RUNNING TITLE: A process evaluation of the SHIFT Study

Abstract

Objectives: To undertake a process-evaluation of a Structured Health Intervention for Truckers (SHIFT) implemented in a sample of UK lorry drivers.

Methods: A combination of 'debrief interviews', focus groups and one-to-one interviews, in addition to observations and reflections of the two lead researchers were used to collect data on the acceptability of SHIFT from a group of 16 lorry drivers and 4 transport managers.

Results: The SHIFT program was considered relevant and acceptable to lorry drivers. It provided them with health information tailored to their specific health needs, long-lasting tools and techniques, which helped to raise their awareness of key health issues and helped to stimulate lifestyle changes during their daily routine.

Conclusion: This process-evaluation suggests that the SHIFT program should now be evaluated on a larger scale and tested through fully randomised controlled trials.

Introduction

Previous research has identified a range of health risks and conditions associated with the occupation of lorry driving including hypertension, hyperlipidaemia, diabetes, cancer, sleep apnoea and sleep deprivation, musculoskeletal and gastrointestinal disorders, and symptoms of psychological distress.[1-4] Associated with many of these conditions is an increased prevalence of overweight and/or obesity among lorry drivers, with 57-87% of drivers worldwide estimated to be overweight or obese[1,5,6]. Lorry drivers' lifestyle involves several factors which predispose them to the aforementioned health problems including long and irregular work hours, unrealistic delivery schedules, traffic and stressful working conditions, lack of opportunity for physical activity, lack of availability of healthy foods at service stations and the compulsorily sedentary nature of the job.[2,6,7] It is clear, therefore, that lifestyles associated with this occupation put drivers at risk of ill-health, for example it has been observed that American lorry drivers' display higher rates of cardiometabolic disorders compared to the general population[8]. Age-standardized hospital admission rates for several chronic diseases were also higher in Danish lorry drivers compared to other male non-driver counterparts.[9] In addition, higher standardised mortality rates were also found in Danish lorry drivers in comparison with other occupational groups of unskilled male workers[10].

The high prevalence of obesity and other related health problems seen within lorry drivers constitutes both a major public health issue and a failing of workplace health promotion. Recently, there has been a raised awareness within the transport sector about the necessity of improving lorry drivers' health, with some companies developing their own

"in-house" health programmes.[11,12] However, limited research has focused on promoting health interventions amongst lorry drivers.[13,14] Isolated reports of previous interventions have documented limited to moderate success in changing drivers' health behaviours, which ultimately improved lorry driver's total cholesterol,[15] high-density lipoprotein[16] and blood pressure.[17,18] However, the most successful interventions were mostly focused on weight loss.[7,15,19-21]

Taking into account both the scale of health risks and problems facing lorry drivers, and the relative lack of health promotion efforts focusing on lorry drivers – particularly in the UK where such efforts are absent – interventions to promote health in UK lorry drivers are sorely needed. The aim of this paper is to provide a process evaluation of one such UK-based intervention: The Structured Health Intervention for Truckers (SHIFT) programme.[22,23]

The SHIFT programme was a pilot trial (involving 57 males drivers [mean (SD) age: 49.5(9.1) years; BMI: 29.3(4.7) kg/m^2]) of a new health intervention for heavy goods vehicle (HGV) drivers which was delivered at a transport company based in the East Midlands (UK). The aim of the program was to promote lifestyle changes in relation to diet, physical activity and sitting time, and to reduce risk factors for cardiovascular ill-health and chronic disease (e.g., high blood glucose, dyslipidemia, high blood pressure, elevated body fat and waist circumference) amongst the drivers. The program – which was informed by our previous research exploring the barriers to healthy lifestyles among drivers[23] – lasted for 3 months and consisted of pre-and-post-health assessments, one-to-one counselling, a 6-hour education workshop, a cab-workout, health coaching throughout the duration of the intervention, step count challenges on a monthly basis and access to a "healthy packed lunches" scheme. In addition to these strategies, lorry drivers were provided with free membership at the company's gym for the duration of the intervention plus 3 months after

the intervention. Clinically meaningful positive changes in several cardiovascular health indicators were observed post-intervention. A paper detailing the intervention, including its study design and participants, and the main findings can be found elsewhere.[22] This work was previously published as part of a thesis by Dr Varela Mato and deposited in Loughborough University's repository service on December 2016[23].

The process evaluation approach

In this paper, we explore some of the challenges involved in conducting a health promotion intervention within a transport company by conducting a qualitative process evaluation. Process evaluations explore the implementation, receipt, and setting of an intervention to provide contextual information regarding how and why an intervention either succeeded or failed to produce change in the participants.[24,26] Process evaluations have been described as an essential component of designing and testing multicomponent interventions whereby there are many potential 'active ingredients' and methodological challenges.[25,27] Therefore, using the process evaluation approach, we examined the participants' views on the intervention, how the intervention was delivered and the context and environment in which the intervention was conducted. Moreover, throughout this process evaluation we try to determine whether the intervention was delivered as intended (fidelity), what barriers or difficulties might have jeopardised the implementation of the intervention, and whether or not contextual factors played a role in the success or failure of this intervention.

The questions we attempted to answer as part of the process evaluation were as follows: a) how did the drivers respond to the intervention (e.g., in regards to interest,

perceived relevance, acceptability, willingness to participate)?; b) what role did the context of the transport company play in the implementation of the intervention?; and, c) what challenges were encountered by the researchers in conducting the intervention in this worksite setting? Answering such questions will provide valuable contextual information regarding the practicalities of conducting health interventions with lorry drivers, who are considered a hard to reach occupational group. As noted above, there are many aspects of the lifestyle of a professional lorry driver that make it difficult to adopt regular physical activity and healthy eating practices. Furthermore, the operational environment of a large transport company is complex, with complicated planning arrangements and delivery schedules that need to be maintained, as well as frequent training updates and the difficulties of managing a large driving workforce. Therefore, delivering even a relatively 'straightforward' multicomponent health intervention in the context of a transport company has the potential to be difficult. In order to consider how programmes like SHIFT might be feasibly, reliably, and successfully implemented to help promote drivers' health, it is therefore essential to consider the factors which affected the implementation of SHIFT and the processes through which it was conducted.

Methods

Following the approval by the University's research ethics committee, several sources of information were used to collect data on the processes involved in implementing SHIFT. Firstly, drivers' views on the programme were assessed mid-way through the 3-month intervention period using a brief semi-structured interview format. A random sample of 16 drivers out of 57 participating in the SHIFT programme took part in these 'debrief

interviews'. Data were collected based on participant availability during 3 shift patterns (Night -22:00 to 06:00-, Morning – 6:00 to 14:00, Afternoon -14:00 to 22:00) whereby the researchers spent time in the company's transport office to interview drivers. Data collection stopped at a point where saturation of data was reached, which was determined by repetitive answers to the research question with no new information to establish new categories. Sample questions included "What did you think of the SHIFT education session you attended?", "Were there any parts of the program you particularly liked, anything you didn't like?", "Was there anything that could have been improved about the SHIFT education session?" and "Have you been able to make any lifestyle changes following the SHIFT education session?"

Second, at the end of the intervention focus group with transport managers (n = 4) and an individual interview with the transport planner were conducted to assess the overall execution/implementation of SHIFT and whether the pilot programme could be implemented company-wide. In the focus group, sample questions included: "Were you able to support the drivers in their participation in the SHIFT programme? If so, how?" and "Were there any aspects of the SHIFT programme that proved operationally difficult to implement or manage?" In the individual interview with the transport planner, questions were focused on practical aspects of scheduling drivers to take part in the intervention with regard to planning and logistics. The interviews and focus groups were digitally recorded and transcribed verbatim before being subjected to a thematic analysis.[28] As a first step in the analysis, the data were read and re-read as a way of immersing in the participants' stories. Segments of the text that was relevant to the research questions were then highlighted and categorised based on the following themes: drivers' responses to the programme and contextual challenges in implementing SHIFT. The text was then loosely

coded to highlight specific words, phrases, or textual segments which were related to specific topics and refined into the sub-themes presented within the two main categories of discourse abovementioned.

Third, observations and reflections of the two lead researchers (NC and VVM) were recorded and used to evaluate the challenges involved in carrying out the pilot SHIFT intervention within the company. These observations and reflections took the form of field notes recorded during and after the SHIFT education sessions and throughout the intervention period, and post-intervention reflections on the program's implementation.[25] The observations and reflections were added to the thematic analysis and woven into the process evaluation report.

Results - SHIFT programme implementation

The process evaluation report is divided into two main sections detailing a) drivers' responses to the SHIFT programme and b) contextual challenges involved in implementing the programme in the transport company setting.

Drivers' responses to the programme

A number of themes were identified which encapsulated the drivers' general response to the SHIFT program. These themes are described as "*hard-to-engage*", "*positive responses to the program*", "*raising awareness and reinforcing health messages*", and "*stimulating change*". Below, we use data extracts from the debrief interviews, along with reflections and observations from the researchers, to discuss each of the identified themes. These extracts are examples of the general perceptions shown by the drivers related to the implementation of SHIFT.

Hard-to-engage

Generally speaking, drivers' attitudes toward participation in the program reflected a group that was 'hard-to-engage'[29,30] which created difficulties during the initial (recruitment) stages of the project. This particular sample of lorry drivers have experienced regular and frequent health promotion campaigns run by the company's Health Action Team, yet engagement remains low. Therefore, as part of the recruitment and promotion process, the researchers (NC and VVM) spent a considerable amount of time in the drivers' lobby of the company's transport office, engaging and communicating information to the drivers regarding the implications and the benefits of taking part in the SHIFT program. Participants were later randomly selected from the overall workforce and scheduled to take part in the program on an opt-out basis (Figure 1).

Insert Figure 1 about here: Flow chart representing the lorry drivers' sample size and the uptake on the study.

Typical responses we received during this phase of the study reflected a degree of scepticism about the work we were doing and about our capacity to make changes within the company which would increase opportunities for healthy living, as several drivers commented: "You're working with your hands tied behind your back" or "You might as well pack up and go home now." Indeed, the drivers commonly perceived that the constraints of their working lives – particularly in regards to working hours – were the primary reasons for their unhealthy lifestyle behaviours, and that these constraints were not amenable to change through our intervention.[23,24]

There was also a perception amongst the driving workforce that drivers in general were "stuck in their ways" and would always be resistant to attempts to effect change in their lifestyles; as the following quote from one of the program participants highlights:

> *A lot of them are stuck in their ways and I said to them [SHIFT educators] "You'll be wasting your time with a lot of the drivers here." I mean, I don't know how many drivers signed up for it [SHIFT program] but I bet a lot of them were like "Ohhhh, I ain't doing that!" (LDP52)*

Even amongst some of the drivers who agreed to participate in the program, our well-intentioned, non-directive and participant-focused interactions could still be construed as unwelcome "preaching" of health messages by drivers' resistant to change:

> *I'm the sort of person that the more people preach to me, the more I dig my heels in. (LDP10)*

Such responses might be considered as typical of men who seek to resist the repeated 'imposition' of over-zealous health promotion messages, for example by the media.[28]

Positive responses to the program

Despite drivers in general resembling a 'hard-to-engage' population, there was ample evidence that participation in the SHIFT program helped to transform drivers' attitudes towards health and that the program was enjoyed and valued by participants. Table 1 shows five quotes highlighting the acceptance of the implementation of SHIFT.

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Table 1. Quotes highlighting participant's positive responses to the implementation of SHIFT

[It was] really good. I didn't expect it – I was apprehensive about it, thinking it would be a waste of time, this and that. But once I was on it and the information you immediately gave me – it was . . . even though you think you're fit, it's still quite shocking some of the stuff you can improve on. (LDP69)
I enjoyed it all. I didn't go into it looking to enjoy it sort of thing. I was just gonna see what I could do to not enjoy it really – I've done lots of things like that. But no – they [educators] were very good, very entertaining and good with putting the information out there. (LDP11)
[It was] really good. I didn't expect it – I was apprehensive about it, thinking it would be a waste of time, this and that. But once I was on it and the information you immediately gave me – it was . . . even though you think you're fit, it's still quite shocking some of the stuff you can improve on. (LDP69)
I thought it was very good and informative. We all hear these things on the televisions and to varying degrees take notice. But it's actually when you're in the [SHIFT education] session that you can be a bit more focused on it. And I did find it astounding that when we are delayed or at these premises [deliveries/warehouses] for a long time, just simply standing is better than sitting, which is good because we do have plenty of time to stand rather than sit. (LDP21)

I genuinely actually quite liked it. Quite informative, we all learnt a lot, plus it was a bit of a giggle – it wasn't too serious, was it? Yeah, I thought it was very useful. Don't know what else to say really, but yeah. (LDP46)

The positive attitude shown by the drivers towards their participation on the SHIFT programme was supported by their answers to questions such as: "Were there any parts of the program that you didn't like?", "Was there anything that could have been improved about the SHIFT education session?". Table 2 includes 5 quotes that summarise the driver's answers to the above questions.

Table 2 Participants' quotes related to the questions: a) Were there any parts of the program that you didn't like?" b)"Was there anything that could have been improved about the SHIFT education session?"

No, it was all good, I thought it was well presented, the women did it really well. Yeah, so just a general all-round thumbs up from me (LDP5)
I think it was alright actually. I think it could have been condensed down into less hours. Because it just seemed to be going over and over. . . not over and over the same sort of stuff but delivering the same sort of message if you know what I mean. But yeah, basically that was about it (LDP10)
well, there was nothing I disliked, I just thought it was quite informative. The thing I took out of it was that little changes make huge differences. Not, you don't have to live like a monk – you can still enjoy yourself, so yeah – that's what I got out of it really (LDP20)
not particularly, I mean they give you plenty of information and it was made

> interesting and entertaining shall we say. You know – but no I would have thought – it seemed very full of information and they gave us plenty of envelopes with plenty of stuff in them to go away and read. But, no – it was a very good day I found. (LDP48)

> Informative. Obviously, it is exactly that – it is informative, it doesn't force you to do anything, but it does make you think about what your choices are and what your actions – and the reactions to your actions are. (LDP59)

These positive responses provide some indication that the program was considered appropriate by the drivers, that the education they received was pitched at the right level and was informative, and that drivers were encouraged to reflect on their lifestyles and consider incorporating changes. However, due to the design of the study there is also the possibility that drivers who responded positively were already predisposed to promoting their own health; a possibility we explore further below.

Raising awareness and reinforcing health messages

One of the key themes we derived from the debrief interviews with the drivers was that the SHIFT program helped to raise awareness of various dietary hazards and of the importance of increasing one's levels of physical activity, in particular walking.[31] In addition, the program helped to reinforce key health messages (e.g., 5-a-day, reducing fat and sugar intake, increasing daily 'step-count', physical activity guidelines) with which the drivers were familiar but upon which they had been slow to act. This theme of 'raising awareness' is evident in the data extracts from the debrief interviews presented in table 3.

Table 3. Participant's quotes related to the theme of "raising awareness".

It puts it at the front of your mind rather than at the back . . . just being more aware of my health and what I'm putting into my body (LDP11)
My awareness has changed, awareness of my health, awareness of potential health problems, and awareness of how to ameliorate – good big word! – the potential health problems in the future. (LDP4)
Some of the stuff I thought I knew I didn't know, I didn't know nothing about that. So that was quite an eye opener as well. (LDP69)

As these extracts illustrate, participating in the SHIFT programme helped improve the drivers' awareness of the health risks associated with poor diet and inactivity, challenged some misconceptions they held previously, and helped to reinforce the importance of persevering with efforts to implement lifestyle change.

Stimulating change

One of the key themes we identified was termed 'stimulating change' and captured the extent to which participating in SHIFT helped drivers to change their lifestyle habits (Table 4). Two sub-themes are incorporated within this theme (acceptability of intervention components and the question of sample bias).

Table 4. Participant's quotes related to the theme of "stimulating change".

It kind of gives you that little push because you actually know what's going on, instead of thinking "Ahhh, I'm fit as a fiddle" you think – don't you, but until you actually see the results you don't really physically know, do you? So yeah, it gives you that slight little push. (LDP46)
It's been really – like a wake-up call to me really. And I'm going to try and hit my target every day. Because my granddad had a few heart attacks, on me dad's side, and they've had heart disease and stuff, so its just like a wake-up call. (LDP66)

As these quotes demonstrate, participating in SHIFT and receiving the results of a full health assessment during the SHIFT education session stimulated drivers' intentions to change their lifestyle behaviours and to try to improve their scores on the various health outcome measures. Therefore, during this session, drivers had the opportunity to discuss their own results (if desired) with their peers and the educators and seek advice on how to integrate lifestyle changes within their daily routine. In addition, drivers also frequently described being successful in making specific "small changes" to their daily routines such as walking more both outside of work and during in-work delays, cutting down portion sizes and making healthier food choices (Table 5).

Table 5. Participant's quotes related to the sub-theme of "small changes".

Generally, now – I get out more and I do a bit of walking about. I think – instead of sitting here for an hour, I go for a walk for an hour and I come back – wherever I am. (LDP46)
I've changed my margarine to Flora low cholesterol stuff. And my food intake now, I know when I've had enough – I don't eat a lot, I'd only have like – today when I go out, I've got one sandwich and I'll eat two bananas a day. And all I drink is juice with water, non-sugar stuff – so yeah, I'm doing alright. (LDP35)
I do try and do as much sort of activity as I can. I'm wearing the pedometer and I keep checking that every day . . . It's a way of checking really – you just don't realise. (LDP48)
It spurred me on and I watched everything I ate for – till yesterday and then I just seemed to crash – don't ask me why [laughs]. But I've already got it in my mind that that's not gonna stop me, I'm gonna get back on with it. (LDP59)

Participants frequently expressed surprise that they could potentially improve their health by making small changes to their lifestyles such as standing and walking more during the day, and by making healthy food 'swaps' such as brown bread instead of white, and water instead of fizzy drinks. They mainly spoke of changing their lifestyles "slowly but surely" in

order to improve their health behaviours. Some drivers even described making substantial efforts at lifestyle change in order to bring their weight under control and achieve better health. This is highlighted in the quotes included in table 6 and in the results presented elsewhere.[22,23]

Table 6. Participant's quotes highlighting lifestyle changes to improve their health. These quotes are related to the sub-theme of "small changes".

I've cut down on portion sizes and I've joined the local gym as well. So I'm just going all out now. And now my partner is talking about the traffic lights stuff on food – so keep avoiding the red stuff and keep going for the green stuff. I bring smoothies into work as well now. And since the session I've stopped eating chocolate, I've not had any coke. I used to have a chocolate bar every day and about two or three cans of coke. I've not had any of that. (LDP66)
NC: would you say your attitude towards health has changed since you attended the session? PARTICIPANT: my attitude? Yes – I'm even instilled in my son a bit – especially when I found out some of those drinks, you'd have thought – no, there wouldn't be much sugar in that but you know, there is a lot of sugar in that and I've kind of drilled into my son – you know, try and stop him drinking so much fizzy stuff. So what –that and the food-wise, it was quite a shock to see how much stuff is in some of these foods and drinks. (LDP58)

Accordingly, feedback from the drivers indicates that the SHIFT program was successful in prompting lifestyle changes among the drivers. This statement is supported, not only by the

drivers' responses to the program, but also by the significantly improved health outcomes at 3-month, compared to the baseline assessments.[22]

Sub-theme: Sample bias? To avoid the sample bias, participants were randomly selected from the overall driver workforce, although they were given the opportunity to opt-out of the program. It is possible therefore that those who decided to participate were already interested in lifestyle change and were contemplating efforts to improve their health when the program began (as shown in the quote below – LDP52); with the rest of this "hard-to-engage" group remaining unengaged.

> *I'd already put everything in place beforehand and I'd just been sticking to it since. (LDP52)*
>
> *NC: Did you come away from the session with a plan of any changes that you wanted to put into practice?*
>
> *LDP68: Not necessarily because I'm already doing that anyway but it's just reinforced them – to keep it up . . . It's kept me on the right track.*

As indicated previously, the SHIFT program appeared to successfully change some drivers' attitudes towards health, improving their awareness of health risks, and encouraging them to do more to promote their own health. Moreover, it even helped to transform the behaviours of some drivers who might previously have been described as "hard-to-engage". However, the possibility of some elements of a self-selecting sample bias cannot be discounted which may mean that SHIFT might not reach the 'very hard to engage'.

Sub-theme: Acceptability of intervention components. The drivers commented during the debrief interviews on various components of the intervention, with these comments providing useful evaluative statements that helped us understand the acceptability of SHIFT to driver participants. Firstly, the SHIFT education session was evaluated positively by the majority of drivers interviewed as per shown in the positive responses to the program. Similarly, drivers were on the whole receptive to the opportunity for a health assessment and receiving feedback on a range of health outcomes:

> *It brings health to the forefront of your mind and especially with some of the measurements, which is quite nice. Free health check? Carry on! Because at my age – 48, 49 in June, I have to start thinking of these things. (LDP4)*

Feedback regarding the cab workout (Table 7) enabled us to determine what worked and what didn't in regards to the equipment provided and exercises recommended. For instance, drivers generally responded well to the resistance bands and reported using them when delayed or on a break, but the resistance balls were viewed as awkward and cumbersome to carry around. The peddle cycle devices were also quite poorly taken up by the drivers, again for practical reasons (see comment below); although some drivers indicated that the uptake would improve if peddle cycles were part of the cabin's furniture. (Table 7). Amongst some of the drivers, use of the cab workout kit was viewed as unacceptable because it was perceived to interfere with rest-time during the working day (Table 7).

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Table 7. Participant's quotes highlighting acceptability of the "cab workout" and the equipment provided as part of it.

I'm only using the Therabands because it's the easiest thing to carry. The ball, I know you have to keep blowing up the bloody thing. I know you can collapse it and re-inflate it but the theraband's easy – just fold it up and put it in your bag. (LDP4)
The band I find it easier to use, because its carrying it about with you to work and that as well so that sort of thing. (LDP21)
I use them [Therabands]– people look at me funny when I'm sat in the cab doing this. One of the drivers – I was sat at Chepstow and he looked at me and said, "what are you doing?!" and I said "this gives you exercise and keeps your muscles moving" and he said "oh, that's a good thing". (LDP35)
I've not actually used the ball yet because I don't really get a great deal of time on a [loading] bay because most of the time I'm unloading myself. But when I have my breaks I'm using the therabands. But I'm using the grip strengths every day. (LDP66)
The peddle thing, they're just too flimsy, they're just all over the shop. I haven't used them very much. (LDP11)
When you have your break at work, you just need a rest really. (LDP55)
On my break, I have me kip – I go to sleep or read the newspaper. (LDP10)

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In order to optimise the cab workout for future interventions, it should be noted that the grip strength tools and resistance bands were viewed as lightweight, accessible and practical but the resistance balls and peddle cycle machines were viewed as cumbersome and impractical. Drivers may also benefit from further encouragement to utilise opportunities for being active in ways that do not compromise rest-time (e.g., during delays on arrival at a customer).

Also with regard to acceptability, it is notable that there was a very low take-up of drivers on the "healthy lunches" scheme, and this was eventually discontinued by the catering staff who helped set it up. Feedback from drivers who declined to participate in this scheme (whereby drivers paid a subsidised £1.50 for a sandwich or salad, a piece of fruit, and a bottle of water), was that the lunches would not provide enough sustenance for a 12 or 13-hour shift in the lorry and that there was a limited range of food choice options on the healthy lunches menu. In addition, the "healthy lunches" scheme was set up during the busiest time of the company, which conflicted with the drivers' schedules and many didn't know when to order the packed lunch for because they were required to order it the week before; with drivers generally preferring to bring their own. Accordingly, future similar schemes might consider how healthier choice food options can be made more varied, appealing, appetising, and satiating for lorry drivers.

Contextual challenges in implementing SHIFT

Several themes describe the challenges we faced in implementing the SHIFT programme within the contextual setting of the transport company. These themes were "operational demands", "communication", "participant burden", and "cost-benefit". Below, we use our own observations and reflections – along with data from the interviews and focus group – to

describe the nature of these challenges and steps we took to overcome them and/or limit their influence on our pilot study.

Operational demands

One of the most significant challenges we encountered was accommodating our data collection (i.e., the health assessments) in the midst of the company's complex operational demands. To complete a full health assessment took 2 hours per driver, and planning the drivers to attend these health assessments when the company had tight delivery schedules that needed to be maintained proved to be difficult. Indeed, due to a chronic shortage of drivers within the wider transport industry,[32] problems with short-staffing meant that the company had little opportunity to release the drivers for the time required to attend the health assessments. As such, there was a situation of competing priorities whereby the transport managers wanted to support the pilot study and facilitate the health assessments, yet on occasions this was incompatible with the company's operational activity. As a result, data collection had to be extended for an extra month and a half because, in the case of some drivers, health assessment appointments had to be cancelled last minute because they were required to start their shift immediately. As such, we frequently had to re-schedule drivers for the health assessments. In the focus group session, the transport managers acknowledged that planning 60 drivers to attend a 2-hour health assessment would always be challenging operationally. One way to mitigate this challenge in future may be to work with transport staff in charge of planning operations from the first stages of

conceptualising a health intervention, and to ensure that intensive periods of data collection do not clash with periods of increased operational demand (e.g., during the Christmas and holiday season).

Communication with drivers

Finding the most effective means of communication with the drivers proved to be challenging throughout the intervention. We first encountered this challenge during the recruitment phase of the pilot study. One of the main problems with communication was the transient nature of the workforce. Drivers in the company start their shifts at different times of the day and night (each driver has a two hour "start-window" when they can be called in), only passing briefly through the transport office at the start of their shift to pick up their keys and paperwork, and then again at the end of their shift to clock-out. Communicating face-to-face with the drivers (which was generally perceived by the company and the researchers (NC and VVM) as one of the more effective modes of communication) thus proved challenging, and required the researchers to spend several days camped out in the drivers' lobby – over several shift patterns to cover the 24-hour working period – in order to maximise the number of drivers with whom we could communicate. This approach was utilised in the first instance in order to provide drivers with the necessary information about the study (i.e., what we were doing and why, how to get involved, when the intervention would begin). However, despite its effectiveness, we were unable to utilise it on an ongoing basis as our primary means of communication due to the frequency with which drivers needed to be provided with information about the study, and the time-intensive nature of this strategy. This should be taken into consideration for

future interventions if resources are available, because this would imply having a researcher on site permanently.

We also provided the drivers with written briefs regarding the project by placing information leaflets and project updates in the drivers' pigeon holes. We found this strategy to be relatively ineffective because the drivers were typically 'information-saturated' with training updates and management operations, and tended to dismiss information not pertinent to their core duties without much consideration, although this improved slightly by placing the information in recognisable envelopes with the SHIFT logo on it. Mid-way through the intervention, we also erected a dedicated "SHIFT study notice board" in the transport office, and filled it in with information about the project and an eye-catching display intended to draw the drivers' attention. We placed project updates on the notice board, and when combined with pigeon-hole information, this became a more effective strategy as the study wore on and more of the drivers' workforce became aware of what we were doing. Finally, for all drivers who took part in the study, we obtained telephone and email contact details so that we could arrange the health assessments directly and send project updates. The combination of these last two strategies proved the most effective and feasible means of communicating with the driving workforce.

Participant burden

Another barrier/challenge we encountered was the perceived burden on participants of taking part in the study. This burden mainly related to the health assessments whereby participants were required to undertake an 8-hour fast (for a finger prick test measuring fasting blood glucose and lipids), and to wear one activity monitoring device for a 7-day period. The fasting caused problems especially for the night-time drivers (22:00 to 06:00),

who would wake-up in the early afternoon and start their shift in the evening, having not been allowed to consume anything except water before coming into work. Whilst all drivers were allowed time to consume a meal prior to heading out in the lorry, the canteen was not open during the night shift and at certain hours during the day, and fasting proved uncomfortable or too much of a nuisance for some drivers. In addition, the activity-monitoring devices (an accelerometer clipped on with a buckle around the waist, and an inclinometer taped to the middle of the thigh) were generally viewed as uncomfortable or irritating, and thus some drivers were reluctant to take part when they realised what the data collection entailed. Ultimately, and linking back to the above point about possible sample bias, it may have been that drivers who were motivated to take part were willing to put up with the mild inconveniences of fasting and wearing the devices in order to reap the anticipated benefits of taking part in the intervention. Therefore, the participant burden was related only to the data collection, and not to the intervention itself. However, the data collection and the discussion of the participant's health results was considered motivating by most. Thus, it seems this should be an accepted burden when implementing the SHIFT study in the future.

Cost/benefit

Less of a "challenge" per se, but of clear importance to the managers as described in the focus group session, was a cost/benefit analysis that favoured implementation of the SHIFT program. The final cost/benefit will clearly be dependent on the study results – including the feedback from participants as outlined in this process evaluation. The key costs which the company needed to balance were the costs of releasing staff from regular duties to attend the six-hour education session (and the additional time costs of the health

assessments), and the expense of funding the SHIFT program itself. Central to justifying these costs will be whether the SHIFT program was able to make significant differences on our core outcome measures, and long-term, whether participation is associated with a reduction in sickness absence and an improvement in employee well-being.

Discussion

This paper reported a process evaluation of a new health intervention for lorry drivers which we have piloted[22,23]. The results illustrate support for the SHIFT program from the perspective of the participants, and provide the context and background against which the intervention outcomes must be interpreted.[25] In particular, this process evaluation demonstrated that SHIFT was considered acceptable by participants, and that participating in SHIFT helped to raise drivers' awareness of key health issues and helped to stimulate changes in their lifestyles. For example, drivers reported becoming more aware of how their day-to-day activities regarding food choice and physical activity impacted on their health, and expressed a desire to improve their heath behaviours. They also reported making concrete changes to their working routines such as walking or standing more on breaks and when delayed at a customer, using exercise equipment provided to them as part of a novel 'cab workout'.

The findings provide important evidence that tailored health promotion interventions can be effective in engaging lorry drivers and in stimulating changes in their lifestyle behaviours. This is significant given that drivers are often considered to lack the necessary tools for making positive changes because of their restrictive working environments.[7] Moreover, the fact that drivers responded positively to the SHIFT pilot program and found it acceptable and relevant is especially promising given the lack of

currently available health promotion efforts within drivers in the UK. Drivers are, as Apostolopoulos et al.[2] put it, "vulnerable to a plethora of health risks and are also a medically underserved population" (p. 121-122), and therefore the SHIFT pilot study constitutes a positive step in the right direction of improved driver health and well-being.

Our findings are also relevant to work in the broader area of workplace health promotion, particularly in the context of those who work 'off-site'.[33-35] Health interventions for lorry drivers differ from those in other work environments due to the "off-site" nature of the job and that "workplace-bound" interventions are not applicable.[20] Workplace health promotion with lorry drivers therefore entails that researchers find ways of overcoming practical barriers (e.g., a lack of safe spaces for physical activity, lack of available healthy food options) that drivers face out on the road. In addition, due to the nature of their job, it is important that researchers build up a relationship with the drivers, which offers genuine support and applicable advice on how to carry out small changes towards a healthier lifestyle. The various components of the SHIFT program were intended to address these barriers, for example by providing drivers with exercises they could do within their lorry cabs and by providing a healthy lunches scheme. Our findings demonstrate that certain components of the 'cab workout' kit were considered suitable by drivers (i.e., Therabands/resistance bands and grip strength tools) but that other components were not considered suitable including pedal cycle machines and resistance balls. We also learned that – consistent with previous research[36,37]– drivers require healthy food options that are considered appealing and satisfying enough to "keep them going" for a 12 or 13-hour shift. Further consideration of how to overcome this particular barrier would be important for future health interventions with drivers.

Strengths of the SHIFT pilot program that may have helped to successfully reach out to drivers include that health information was tailored to the specific health needs and challenges faced by lorry drivers, thereby making it relevant and acceptable to a large number of our target population.[34] In addition, this health intervention provided drivers with long-lasting tools and techniques that will enable them to pursue a healthy lifestyle during their daily routine. Correspondingly, a weakness of the pilot study was a failure to engage a proportion of the drivers in our efforts at health promotion. Indeed, we were not able to demonstrate that SHIFT was able to reach out to our entire target audience due to the number of drivers that declined to participate and remained "hard-to-engage". Further work needs to be done in order to find ways of engaging with this group of drivers who likely remained highly sedentary and constitute an "at-risk" population in terms of lifestyle-related diseases. One strategy to engage this population may be to use popular and more acceptable activities (e.g., football) as a 'hook' to engage men in health promotion in ways that appeal to them. Pringle et al.,[33,34] for example, demonstrated much success in engaging men in health promotion activities when programs were delivered through the guise of English Premier League football clubs (e.g. the Football Fans in Training campaign - FFIT - http://www.ffit.org.uk/index.php). Having health programs associated with the 'club badge' and delivered at club grounds helped to stimulate interest in health promotion among men who otherwise would not have participated and would be considered as "hard-to-engage".[30] Taking such strategies into transport companies – places that employ a large number of potentially "hard-to-engage" men – and promoting them on-site may be one way to improve the uptake of drivers in health interventions.

Another potential way of reaching out to more drivers may be to train and employ driver 'health coaches' as proxy conveyors of health promotion efforts. This has been

discussed as a way of increasing employee ownership[34] over health promotion efforts, and as a way of continuing to capitalise on the momentum for health promotion generated through SHIFT. One rationale for having drivers themselves as conveyors of health information and encouragement is that – for some drivers – they may constitute more appropriate/impactful health promotion *messengers.*[38] That is, drivers possess a familiar credibility based on the fact that they share the same barriers and challenges to healthy living as other drivers, and they are more likely to share trust and camaraderie with other drivers that may be missing in interactions with managers and/or health professionals.[23,24] Under the guidance and training of expert health professionals, drivers acting as 'driver health coaches' might therefore be able to engage with other drivers who would otherwise decline to take part in health promotion initiatives.

Conclusion

Taking account both the strengths and weaknesses of the SHIFT program, results of this study provide important learning that may usefully inform the future development of health interventions for drivers.[34t6] We have demonstrated that the SHIFT program is relevant and acceptable to drivers, and that it can be effective in raising awareness and stimulating lifestyle change amongst participants. The SHIFT program should now be evaluated on a larger scale, at other transport companies, and tested through fully randomised control trials.

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