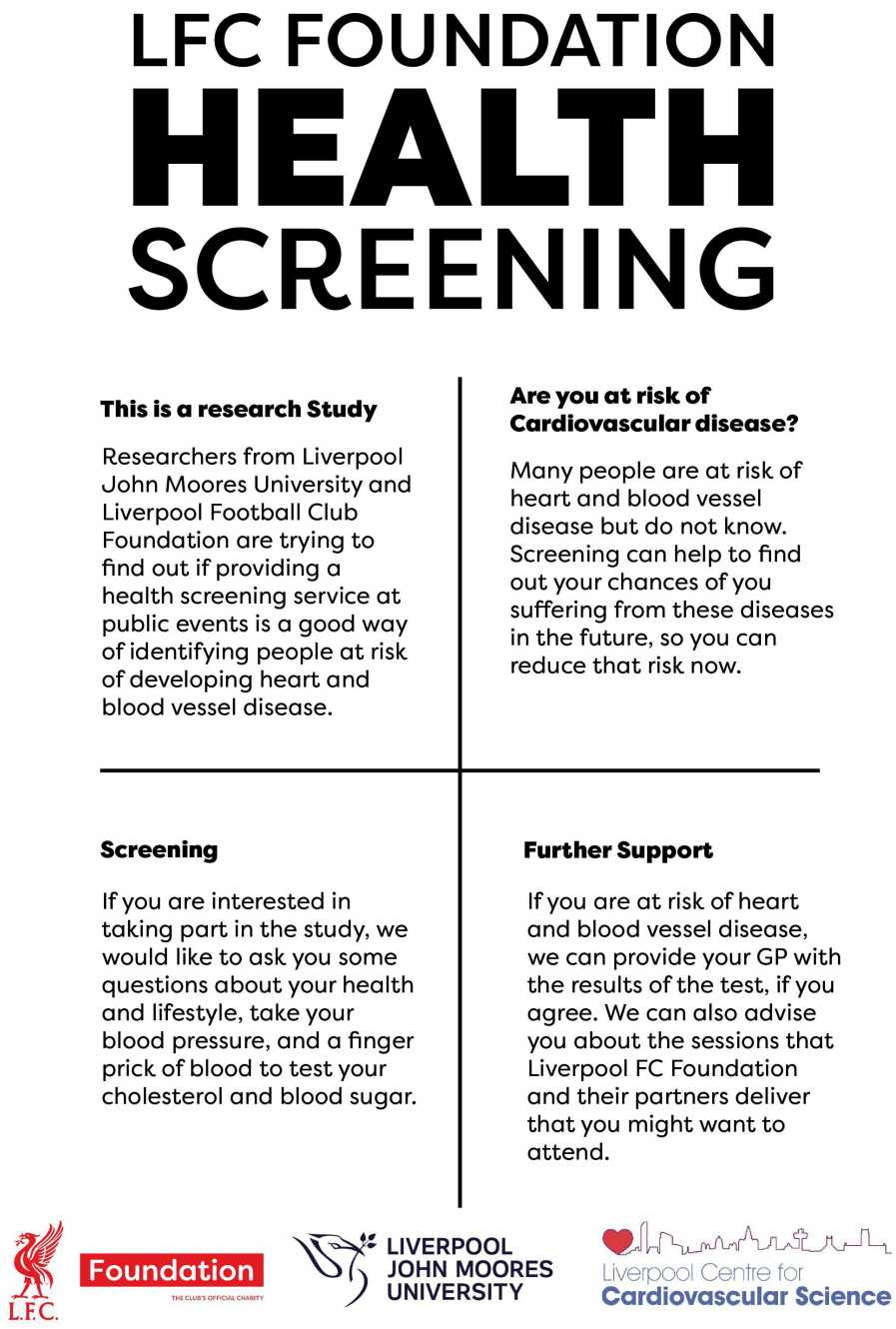

Figure 2 Ethnicity of participants.

- How to improve the programme.
- Why the programme was felt to be successful by the participants.

Each of these subthemes will be discussed in turn.

Six participants stated that they felt the community location of the screening to be beneficial, with comments such as:

> this is great that I can do it here, I mean I play football anyway [0021] and
>
> the fact that just after football, the opportunity to get yourself screened for potential risk, cardiovascular risk is important. Especially for our families I think it is important to know where you standing in regards to your risks [0023]
>
> it is not something you have to phone your GP to go and do, so it is nice to have it in the community, isn't it? [0026]
>
> In the hospital… it is (a) scary… environment. Whereas here they come around and explain it [0025].

The brief nature of the screening was also appreciated, with one participant stating:

All was fantastic. It was quick; it didn't feel like it was too long. You so busy in your normal day-to-day, you don't want it to drag on; no, really efficient [0026].

Five participants appreciated the targeted health promotion information provided after screening, with one noting:

I was given some advice how to make adjustments to my diet and lifestyle too to address those numbers and make sure they stay in low range [0023]

The immediate provision of results was positively received with applicants declaring:

when they put …(the results) in front of you. I was like I'll do it [0028]

I was really happy to have access to that today and also to get the results quickly right away. I didn't have to wait or anything. So, it was really good to know that is fine and is actually helpful [0027]

The format of providing additional resources was also appreciated, with a participant stating:

I was given a barcode to access services. So that was really good, that was really positive [0019]

While one participant felt they "*wouldn't change anything*" [0020] about the screening programme, some suggestions were made that could offer improvements. Two participants suggested a need for more resources to reduce delays waiting for test results; two felt the programme should be repeated twelve months later to offer a follow-up service to see if people had followed the advice and provide further guidance; one suggested a need for additional advertising to make the screening availability and location clearer. In the interview, it was evident that one participant had not realised that they had been given a QR code with links to community resources that could be beneficial, so this could be more explicit. Finally, one participant felt that the health promotion advice could be more explicit to encourage people to change their health behaviour, stating:

you're (doing) some fabulous things here, but if you don't say to people 'this is going to kill you' …you've got to be ruthless to be kind [0022]

The screening programme was described as 'fantastic' (0022 and 0026), 'helpful' (0027), 'providing motivation' (0026), 'raising awareness' (0030), 'positive' (0020), 'works well' (0019) and one individual noted that:

I'm quite happy to be honest because they checked all, 'cause I wouldn't have known the outcome [0029].

Pre-existing health risks for each individual

One-third of participants (n=4) interviewed identified that they had concerns regarding their weight, but it was interesting to note that while one participant identified that the screening had indicated an elevated BMI, none of these four individuals mentioned their BMI results.

One participant recognised that their ethnicity increased their cardiovascular risk. Three participants identified familial health issues that would suggest regular screening would be beneficial. For example, one participant stated:

my mum has high cholesterol and she got high blood pressure. And she's recently been to the doctors, and they said she's prediabetic. My nan had diabetes; my nan from dad side, they both suffered stroke [0030].

Another participant stated:

I was advised to have my cholesterol checked too (due to familial health issue) but that was before Covid I thought I'm not going to get my cholesterol checked so will not just think about it [0027].

Two participants identified that the screening had indicated they had high blood pressure. Five participants identified high cholesterol levels, with one attributing it to their diet and recognising the issues associated with fast food.

Sometimes taking kids out is more convenient when you're out somewhere and you don't time to make choice. It's just convenient to say, oh, drive to McDonalds. And sometimes it's a treat as well for them…and it is actually nice, but I know it's not good [030]

Presenting health and health behaviour

This theme had four subthemes:

- Results of the screening tests (BMI, BP and cholesterol).
- Current levels of activity.
- Current diet.
- Prior weight loss.

Only one of the four individuals who voiced concerns about their weight identified that they were attempting to address this:

I've start losing 3 and a half stones and I quitted smoking 8 years ago. So, I know what I need to work on to get my cholesterol little bit lower [0028].

Two other individuals noted that they had lost weight in the past 2 years, with one stating:

About 2 years ago I was 15.2 and I thought is I don't do something about it I'm going to end up 16 stones which is wrong for me. So, I've lost over a stone in about last couple years [0020]

Rather than attending slimming clubs as noted by the other participants, this individual attributed their weight loss as follows:

I cut down my alcohol in general, but in particular I cut down beers… losing the beers have helped with the weight lost [0020].

Only two participants discussed engaging in regular activity, but only one of these described specific sporting activity, stating:

I do train, not weight or stuff like that but I do train. I do little bit weight, but I'm very active, very active. And I have a big garden, so tend to do all sorts [0019].

Three participants described their current diet, and in two cases, how they had modified it to improve their health:

I'm generally trying to eat a bit less and a bit better stuff, a bit more fruits and vegs …I've done that [0020].

Less carbs. I've had my first chocolate bar today; I haven't had any for about a month… I eat more than 50% vegetarian or treat myself with a bit meat [0028]

Proposed changes in behaviour following screening

As a result of the screening, three individuals identified that they would make changes to their diet, with one having discussed diet in their health promotion advice stating:

I'm going to make deliberate change because the whole nation probably we love our butter and our toast and bread. So, I think looking for alternative to butter, which obviously contributed to increasing LDL is a big sort of change I think I can potentially make [0023]

Two participants were attending slimming clubs or were on eating plans and had successfully lost weight, so were not intending to make further changes as a result of the screening. A second individual noted that while they had plans to commence attending a slimming club:

I was worried about the cholesterol thing because that's not good. I've just got to try now, try harder [0029]

Only one participant stated that they wanted to stop smoking. Another identified that they smoked 'only' nine cigarettes per day and felt that their activity ameliorated the impact of smoking, saying:

I am happy staying at none, and nine is quite difficult to do. I have been smoking since the age of 16, that's a long time. I've been smoking nine now (I may have extra one someday)… Nine is a pretty good…if it was just smoking nine without any other exercise, that wouldn't be good [0019]

It was interesting to note that one individual who had self-identified as 'oversized' (0028) did not identify any issues with their results or any wish to make any lifestyle changes as they felt their screening results to be 'great, so, really, really reassuring to know that' (0028).

GP access and health screening

Five participants identified problems with getting appointments to see their GP, including one participant who had tried to book an appointment earlier in the day.

I happened to ring my GP this morning for an appointment for something. I rang 72 times, 72 times, ehmm…eventually when it was answered, no appointment. And that's quite a common thing for my GP practice. In the past I've rung far more than 72 times, I've rung 100 times before and got no appointment [0020].

One additional participant felt that people do not see their GP.

because they're frightened to go to doctors… These people think it's alright, and you know it's like Covid disease people will die of underlying illnesses that they didn't know they had [0022].

Health screening was not something five participants felt they would approach their GP for, even in one case where it had been recommended:

I was advised to have my cholesterol checked too (due to familial health issue) but that was before Covid I thought I'm not going to get my cholesterol checked so will not just think about it [0027]

Only two participants identified attending health screening appointments in the past, with one feeling it was important to pursue this as an individual.

I try to beat the clock… Not to deteriorate due to my own fault and find that I'm in hospital with some major health issues and they say well if you've done that 5 years ago you won't be here [0021]

DISCUSSION

The study highlighted how mass screening can identify individuals with a previously unknown increased risk of CVD, hypertension or abnormal lipid profiles and highlighted other risks including smoking and obesity that could be discussed using an appropriate health promotion framework. The screening assessed individuals who, according to the interviews, would not have independently arranged a health check with their GP. These individuals could be considered hard to reach for traditional health service delivery models, but mass screening reduced access issues and made health testing and health guidance available to all who wished to make use of it. Such mass testing was shown to be convenient, quick and easy; with all interviewees reporting positively about the experience and stating that they were happy to engage. Participants recommended rolling out similar sessions with local sports teams more regularly.

The affiliation of a leading sports brand, in this case LFC, was considered a strength by the participants of this study. While it is widely established that those from a lower

socioeconomic background are less likely to engage with health screening initiatives and while the socioeconomic background of participants was not collated, recruitment was deliberately undertaken in areas of high deprivation. The ability to recruit to this study in these areas was seen as a strength of the study. More participants were recruited by staff wearing LFC branded clothing rather than those in nurses' uniform, and participants provided feedback that they found the latter to be off-putting. Results were supplied immediately to participants, alongside individualised health promotion and advice, allowing participants to understand their risk of CVD and highlighting to them the need for a change of lifestyle in keeping with the HBM approach. The provision of QR codes specifically aligned with local resources provided participants with direct access to services suitable for their needs. This study identified a high prevalence of major risk factors for both CVD and other long-term illnesses. Total cholesterol, especially non-HDL cholesterol (non-HDL-C), is an important predictor of CVD events.[39] Almost half of adults living in the UK are reported as having cholesterol levels above 5 mmol/L.[2] Approximately 8 million adults in the UK are currently taking lipid-lowering drugs such as statins.[2] In this study, 41% of participants had cholesterol levels greater than the recommended normal range (>5 mmol/L) and almost 71% of these participants were over the age of 40 years. The LDL/HDL ratio was found to be higher than the normal range in 54% with almost two-thirds (65%) of these being over 40 years. Approximately 16 million adults in the UK are reported to have hypertension (eg, ≥140/90 mm Hg), with almost half of them not receiving effective treatment.[2] According to the British Heart Foundation,[2] about 50% of heart attacks and strokes in the UK are associated with hypertension. We found 20% of participants to have high blood pressure readings, with 60% of these over the age of 40. This is higher than the national average, where 9% of adults aged 16–44, 31% aged 45–64 and 60% aged 65 and over are associated with hypertension.[40] It is estimated that at least 7 million adults in the UK smoke cigarettes.[2] Meanwhile, about 15 000 deaths each year due to CVD in the UK are reported to be attributed to smoking[2]. It is reported[41] that in 2022, the age group 25–34 years had the highest proportion of current smokers in the UK (16.3%); those aged 65 years and over had the lowest (8.3%). The proportion of smokers in the UK in 2002 was 12.9%, or 6.4 million people[41] and has reduced from 2021 (13.3%) and 2011 (20.2%) levels. Our participants had a higher rate of smoking, with 21% of the participants admitting to being smokers (72% of whom were over the age of 40), 7% describing themselves as ex-smokers and another 6% reporting using e-cigarettes. Vapes pose a CVD risk.[42] While it is reported that the use of vapes is increasing in younger people,[41] and people are switching to vapes to help them quit smoking cigarettes (31%); to prevent relapse (22%); because they enjoy the experience (14%); and to save money (12%),[43] and the proportion of the participants who were vaping was lower than the 2022 national average of 8.7%.[40] The 1% incidence of AF in this population was lower than that expected for the local population.[44] Finally, more than 26% of adults in the UK are classified as obese (eg, BMI >30 kg/m^2) and about 38% of them have a BMI index defined as overweight (eg, BMI range 25–29.9 kg/m^2).[2] The British Heart Foundation[2] indicates that one in six CVD deaths in the UK are associated with high BMI index. Our study found that nearly three-quarters of the sample were either overweight or obese. These findings highlight the potential extent of future health harms that can be expected unless healthcare services intervene.

The involvement of LFCF branding and staff created a sense of partnership and, it could be argued, encouraged participants to trust the researchers more readily than they would have if an unaffiliated screening study had taken place. This argument is echoed by the work of Pringle *et al*[45] who completed a study incorporating 11 foundation Community Charity trusts affiliated with football clubs and found that football branding allowed for effective engagement with local communities, describing such affiliation as providing a 'powerful reach' to local people. Participants requested the rollout of more sessions affiliated with sports teams as a positive way to gain greater future engagement. Feedback from participants also highlighted the need for health screening provisions to become commonplace within local community settings, allowing for easy access to local people, which could support public health initiatives.

To gain a greater understanding of the impact that sports-branded health screening has on engagement, a larger scale study is needed with a larger budget to allow for the purchase of more equipment to support a wider roll-out of health screening. It is also recommended that information on socioeconomic background of participants is collated to examine any link between socioeconomic status and engagement with health screening, particularly those affiliated with sports branding, allowing for future exploration of the barriers that are faced and how community-led initiatives can address this. Future studies should also consider affiliation with other sports brands to capture the engagement of other members of the wider community. Furthermore, affiliation with other charitable organisations, religious groups, community hubs and social clubs recognised by the local community may capture individuals who do not affiliate themselves with any sport. Participants in this study recommended extended advertising to encourage recruitment and the need for follow-up with participants in future studies.

The findings from this study provide a rationale to evaluate further the validity, feasibility and clinical value of a mass community screening programme. Expansion of the research to include a wider range of people from different underserved populations would provide greater insight into the different cultural or community-specific factors that may influence engagement with health screening and provide more comprehensive insight, supporting the development of inclusive interventions.

Limitations of the study include recognition that affiliation with a leading sports brand could have acted as a deterrent to some potential participants who did not have an affiliation with the specific football team or had no interest in football, thereby limiting the potential engagement levels of the study. Additionally, this study did not follow participants after assessment and can therefore not report if they accessed local services. However, evidence suggests that individuals are more likely to engage with services if they are shown how to access them.[46 47]

Conclusions

Sports-affiliated branding was well received and allowed for positive engagement with the study. The screening identified a significant number of people with high 10-year risk of CVD and high levels of CVD risk factors. Moreover, all participants engaged in discussion regarding lifestyle choices and were provided with information about local health provision. Participants articulated their desire to engage in such screening but were either unable to secure a GP appointment or would not consider accessing the GP for these services. Screening that was immediately available was valued. Larger scale studies are needed to explore the impact that sports branding has on community health initiatives in a drive to reduce the incidence of CVD.

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