



RESEARCH AND
DEVELOPMENT



A Better,
Safer
Railway

Effective Implementation of Behaviour Change Techniques to Influence Health in the Rail Environment T1209



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Executive summary

Across the rail industry, there is a concern that the prevalence of unhealthy behaviours is increasing and leading to serious health problems. These include obesity, type 2 diabetes, fatigue, high blood pressure, and poor mental health. This research aimed to understand the influences within the rail work environment that contribute to unhealthy behaviours and identify effective solutions to enable employees to make positive health choices.

The research focused on two key risk groups: workers based at rail depots (mostly maintenance workers) and train drivers. Empirical research with occupational groups and a rapid evidence assessment were used, so that lessons could be learned from effective behavioural interventions in work environments. These two sources of evidence were used to form conclusions and recommendations for industry stakeholders to consider.

Interviews were conducted with workers as the first step to identifying barriers to positive health behaviours. These sought information about work routine, environment, and influences on health behaviours. We were able to study five different types of work environments in detail. Because of Covid-19 restrictions the observations took place remotely. So, railway staff acted as proxy researchers and recorded their own observations on a bespoke research tool, supplemented by photos. The fieldwork provided rich information about facilitators and barriers to healthy behaviours in various environments. These focussed principally on access to nutritious foods, sedentary behaviours, and access to welfare facilities.

The rapid evidence assessment (REA) was used to identify effective behaviour change approaches to address those barriers. A focus on secondary sources (publications that systematically review and assess the findings from other studies) was adopted to manage the various risks associated with the size of the evidence base. While there were some useful principles to apply in these work environments, the REA showed that much of the available published evidence does not have a good fit with this study. Independent reviewers agree that the quality of reported studies is mediocre or poor. Also, many identified interventions are not readily applicable to a rail environment.

Among the more useful studies were those that support an improved range of items available in station or depot vending machines, and about providing calorie and/or traffic-light information about their nutritional content. This is a key area addressed in our recommendations. Also, a particularly useful message that emerges is about the importance of taking a 'multi-level' approach to workplace interventions. For example, high-quality dietary and fitness advice, whether personalised or generalised to groups, may instil 'good intentions' but cannot achieve sustainable results while environmental and organisational barriers still exist.

Many of the other recommendations made in this report were inferred from the interview and observation data, which provided direct access to workers' lived

experience. These focus on: improved access to welfare facilities to meet personal needs (in particular access to toilets and hygienic places to wash), creating opportunities for drivers to take exercise, and improving communication with employees about wellbeing initiatives. For example, explicitly acknowledging relevant barriers to positive health behaviours when doing so.

Suggestions for future research are made, recognising that this work involves only a small sample of rail workers, and the shortcomings in the published literature identified in the REA.

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1 Research context and approach

1.1 Background to this research

Across the rail industry, there is a growing concern that the prevalence of unhealthy behaviours is increasing and leading to serious health problems. These include obesity, type 2 diabetes, fatigue, and high blood pressure. To date, RSSB's research in this area has focused on identifying and managing the most common conditions experienced by rail workers. A key gap has been around addressing staff behaviours through a behavioural change approach.

Environmental constraints and cultural influences associated with certain roles may impact on behaviours and contribute to health problems. For example, shift work and/or being sedentary for long periods of time are prominent features of some roles. There is evidence that shift workers may be at an increased risk of type 2 diabetes, weight gain and coronary heart disease (Demou et al, 2018). Similar risks are associated with work with low levels of physical activity, such as desk work and driving.

Although broad conclusions can be drawn, relatively little is known about the environmental and cultural influences specific to rail that may be contributing to poor health. RSSB commissioned the Institute of Employment Studies (IES) to undertake research to:

- identify the conditions and influences that drive unhealthy behaviour patterns within the railway workplace
- develop solutions to support positive changes in health behaviour.

The ultimate objective of this work is to enable employees to make healthy choices.

1.2 Approach

The stated objectives of this work are to:

1. Understand the environmental and cultural factors specific to rail work environments that may contribute to poor health. This includes identifying the exact health behaviours to be targeted, and potential barriers to employees making healthy choices.
2. Understand the potential impact that health behaviour change interventions could have on the identified rail work environments. To understand the full benefits that might be achieved from implementing this within the rail industry.
3. Develop rail-specific behaviour change recommendations to address factors related to the rail work environment.

The research focused on two key risk groups: workers based at rail depots (mostly maintenance workers), and train drivers. An infrastructure company and a train operating company have supported this project to enable these groups to participate.

As specified by RSSB, a mixed method approach was adopted. This brought together empirical research (fieldwork) with occupational groups of interest and a rapid evidence assessment which enabled lessons to be learned from effective behavioural interventions in relevant work environments. These two sources of evidence were synthesised to form conclusions and recommendations for the rail industry.

1.3 Fieldwork method

1.3.1 Interviews

Interviews were conducted with rail workers as the first step to identifying barriers to healthy behaviours. A topic guide was produced to elicit views which would inform an early understanding of organisational culture, attitudes to health and barriers and facilitators to health behaviours.

The roles listed in Table 1 were selected during collaborative discussions with RSSB and company stakeholders, who led the recruitment process. Those in bold text also provided observation data (see below). A sample was chosen that was broadly representative of the wider workforce within the selected roles in terms of age, tenure, gender, and seniority.

A comprehensive, informed consent process was undertaken at recruitment stage. IES researchers were not informed of the presence or absence of health conditions, disabilities, or concerns within the participant sample. But some chose to disclose this information during the interviews to contextualise their responses.

Table 1 Occupation of participants (roles selected for observation in bold)

Company	Occupation/role
Chiltern	Driver
	Driver Instructor
	Senior Driver instructor
	Driver (recently trained)
Network Rail	Mobile Operations Manager
	Signaller
	Off-track
	Permanent Way (P-way) group
	Signal and Telegraph group

A diary-style template was used to document the structure of a typical shift, including start and finish times of shifts, time spent at various work locations, and the timing of breaks. This provided insight into the ‘typical shift’ for the main roles of interest. It also provided a rudimentary form of job analysis and allowed a strategic approach to be taken to the observations. The research tools guiding these interviews are included in the separate Appendix.

In total 12 interviews and 5 observations were undertaken. Research notes from the interviews were collated to identify common themes and to understand specific features of each role. Roles and participants of interest were selected for observation with consideration of the variety of locations and tasks covered by each. The observation ‘shortlist’ included a driver instructor and a maintenance team leader, so potential effects of different levels of seniority and responsibility could be understood.

1.3.2 Observations

The understanding of participants’ work activities gained from the interviews indicated that five locations for observational research should be considered.

Table 2 Locations selected for observation

Maintenance workers	Train drivers
<ul style="list-style-type: none"> • Depot and surrounds • Vehicle and access points • Track/trackside/site of maintenance work 	<ul style="list-style-type: none"> • Station and surrounds <ul style="list-style-type: none"> • where shift started • where breaks are taken • Driver’s cab

Because of Covid-19 restrictions, (specifically social distancing of rail staff and guidance preventing IES researchers from travelling), the observations took place remotely, taking a mobile ethnographic approach. This required railway staff to act as proxy researchers and record their own observations on template documents designed by IES.

An ethnographic research tool was developed to chart each employee’s working days, their habits, and time spent at various locations. This comprised detailed observation checklists which were developed for each type of work location. These elicited information about features of the surroundings, such as those that created opportunities to eat, hydrate, rest, and interact with colleagues. A different combination of checklists was needed for each job role—and a briefing document was provided to each participant in a bespoke pack. Photo prompts were included to provide a rich understanding of workplace features that potentially provided barriers or opportunities to health behaviours. These served to compensate somewhat for a lack of in-person researcher observation and reduced the amount of descriptive notetaking needed from participants.

The observation phase comprised three main steps:

1. After IES's shortlisting exercise, each prospective observation participant was contacted either directly or via the relevant gatekeeper to obtain their agreement to further data collection (different arrangements applied to each sponsoring company).
2. Following receipt of research documents (hard copies were sent via post), each participant completed their observation, either during one shift or over a series of shifts. Although the former was desirable (to simulate research observation as closely as possible), in practice the latter offered participants more flexibility and helped minimise work disruption. Photos were taken using personal devices (phones or tablets) and sent to IES electronically. In two locations depot workers provided photos to supplement those maintenance workers were able to take.
3. After reviewing completed observation templates and photos, IES researchers arranged and conducted a short follow-up interview. This was primarily to obtain contextual information about the photos. Probing questions were used. These were of the type used for in-person observations. For example, who used mess areas, content of posters if unclear, type of work carried out on or near track. Where applicable, they were also used to understand the impact of Covid social distancing rules on depicted environments.
4. The final stage involved compiling tables of each environment. These mapped out factors with a potential impact on health behaviours. These were classified as relevant to either:
 - the physical environment
 - attitudes and beliefs of team and roles or wider organisational culture
 - working patterns and job design.

Qualitative data from the initial interviews, observation data, and follow-up interviews were synthesised to form a narrative which is presented in the next chapter.

1.4 Rapid Evidence Assessment

Findings from the fieldwork showed a range of barriers in the various work environments. The aim of the Rapid Evidence Assessment (REA) was to identify behaviour change approaches associated with effective interventions to address those barriers.

In practice the timing of fieldwork meant that the Rapid Evidence Assessment was undertaken at the same time as observation data collection. However, findings emerged sufficiently early to inform the search approach and guide data extraction.

Following discussions with RSSB, the research team agreed on a pragmatic, three-pronged approach to selecting papers for review, weighted towards secondary sources:

academic review papers and study syntheses, supplemented by a more limited search of highly relevant primary sources. A detailed description of the process of searching, sifting and extracting data from identified papers is included in the Appendix.

The final set of papers accessed and fully reviewed comprised:

- secondary sources focussing on workplace health behaviour interventions (n=15, covering findings from 400+ studies)
- a limited number of primary sources documenting the most effective/applicable interventions identified from above review papers (n=5)
- grey or specialist sources (n=4, provided by RSSB and their contacts)¹.

The focus on secondary sources was designed to manage the various risks associated with the size of the evidence base—the risk of overlooking high-quality and highly relevant materials among many thousands of sources on behavioural occupational health interventions. Review papers also offer:

- fast access to collections of studies that have already been selected for quality and relevance
- rigorous comparison of similar interventions from different studies not feasible to undertake in the timeframe of a REA
- the possibility of capturing papers from a relatively larger timeframe and wider evidence base than would be feasible in a REA.

Section 4 of this report groups the findings of the evidence review by theme. It also draws out areas of consensus where these could be determined. Content was prioritised for inclusion in the report where fieldwork indicated high relevance to the rail working environment.

¹ A small number of papers in these categories are not referenced in the report due to drafting changes to achieve a concise narrative.

2 Conclusions and recommendations

2.1 Overview of barriers to positive health behaviours

Fieldwork for this study revealed several barriers to healthy behaviours from the perspective of participants. Environmental barriers mainly focus on access to healthy food, welfare facilities (at times impacting on decisions to hydrate) and opportunities to exercise safely. This section first provides a summary of barriers for each of the main job types included in the observation work because it is this aspect of the study that has yielded the most recommendations.

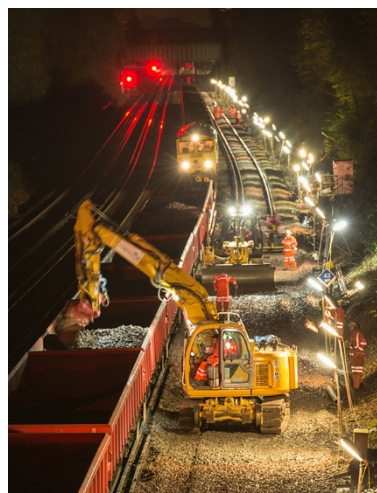
2.1.1 Maintenance workers

Participants involved in this study have largely adapted to circumstances and were motivated to take personal responsibility for their health. In general, those interviewed made proactive choices in response to barriers. For example, bringing a packed lunch to work (to eat cheaply and healthily). There was anecdotal evidence of some maintenance workers buying fast food or processed food with poor nutritional value. Cost was cited as a deterrent to doing this regularly where local options were not cheap.

The hazardous nature of the physical aspect of their work gave rise to mixed feelings about its contribution to supporting physical fitness. This is because avoiding injury (e.g. from manual handling or walking on uneven surfaces) is a priority. Some exercised outside work, but this appeared to be age-related, with older workers reporting that they gained most of their exercise from work.

There was limited direct evidence that social contacts or peers at work directly influence the behaviour of others. However, the reporting of smoking trackside in groups is concerning. Some pockets of resistance to Covid-19 social distancing measures were reported. These arise from scepticism about the virus and its effects, and result in discomfort among workers who felt more vulnerable.

Job design barriers focussed on the nature of shift work. This impacts on work life balance, self-reported alertness, and rest. The unpredictability of unscheduled work or the need to provide cover exacerbate this. Inevitably work at night disrupts eating as well as sleeping patterns and, for some, 'comfort eating' becomes appealing. Many aspects of maintenance workers' role are reactive. For example, taking breaks is often dictated by operational constraints.



Access to welfare facilities was a recurring topic. There were largely negative or neutral views on the adequacy of welfare vans for maintaining personal hygiene and meeting personal needs.

There was an example of positive health behaviours occurring because of temporary Covid measures. One maintenance worker assumed some track inspector responsibilities and consequently spent more time on foot. This was viewed as a positive change both in terms of increased fitness and improved job variety. Arguably this is an example of job enrichment (increasing the range and complexity of tasks a worker performs) serving to improve wellbeing.

2.1.2 Drivers

Barriers to staying fit are related to the intrinsic nature of the driver role. The need to be in the cab for the majority of each shift is a necessary safety priority.

Detailed descriptions of behaviours outside work were outside the remit of this study. However, most research participants compensated for lack of opportunity to exercise during work shifts by making a deliberate effort to exercise outside work. The nature of shift work or the need to provide cover at short notice can make it difficult to form regular habits. Reportedly disrupted working patterns because of the pandemic have exacerbated this.

As with maintenance workers, train drivers participating in this study generally reported making positive choices in response to barriers. They would bring a packed lunch to work to eat cheaply and healthily. Concerningly, they hydrate strategically. They know that potential to use facilities is limited, and that stopping for personal needs is ‘frowned upon’.

Shift work impacts on work life balance and sleeping patterns. It is regarded as an unavoidable aspect of the job. However, the relatively structured and predictable nature of the job allows drivers to make a routine that suits them. They can decide, for example, whether to walk during breaks, socialise in mess areas, or stay in the cab.



2.2 Recommendations

To show how the recommendations were reached, they are presented alongside the conclusions that support them and the type of evidence from which these were inferred. Our recommendations do not directly address the topic of fatigue (and any associated safety concerns). It is evident from communications with RSSB that a significant amount of work by its specialists has been undertaken to understand and address this area².

Furthermore, the rapid evidence reviewed did not yield findings in this area—there is no indication that these issues are suited to behavioural ‘nudge’ interventions. This helps maintain the focus on the work on issues that are directly in-scope and potential amenable to behavioural approaches.

These points should also be noted:

- It was outside the scope of this work to investigate the practical feasibility or cost of implementing each of the recommendations we have made.
- In formulating interventions, co-production with employees and/or their representatives is generally seen as good practice. This is evident from our communications with industry stakeholders and contacts within the industry, as well as in the research literature.
- Managerial commitment has also been identified as a success factor in achieving positive workplace changes (e.g. Daniels et al)³. This helps ensure that intentions to improve wellbeing are not undermined by other organisational priorities and vice versa.

2.2.1 Vending machine contents and pricing

There is firm evidence in the literature which backs improving the nutritional quality of food and beverages available in vending machines. There is also evidence that pricing can be used to incentivise more healthy purchases.

The research literature shows that priming can work as a strategy to influence health behaviours. For example, notices that prompt workers to think about health and fitness, or nutrition in point-of-sale environments can prompt healthier choices. Published evidence suggests that information about nutritional content (especially using ‘traffic light systems’) can be effective in changing behaviour.

² RSSB project T997 looks at road risk related to fatigue and suggests a risk management approach, including a range of risk controls/countermeasures based on the research literature. A range of other resources can be found here: <https://www.rssb.co.uk/en/what-we-do/key-industry-topics/fatigue-and-alertness>.

³ Daniels K, Gedikli C, Watson D, Semkina A and Vaughn O (2017) Job design employment practices and well-being: a systematic review of intervention studies. *Ergonomics* 1-20.

Recommendation: ensure that all staff vending machines offer healthy food and drink options and that pricing does not incentivise less nutritious options.

Recommendation: introduce signage and/or posters placed next to vending machines that promotes healthy options. Explain the benefits of healthy eating and effective hydration.

Recommendation: where vending machines are not present, consider installing them. Stock them exclusively with healthy products, especially where nutritious food is not sold locally.



2.2.2 Use of tobacco

The track side environment and culture may facilitate smoking. There are anecdotal reports that this is a social activity and prompts short breaks from work in groups. The scale of this could not be determined within the bounds of this study.

The literature reviewed in this study did not address this. A more focussed review of the quit smoking literature would be needed to make specific recommendations on behavioural approaches.

Recommendation: workers need to be offered support to give up or cut back on smoking, for example through the promotion of stopping smoking programmes.

Recommendation: leaders should be aware of trackside smoking culture and be able to signpost team members to suitable programmes.

Recommendation: if necessary, future research could be considered with the aim of reviewing specialised literature on behavioural approaches to stopping smoking. Issues such as social norms and environmental cues to smoke could be explored.

2.2.3 Use of notice boards

Observations showed staff noticeboards in various states of (dis)organisation. Since some workers are not able to check emails regularly this is an important form of communication. Given that people typically habituate to seeing the same messages, regular changes help ensure notices are seen.

Recommendation: attention should be given to the appearance and functionality of noticeboards, and where they could be improved. For example, spacing out messages, ensuring important information is not ‘buried’, removing out of date information.

Important messages were not always in the line of sight of all workers. There was an example of an impactful Macmillan display that was displayed in a more formal entrance area to a depot that workers did not use. Some boards gave safety more prominence than health. The presence of notices about social distancing was, possibly, a distorting factor on the relative emphasis of health issues in the visual environment.

Recommendation: important messages, such as potentially impactful campaigns about (prevention or early detection of) health conditions need to be within the line of sight of all workers, preferably in areas where they stop and/or sit routinely.

Flyers for fast food provide an environmental prompt that is not countered by alternative options or contextualised with information about nutritional content.

Recommendation: consider placing ‘nudging’ messages near areas where flyers for fast food are present. Prompt healthier choices by, for example, providing information about nutritional value of various types of fast food. If available, consider adding alternative flyers from different local outlets that provide healthier food.

2.2.4 Access to welfare facilities

The provision of welfare vans is welcomed by maintenance workers (they offer a safe place to heat food, rest and take breaks). But it is unclear how much value the mess areas and toilet facilities add in encouraging positive healthy behaviours. Static mess facilities where available, are always preferred.

Privacy and hygiene issues appear to be a deterrent to using the toilet facilities that welfare vans provide. This study was not designed to address these issues in detail. It is clearly a highly personal and sensitive topic that merits data gathering in a more anonymous context than the current method allowed. This issue has potential implications for diversifying the workforce, for example to include people with health conditions, or women.

A very important aspect of this issue is that workers have limited control over this. Healthy food and drink can be brought from home, and physical exercise can be done outside work. But they are reliant on decisions made by their employer about locations of and access to facilities.



Recommendation: research exploring the benefits of different options for welfare facilities is needed to help organisations ensure adequate provision in different contexts and for diverse staff groups. Options for welfare facilities should consider:

- participants' concerns about the adequacy of welfare van facilities for maintenance workers
- participants' preferences for static welfare facilities
- the use of apps, such as that provided in Network Rail Anglia, which show welfare locations
- the potential to 'plan in' access to welfare facilities when daily schedules are drawn up.

Any surveys or interviews undertaken should guarantee complete anonymity if exploring highly personal aspects of this topic.

Drivers described limiting their water intake, with the lack of opportunities to use the toilet in mind. For obvious business reasons there is pressure not to stop the train for personal needs or delay departure from scheduled stops. Health promotion initiatives that encourage hydration, such as provision of bottled water, appear to be at odds with toilet provision.

Recommendation: adaptations should be considered to policies and practices that deter stopping for personal needs.

Recommendation: guidance to train drivers about hydration needs to explicitly acknowledge the limitations of their work environment—and address how they should stay hydrated despite these.

2.2.5 Messaging and communication

Staff in both driver and maintenance roles do not always have regular access to emails or the time to read them. Therefore, information about health initiatives, events, or employee benefits is sometimes missed.

There was scepticism from a minority of staff about the health initiatives or health information campaigns. These can be dismissed as ‘lip service’ or gimmickry, particularly where it is felt they don't reflect aspects of their job or their work environment.

Online communication and apps only have use to those who can access them. A ‘Digital Divide’ possibly exists in the rail industry related to demographic factors such as age and job history. Ways of reaching people need to be imaginative and inclusive.

Recommendation: ensure health behaviour messaging delivered by email is replicated in other media such as posters, team briefings, or one on one meetings with supervisors.

Recommendation: to tackle any ‘lip service’ perception about employer initiatives to improve health, barriers to healthy behaviours should be acknowledged in the content and messaging, together with statements about practical steps the industry is taking to address them.

There are anecdotal reports of a minority of maintenance workers breaching Covid guidelines. This suggests there may be poor understanding of health and/or beliefs about invulnerability to health conditions among some younger workers. This highlights the possibility that other health issues are not taken seriously among a subset of workers. This creates challenges for those seeking to help them make more positive health choices.

Recommendation: consider information campaigns that encourage younger workers to think about their future health and adopt a realistic attitude towards health risks.

2.2.6 Sedentary behaviours

Research indicates interventions that emphasise the relationship between physical activity and health are particularly effective. For example, providing information about caloric expenditure and physical fitness or saving time. The most compelling evidence is associated with stair use. There is also evidence that provision of information about walking routes can encourage exercise during breaks.



In a rail environment these principles could potentially be applied to encourage drivers to take walks during breaks. Any intervention would need to factor in concerns about leaving station areas because of the time critical nature of driver work.

Recommendation: consider providing maps of walking routes in mess areas and explore the acceptability of this to drivers. These could feasibly contain information about timing and steps or calorie expenditure. Information about places to eat healthy appetising food and their location could be displayed.

Cycling to work is a potential option for some staff, however there was one report that the security of bike storage is not satisfactory. Photos suggest that cycle storage areas for staff vary considerably across the network in terms of their state of repair and degree of shelter provided.

Recommendation: ensure that cycle storage areas are secure and in a good state of repair.

2.2.7 Manager and supervisor behaviours

Participants acknowledged adverse impacts of shift work and/or unplanned work on health behaviours (eating habits, sleeping pattern, work-life balance). But these were viewed as unavoidable. Participants in both driver and maintenance roles were accustomed to organising their life around the needs of their role.

Some participants with management or supervisory responsibilities referred to the importance of line managers asking open ended questions about mental health. It is unclear whether managers are encouraged or expected to ask about wellbeing more

broadly. For example, prompting discussions about whether any aspects of their work are adversely impacting on health behaviours.

The health behaviours literature points to the importance of manager buy-in and role modelling regarding health behaviours. Managers involved in this study also highlighted this.

Recommendation: there should be an expectation on managers to ask workers open-ended questions about wellbeing. They should also make opportunities to discuss barriers to positive health behaviours. This could include the impact of their current work-life balance, and perhaps, for example, whether welfare facilities were available when they needed them. Also, whether they have had sufficient opportunity to take exercise, rest, sleep, hydrate and eat healthily. Soft skills in supporting the health and wellbeing of direct reports at work need to be developed among line managers.

Recommendation: individuals with supervisory or manager responsibility should be encouraged to recognise their role in showing buy-in of health initiatives and in role-modelling positive health behaviours where possible.

2.3 Future research

These areas are suggested for future research:

- Anonymous surveying could support further understanding of the impact of the rail environment on healthy behaviours, particularly sensitive and personal topics relating to personal needs and hygiene.
- Future work could consider employees in a wider range of roles and environments. An obvious target would be drivers working for freight operators, to explore the commonalities of their experiences with the drivers participating in the current study.
- Any implementation of the recommended actions above should involve piloting and evaluation, ideally involving a matched control group. Where interventions are introduced in combination, research designs should be adopted that allow the most effective elements to be determined. Mixed methods programme evaluation approaches could be adopted to address this.
- Covid-19 disruption caused some employee's roles to change, sometimes enriching their job and/or allowing them to take more exercise. Research to fully explore this among a wider group of workers could yield novel solutions that might be sustainable beyond the acute phase of the pandemic.
- A review of prior initiatives could reveal which 'one-off' campaigns or competitions have been more or less successful from the perspective of workers. This could help ensure that future initiatives are not viewed with scepticism and secure better engagement.

3 Findings from interviews and observations

This chapter provides a summary of the fieldwork data collected from rail workers. It starts with an overview of aspects of work that are supportive and not supportive of health behaviours. These mainly draw from the first round of interviews. A brief discussion of the impact of Covid-19 on job roles is also provided.

The latter part of this chapter reports in detail on factors that arise in specific locations as reported on the observation tool and/or accompanying photos and follow-up discussions.

3.1 Enablers and barriers common across health environments

Enablers and barriers are reported here in general terms, intended to represent themes that cut across job roles and specialisms. Knowledge of these helped inform the evidence assessment (reported on in Chapter 4) and allowed particular focus to be paid to areas requiring effective solutions.

3.1.1 Enablers

Communications from employers about health and wellbeing were reported on a range of themes. Health campaigns featured in routine briefings and meetings (although unsurprisingly information about Covid-19 had dominated recently). Among some participants there was a feeling that there were too many emails with health promotion messages to read and absorb. Nevertheless, there was broad consensus that employer messaging had benefitted knowledge about topics such as diet, exercise, sleep and, in particular, mental health.

Those who took regular exercise outside work were primarily motivated by the knowledge of the wellbeing benefits of doing so. Similarly, there was apparently good awareness of what a good diet looked like and the importance of hydration, particularly when working in the heat.

There was no evident demand for health surveillance or occupational health checks beyond services currently offered or sought. Those reporting the availability of on-site blood pressure checks or broader health checks had, in general, taken up that offer. Although some participants' awareness of company benefits could be vague, they were generally confident about where to find this information if needed.

There was no indication that work impeded making or attending health appointments. While shift patterns could cause inconvenience there was no evidence that they were prohibitive to this.

3.1.2 Barriers

More barriers to positive health behaviours were cited than enablers. In the interviews these fell under several themes and provided material to investigate further, in the observation and probe, in follow-up discussions.

3.1.2.1 Access to healthy food

'It's difficult to eat healthily' or similar was a frequent observation: this difficulty arose predominantly from the types of food sold at convenient locations, especially during late or night shifts. A solution for participants in this study was to bring food from home. This would normally be a prepared packed lunch and/or selection of snack items to eat during their shift.

Among packed lunch items (participants provided photos of these) salads, sandwiches and fruit predominated. In some cases, there were a limited number of calorie-rich snacks, such as sweet cereal bars or crisps. Another motivation for bringing a packed lunch, especially among maintenance workers, was the cost of buying food on an ad-hoc basis, at supermarkets or fast-food outlets, en route between jobs.

In general, participants reported avoiding junk food, although caffeinated fizzy drinks were popular to combat fatigue. Fast food was mentioned mostly in relation to colleagues' behaviour, usually in younger age groups. There was an apparent divide between those who take steps to maintain a healthy diet and others who prefer to eat whatever is convenient and tasty.

3.1.2.2 Access to welfare facilities

Access to toilets was a common theme across both occupational groups. This presents a particular difficulty for drivers, who are predominantly confined to their cabs. It also affects maintenance workers who often work remotely. It was clear from the fieldwork that this is an area that Network Rail is addressing with increased provision of welfare vans. Although this was welcomed by maintenance engineers, reports on the usefulness of the facilities they provide was mixed. Static welfare facilities at access points were preferred, and there was a desire for these to be provided more widely.



A related area of concern is keeping and feeling clean. Apart from it being a component of dignity, Covid-19 has heightened the importance of access to running water and soap in a hygienic environment.

A very important aspect of this issue is that workers have limited control over this. Unlike access to healthy food and drink (which can be brought from home) or physical exercise (which can be done outside work), they are reliant on decisions made by their employer about locations of and access to facilities. This emerged as arguably one of the most important issues in the study. That is because it was the only factor that was linked to a personal experience of becoming unwell (a driver's experience of gout that was attributed to a build-up of uric acid).

3.1.2.3 Highly sedentary vs highly physically demanding work

Drivers and maintenance workers arguably represent the two extremes of this range. The obvious issue for drivers is being in a seated position for much of the day. This is combined with the vital importance that they remain highly alert. So, maintaining energy levels is important, but over-eating is a risk.

Maintenance workers are generally active for large parts of the day and need to maintain their energy levels for the physically demanding aspects of their job. There were mixed views as to whether the physical aspect of work as a maintenance engineer leads to improved health. Risk of injury due to accidents, and wear and tear on joints were raised as concerns.

The environment is hazardous—there can be hidden hazards in the undergrowth. And walking along the track means navigating the shale surface. This can be uneven and uncomfortable to walk on. Often heavy machinery is being carried, which adds to the physical rigours of the job and risk of injury.



Because of dangers from slips and trips and other safety risks, the relationship between work and fitness is not straightforward. Speaking generally, younger participants felt the physical aspect of the work did not keep them satisfactorily fit. On the other hand, the priority of older workers tended to be staying free of injury and/or not aggravating existing orthopaedic conditions.

Significantly, fear of being injured was mentioned. Once in the context of working but also in the context of playing contact sports outside work. Here it was felt that the risk of getting injured and not being able to work was a consideration.

3.1.2.4 Shift work and other elements of job design

Some participants cited shift work as a negative influence on their health and wellbeing. This was predominantly in relation to fatigue, but it was viewed as ‘the nature of the beast’ when working in the rail industry. It was viewed as an inconvenient but necessary part of the role. Impacts on work-life balance were acknowledged and seen as unavoidable. Participants in both driver and maintenance roles were accustomed to organising their life around the requirements of their role. This could mean skipping participation in sport at particular phases in their roster (particularly social or team sports) or having less time to spend with family members, or to help with childcare.

Attitudes of drivers towards the pressures of shift work were more positive than those of maintenance workers. But this is to be expected as a significant amount of track maintenance takes place at night. Working on a shift from Saturday evening into the early hours of Sunday morning is routine for P-way workers, as many of their tasks require possession of track sections⁴. A lot of maintenance work is physically demanding and the effects of this are compounded by the pressures of working difficult shifts. Fatigue at the end of shifts can be an issue when having to drive home. There are obvious commercial imperatives for completing maintenance as quickly as possible and this puts pressure on the pace of working and opportunities for breaks.

3.1.3 Impact of Covid-19

Participants reported that the impact of Covid on the driver role has been relatively low on the way the job is done, but it has impacted on timetables. There was a period during the height of lockdown when workload was lower than usual. However, service has resumed to reach near-normal levels recently. As with all rail environments social distancing has been in place in break areas. Prominent signage has been a feature, with reminders about hand washing present in toilets and changing areas. In the case of drivers, regular Covid testing is seen as heightening awareness of health issues. For those who are older and/or concerned about their weight, this serves as a regular reminder of the increased risk they might face if infected with the virus.

⁴ When a section of track is required for maintenance and trains cannot run, it is handed over by the operators to the engineers, who take possession. Special protective measures are used to prevent access by unauthorised trains.

The day-to-day impact has been greater for maintenance workers as they have to travel in numbers that will allow them to maintain small 'work bubbles' in vans (maximum two to a van). This means splitting up teams who would normally travel together, which affects social interaction between sites. It can also make parking problematic, as access areas are designed for fewer vehicles. Where teams work together outdoors, they have been asked to wear masks and observe social distancing.

In general participants felt the precautions that had been taken were adequate. However, one participant described a stubborn minority of 'non-believers' who did not adhere to social distancing safety notices or wear masks. It was felt that many P-way tasks were difficult to do at a distance, so it was concerning for those potentially more vulnerable to the virus when co-workers did not cooperate with guidelines. Escalation of these issues to management had achieved some but not complete success.

3.2 Influencing factors unique to specific environments

This section sums up findings about the rail environments relevant to the worker groups that were studied. It draws mainly from the observations and accompanying follow-up activity, but also includes information from the initial interviews where relevant.

The tables in this section show factors that may impact on health behaviours, generally reported in the observation process or apparent in photos. Some have also been inferred from the interview and observation data rather than reported directly from them. They show areas where there may be potential to make changes: they are not intended to be recommendations.

3.2.1 Depots

Maintenance workers and many drivers start their shifts at depots, which offer mess rooms and welfare facilities. Teams typically spend 15-30 minutes there on arrival. They attend meetings, briefings, and toolbox talks. And they will familiarise themselves with their schedule before departing to sites. These occasions offer a potential setting for health and wellbeing related issues to be addressed. Participants reported that health promotion initiatives or campaigns already feature in these.

All reported environments had a staff kitchen equipped with a fridge, microwave, a hob, and cooking and eating utensils. A potential barrier to use for one participant was the lack of cleanliness of the kitchen. (It is reportedly the responsibility of staff to keep this area orderly between daily professional cleans). Time pressures mean that staff do not typically spend long there, although the microwave is sometimes used to heat food. Tea and coffee are reportedly provided



by the employer. Staff take it in turns to buy milk. Participants reported having access to water coolers in kitchens and free bottles of water.

A vending machine was present in some locations, stocked with high sugar and high fat snacks. Staff reported avoiding using them where possible. There was no visible information in the area around them about healthy eating—information that might influence purchasing decisions.

Other areas accessible to staff include seating areas and toilet facilities. Social distancing rules were evident with some seats or areas marked off. There were varied reports of adherence to social distancing.

Poster areas are frequently cluttered and scattered, with health-related content sometimes being obscured by safety posters. Information about Covid-19 and the need to draw attention to social distancing and mask-wearing rules has added to this cluttering. Some appear to be in areas that workers pass through, often with limited time to spend.

In one depot, an impactful Macmillan campaign display about early signs of cancer was placed in an entrance area normally used by managers or visitors; this was not replicated at the entrance maintenance workers normally use. Most staff were therefore unlikely to encounter the poster or spend time reading the information.

Of concern, there was anecdotal report of maintenance workers ending nightshifts being close to ‘falling asleep at the wheel’. It is unclear how widespread this experience is, however RSSB and the industry Fatigue Coordination Group are working on a ‘Fatigue Friendly Rosters’ project. Other industry work to tackle fatigue can be accessed online⁵.

Cycling to work is a potential option for some staff, however there was one report that the security of bike storage is not satisfactory and that this presented a disincentive to do so.

Table 3 identifies various aspects of the depot environment which may impact on health behaviours and/or where there may be potential to make changes.

⁵ A range of resources can be found here: <https://www.rssb.co.uk/en/what-we-do/key-industry-topics/fatigue-and-alertness>.

Table 3 Depots: factors potentially impacting on health behaviours

Physical environment	<ul style="list-style-type: none"> • Protocols and responsibilities for cleanliness of kitchen area. • Availability and pricing of vending machine food and drinks. • Availability of prompts and signage around vending machine about importance of a healthy diet. • Visibility of nutrition information about items in the vending machine. • Availability of information about nutritious food, and relevant special deals at shops and food outlets in the immediate local area (as a counter to flyers about fast food). • Appearance of noticeboards—are they uncluttered, up to date? To what extent is health and wellbeing information given appropriate prominence? • Availability and acceptability of areas to rest or take naps. • State of repair, security, and shelter provided by cycle storage facilities. • Availability of information that directly addresses commuting home when overly fatigued (with appropriate actions, such as reporting procedure, taxi number⁶).
Attitudes and beliefs of team and roles, wider organisational culture	<ul style="list-style-type: none"> • Briefings and toolbox talks at depots on health topics. • Content of manager or supervisor one-on-one discussions about barriers to healthy behaviours as they arise (such as work/life balance issues presented by rostering and cover). • Promotion (via multiple channels) of campaigns, events, competitions, and employee benefits. • Consistency of messaging across communication channels about health and fatigue (in-person vs email vs posters) • State of repair, security, and shelter provided by cycle storage facilities.
Working patterns and job design in job roles	<ul style="list-style-type: none"> • Consideration of healthy behaviours when planning daily schedules. (Such as vehicle stops at convenient locations to purchase food and use welfare facilities, or to need more or less walking.) Policies to address driving home when excessively fatigued. ⁷

⁶ Please see footnote 2 referencing RSSB's work in this area.

⁷ Please see footnote 2 referencing RSSB's work in this area.

3.2.2 Road vehicles, road journeys and access areas

Maintenance workers are reliant on road transport to reach work sites remote from depots and stations. There is scope to stop and buy food and drink and use toilets on journeys to sites. But these are dependent on work schedules and route between sites. In Network Rail there are designated locations where staff have access to toilets and washing facilities (either Network Rail sites or public facilities such as supermarkets). This is felt to work well but does not offer a solution when working at remote locations. Network Rail East Anglia has access to an app which provides details on these and can be accessed wherever there is a phone signal.

Workers are currently travelling alone or in pairs because of social distancing rules. Network Rail has acquired more vehicles to accommodate this. These are often ordinary transit vans but there is increasing use of welfare vans, which have mess and toilet facilities. When parked they are a safe comfortable place to sit during breaks. Passenger seats of vans are used to eat food brought to work or purchased en route.



Welfare vans are equipped with basic kitchen facilities: a supply of cold and hot water, areas to store food, a fridge, a microwave, and some utensils. At present, because of social distancing rules, seats around tables can only be used by two people. Typically these facilities are used to heat food and soup and make hot drinks. More involved food preparation rarely happens in the van because workers prefer to bring packed lunches. Plates or utensils are rarely needed.

Welfare vans were generally seen as supporting healthy behaviours. But it was felt that they did not offer sufficient hygiene in the context of Covid. Handwashing could not be done properly, as some workers do not leave the basin area in a hygienic state. Toilets in welfare vans are only used as a last resort because of a reported lack of privacy. Because this study did not involve direct researcher observation it is difficult to

objectively comment on this issue and how it impacts on individual welfare. The observation of a box of antidiarrheals inside a van (via photo) is a stark indication of the issues faced by workers who experience gastrointestinal symptoms at work.

Table 4 identifies various aspects of these environments which may impact on health behaviours and/or where there may be potential to make changes.

Table 4 Road vehicles, road journeys, and access areas: factors with a potential impact on health behaviours

Physical environment	Adequacy of welfare vans for privacy and hygiene. Availability of fixed mess areas and toilets at access areas.
Attitudes and beliefs of team and roles, wider organisational culture	Degree to which management seek views on acceptability of welfare vans and take action on this. Extent of role-modelling of team leaders and supervisors to set an example to others. Such as healthy eating and hydration.
Working patterns and job design in job roles	Extent to which access to welfare is planned into journeys to, from, and between sites.

3.2.3 Maintenance work sites (side of track)

Maintenance work takes place at sites remote from station and depots, and often some distance from where vans can be parked. Some work locations are close to roads and/or towns, for example level crossings. There can be a lot of walking, and while this provides exercise, it can be uncomfortable. Walking on ballast is a potential trip hazard—this is an everyday reality for P-way workers. Fear of injury was repeatedly mentioned. Frequently heavy equipment is carried, making walking more difficult.



Some maintenance tasks are more hazardous than others. Depending on the nature of the tasks, the high-risk nature of the work can be at the top of people's minds—alongside the need to follow safety procedures. This takes precedence over any health

consequences of the work. Only one worker mentioned that some repetitive manual tasks could provide 'a workout'. He made a conscious effort to alternate arms to build muscle strength in both limbs.

Workers take breaks when it is safe for them to do so or when environmental conditions prevent work. Because this is an open-air environment smoking during breaks is tolerated and reportedly a communal activity for some. It is not clear whether smokers take additional breaks to smoke, but it could be argued that this environment supports or encourages smoking. There may be scope to introduce initiatives that address the social aspect of smoking or build group cohesion around giving up smoking.

Table 5 identifies various aspects of the track side environment which may impact on health behaviours and/or where there may be potential to make changes.

Table 5 Maintenance work sites: factors with potential impact on health behaviours

Physical environment	Proximity of work site to welfare facilities
Attitudes and beliefs of team and roles Wider organisational culture	Extent of role-modelling of team leaders and supervisors to set an example to others during breaks. Such as healthy eating and hydration. Attitudes to smoking and smoking as a social activity.
Working patterns and job design in job roles	Flexibility in schedule to take account of availability and proximity of welfare facilities, and personal needs. Matching of workers to tasks considering physical demands of task and fitness of worker. Environment where staff are allowed to smoke and smoking in groups.

3.2.4 Driver's cab

The driver's cab is by necessity a functional environment with minimal distractions from driving. Drivers spend the majority of their shift here so it needs to be comfortable and as supportive to wellbeing as possible.

There was high awareness of posture while driving, and stretching exercises that can be helpful during breaks. It is not clear whether there is scope for visual prompts to encourage drivers to do this.

A barrier to positive health behaviours was felt to be the lack of access to a toilet between break locations. This served as a deterrent to proper hydration: more than one participant reported limiting water intake with this in mind. Lack of opportunity to urinate was highlighted by one driver as a risk factor for an underlying condition he suffers from.

It is possible, if urgent, to stop the train for personal needs, but this is said to be ‘frowned upon’. And there are obvious punctuality implications for unscheduled stops.

Isolation is a natural part of the job and largely seen as a positive. The autonomy is an important factor, as cultural factors do not have the same impact as when working in a team.

Table 6 identifies various aspects of the cab environment which may impact on health behaviours and/or where there may be potential to make changes.

Table 6 Driver’s cab: factors potentially impacting on health behaviours

Physical environment	Visual prompts to encourage regular stretching. Visual prompts to drivers of the importance of hydration. Proximity of toilet facilities.
Organisational culture Attitudes and beliefs of team and roles	Behaviours role-modelled by driver instructors or others when in the cab. Business attitudes towards meeting personal needs and urgent access to toilets. Knowledge and attitudes towards the risks of not emptying bladder regularly.
Working patterns and job design in job roles	Policies on stopping or delaying train departure or personal needs. Extent to which scheduling allows time for personal needs.

3.2.5 Stations

The maintenance staff involved in the study did not report routine visits to stations during the normal course of their day. They are however used by drivers. Only larger stations have staff facilities. These provide an opportunity to access welfare facilities and socialise with other drivers in an otherwise solitary role. There is wide variation in the station facilities. Longer breaks tend to be scheduled at stations with more facilities. It is reportedly ‘easy to eat badly’ due to a preponderance of processed food at stations. A vending machine was present in some locations, stocked with high-sugar and high-fat snacks. Drivers did not report making use of them. Flyers for fast food were seen in some staff areas.



Staff may stay in their cabs during some breaks. This can include personal preference, and this autonomy is felt to be important. But it can mean drivers miss out on opportunities to socialise and exercise. One driver reported taking advantage of near-empty platforms during lockdown to walk up and down during breaks. Other drivers reported going on occasional walks but felt that venturing too far from the station was risky given the time critical nature of their role.

Areas for staff serve the purpose of providing a place to socialise and to rest. They were highly valued for these reasons. Drivers said facilities for sleeping were feasible in some locations (secluded areas with a curtain to shield light were documented in the observations). But they did not report using these to nap or seeing colleagues use these facilities to sleep. But they appreciated their provision.

Photos showed disparity in the appearance of mess areas in different stations. One driver felt the food preparation areas were not kept satisfactorily clean. In one large station there was a notable difference in the appearance of notice boards maintained by different companies, with one appearing to have more comprehensive well-being information than another.

Wider socialising is only possible on very infrequent occasions. It was reported that there is a culture of not drinking much alcohol so an evening out with a free day ahead can present a rare opportunity to do this.

Table 7 identifies various aspects of the station environment which may impact on health behaviours and/or where there may be potential to make changes.

Table 7 Stations: factors potentially impacting on health behaviours

Physical environment	<p>Protocols and responsibilities for cleanliness of kitchen area.</p> <p>Availability and pricing of vending machine food and drinks.</p> <p>Prompts and signage around vending machines.</p> <p>Visibility of nutrition information about vending machine items.</p> <p>Availability of information about nutritious food and relevant special deals at shops and food outlets in immediate local area (as a counter to flyers about fast food).</p> <p>Appearance of notice boards: are they are uncluttered and up to date? Is health and wellbeing information given appropriate prominence?</p> <p>Availability and acceptability of areas to rest and take naps.</p> <p>Availability of suitable and safe routes to take walks during breaks.</p>
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Attitudes and beliefs of team and roles, wider organisational culture	<p>Knowledge of suitable and safe walking routes local to stations where breaks are taken.</p> <p>Perceptions of walking as normal (a social norm) during breaks.</p> <p>Availability of information about napping⁸ (and knowledge of where it is feasible to do so) in the event of mild fatigue.</p>
Working patterns and job design in job roles	Flexibility in scheduling for personal needs and exercise.

3.2.6 Signal box

No observation was undertaken within a signal box environment, but an interview was conducted with a member of signalling staff. The job is largely sedentary. Although based in one place the job shared many commonalities with a driver role. In particular, the importance of alertness throughout each shift. Breaks are usually spent walking to the local town. Food and drink choices are limited to local supermarkets and fast-food outlets. There is access to a staff vending machine which sells chocolate, crisps and other high-calorie snacks. Shift work is a standard part of the role and night shifts can reportedly lead to comfort eating, for example choosing to snack on unhealthy food from vending machines.



3.3 General comments

The roles of drivers and maintenance workers differ considerably in relation to the predictability and level of autonomy offered by their role. There are clearly diverse experiences across and within the professional groups included in this study. The summary above is not intended to be an exhaustive list of factors. This is particularly so as some individuals voiced their own very personal concerns, sometimes linked to underlying conditions with symptoms that they manage day to day.

The next chapter discusses the findings of the evidence review and its relevance to the observation findings.

⁸ There is support on preventative napping in RSSB's overarching fatigue guidance RS504.

4 Findings from the rapid evidence review

4.1 Characteristics of the literature

4.1.1 Quality of primary studies

As is customary in reviews, all authors had applied quality and relevance criteria in their selection of studies. Having met those criteria, included studies received further scrutiny as to their quality and rigour of approach.

Several reviewers are critical of work in this field. For example, in a systematic review of workplace interventions promoting healthy eating Maes et al (2011) report that out of 13 studies, 10 were rated as having ‘weak’ and three as having ‘moderate’ methodological quality, ‘providing inconclusive evidence for effects’. Reviewing literature on workplace dietary interventions aiming to increase fruit and vegetable intake, Geaney et al (2013) note the ‘limited quality’ of existing research, remarking that none of the studies they reviewed were designed ‘in accordance with established guidelines for developing, evaluating and implementing complex interventions’. In a review of interventions to increase physical activity at work Malik et al (2014) highlight the prevalence of selection and response bias and more general methodological limitations across studies. In their review of workplace dietary interventions Allan et al (2017) highlight similar concerns.

- **Study design:** Malik et al observe that many studies within the 22 they reviewed had a high or unknown risk of bias. Descriptions were often insufficiently detailed to code risk of bias due to factors such as selection or attrition (of participants) or detection (of effects).
- **Multistrand interventions:** it is difficult to isolate reported effects to a single intervention when they are a part of a programme with multiple components. This makes it difficult to determine whether (for example) food labelling coupled with a health promotion campaign is more powerful than labelling alone.
- **Primary sources frequently lack detailed information:** as argued by Allan et al, this is important as it ‘helps practitioners learn about effective interventions and replicate them’. For example, in one study where labels were used to denote healthier food, information on how the labelling was implemented and information given on the labels was not specified (Engbers et al, 2006).
- **Cause effect relationships can be unclear:** to illustrate this the Allan et al cited a study which showed small yet significant improvements in weight and BMI (Goetzel et al, 2010)⁹. However, no effects were observed on food intake. They

⁹ Goetzel RZ, Roemer EC, Pei X, Short ME, Tabrizi MJ, Wilson MG, et al. Second-year results of an obesity prevention program at the Dow Chemical Company. J Occup Environ Med 2010; 52: 291-302 (cited in Allan et al, 2017).

raise the question of ‘whether this was through another pathway (e.g. physical activity), mere chance, or the result of bias.’

- **Effect sizes not calculated or small:** there is criticism that differences made by interventions are not subject to sufficient scrutiny. Calculation of effect size (a statistic which indicates the practical significance of a research outcome) can be helpful when deciding whether potentially costly interventions are worthwhile.
- **‘Dose-response’ associations are not determinable:** studies tend not to be designed to show whether more invasive or more resource-intensive interventions produce larger effects relative to ‘lighter-touch’ interventions.

The latter point about the difficulty of evaluating multistrand interventions is pervasive. In their review of lifestyle interventions for shift workers, Demou et al (2018) comment *‘while the range of targeted behaviours and other reported outcomes, workplaces covered and intervention components included in this review is a strength, at the same time the heterogeneity of the included studies and intervention components do not allow for a meta-analysis, or assessment of the effectiveness of specific intervention components on our target behaviours’*. This argument has potential implications for future research RSSB may want to conduct and this issue is in our recommendations.

Generally, testing behavioural interventions in controlled environments enables better quality studies to be undertaken. In a review of choice architecture interventions,¹⁰ Landais, Damman, Schoonmade et al (2020) report that most of the studies they reviewed (70 out of 86) were of ‘high methodologic quality’. It is somewhat inevitable that research carried out in a more applied context is more open to methodological criticism and it is important to bear this in mind when appraising the literature in this area.

4.1.2 Level of certainty and clarity of reviewers’ conclusions

Reviewer verdicts on study quality and/or small effect sizes have prevented some reviews from drawing firm conclusions. It is common to find very general or tentative statements which are not sufficiently specific to act upon.

For example, in their summing up, Geaney et al (2013) conclude that only ‘limited evidence supports interventions aiming to increase fruit and vegetable intake’. Another tentative conclusion is reached by Engbers et al (2006) who reviewed worksite health promotion programmes with environmental changes. While more than half of interventions they reviewed produced significant effects on behaviour they merely conclude that the evidence is ‘promising’. They note that effect sizes could often not be calculated, and where they could (usually for studies with significant effects) effects ranged only from small to medium.

¹⁰ Choice architecture refers to the practice of influencing choice by organizing the context in which people make decisions, such as making a change to the visual layout of the environment.

Malik et al (2014) conclude ‘while the studies included in this review show some evidence that workplace physical activity interventions can be efficacious, overall the results are inconclusive’. Along with many other authors they cite a need for better designed studies.

In a ‘systematic review of systematic reviews’ on dietary workplace interventions, Schliemann and Woodside (2019) found a lack of consistency in findings of what interventions are most effective. A conservative conclusion is made, in this case that ‘workplace dietary interventions can positively influence diet and health outcomes’ but ‘there is a lack of consistency in findings of what interventions are most effective’.

4.1.3 Breadth of focus

There is poor coverage of job design interventions to improve health behaviours even though relevant terms were included in the search. Typically, job design is accepted as a ‘given’. For example, Chapman and Naweed (2015) conclude that ‘while issues such as fatigue and work pressure are clear contributors to obesity risk, they are also baseline properties of work in all transport sectors and that ‘beyond radical changes in job design, these issues are likely to remain a staple of the transport environment’.

Previously IES has conducted reviews on health and wellbeing and job design (IES, 2021)¹¹ and found little academic literature explicitly linking the two. It is possible its impact on health is seen as too tied in with specific roles or work activities for academic investigation.

4.2 Summary of relevant findings

While the above important caveats must be considered when looking at the evidence there are some useful messages that emerge. In particular some of the primary studies cited have relevance to the barriers highlighted in the fieldwork, especially those that describe the effects of environmental or social ‘nudges’.

The approach this summary takes is principally to draw out the main conclusions from each review, supplemented with examples of primary studies where these illustrate particular points. The most relevant of those primary studies were accessed and reviewed, along with the other sources described in the method section.

4.3 Studies conducted in a transport setting

Chapman and Naweed (2015) reviewed evidence on initiatives to prevent or manage obesity in the surface transport industry and examined existing interventions to determine barriers or facilitators to outcomes.

The review focused on individual, environmental and organisational level interventions comparing approaches that reported successful outcomes to those that were less

¹¹ Unpublished IES report focussed on job design for a UK government department (2021).

successful. Successful interventions tended to take multi-level approaches, mixing individual and environmental interventions. For example, a successful wellness programme for US bus employees consisted of education, personalised health feedback and consultations with health coaches, in addition to environmental changes such as a 24-hour gym and improved access to healthy food (Davis et al. 2009)¹².

Significantly, among the 32 studies reviewed by Chapman and Naweed only one was conducted in a rail industry setting (MacGregor, 2009) which evaluated a multi-level program which increased the number of overweight drivers taking exercise. The intervention combined several approaches, including altered vending machines, provision of education materials, gym membership and increased occupational health provision (better access to occupational health nurses and health surveillance).

However, there were several limitations to its approach. Physical activity levels were measured by self-report, and there was no comparison group in their research design. Furthermore, the sample comprised only 33 drivers and no steps were taken to isolate the influential aspects of the intervention.

Taking a broad view of the literature, Chapman and Naweed conclude that programs that did not report significant positive outcomes tended to adopt a primarily individual-level approach, focusing on tailored and targeted health messages, educational materials, and counselling approaches only (e.g. Hwang et al. 2012¹³; Sorensen et al. 2010¹⁴). Health interventions that did demonstrate measurable successes included incentivising (e.g. tokens, lotteries, prizes), peer mentoring, development of personalised feedback and health profiles, and the offer of healthier on-site food choices. However, as with the rail study described above, among the many interventions which employed some combination of these approaches it is not possible to determine the effective elements.

A key point raised by these authors is that these factors are mutually dependent: individual-level strategies cannot be sustainably implemented while environmental and organisational barriers still exist. High-quality dietary and fitness advice, whether personalised or generalised to groups has limited impact if the means to take action are

¹² Davis, L, Loyo, K, Glowka, A, Schwertfeger, R, Danielson, L, Brea, C, Easton, A and Griffin-Blake, S 2009. A comprehensive worksite wellness program in Austin, Texas: partnership between steps to a healthier Austin and Capital Metropolitan Transportation Authority. *Preventing Chronic Disease*, 6(2): 60; (cited in Chapman and Naweed, 2015).

¹³ Hwang, GS, Choi, JW, Choi, SH, Lee, SG, Kim, KH, Cho, YM and Yoon, C 2012. Effects of a tailored health promotion program to reduce cardiovascular disease risk factors among middle-aged and advanced-age bus drivers. *Asia-Pacific Journal of Public Health*, 24(1): 117-127; (cited in Chapman and Naweed, 2015)

¹⁴ Sorensen, G, Stoddard, A, Quintiliani, L, Ebbeling, C, Nagler, E, Yang, M, Pereira, L and Wallace, L (2010) Tobacco use cessation and weight management among motor freight workers: Results of the gear up for health study. *Cancer Causes & Control*, 21(12): 2113-2122; (cited in Chapman and Naweed, 2015)

unavailable. This underlines the importance of the current study and its emphasis on organisational barriers.

The arguments made in the paper suggest that environmental interventions could be effective on their own, but only one example of this is provided. One programme that was solely focussed on vending machines, comprised improving availability (by 50 per cent) and affordability (price decrease by at least 10 per cent) of healthy food and beverages (French et al. 2010). Objective analysis of sales showed greater sales of these items over an 18-month period.

A further study, targeting physical activity in truck drivers, was cited in a review which focussed on shift working (Sendal et al 2016)¹⁵. The authors reported a reduction in the number of truck drivers sitting for more than nine hours each day at work (self-reported) after implementing different interventions or combinations of interventions, including displaying healthy eating posters, supplying free fruit, promoting online resources, group educational sessions or a step challenge. As is the case for many other studies involving multi-component interventions, the most influential element could not be determined.

Wong et al (2014)¹⁶ looked at uptake of workplace supported initiatives such as walking clubs and corporate gym membership. They highlight that these are used by some, but not perceived to be accessible for all due to health issues (e.g. injuries) and time (shift work and irregular driving routines). This chimes with findings from the fieldwork in this study, but further exploration would be needed to assess demand and acceptability of interventions like this in a rail context.

4.4 Interventions by health area

Reviewed papers taking a cross-sector approach or looking at multiple types of environment tend to focus on one area of health. The remainder of findings reported in this chapter are grouped accordingly.

4.4.1 Diet and nutrition

Bauer and Reisch (2019) assessed reviews of behavioural insights-based interventions and the scientific evidence regarding their efficacy in nudging people towards healthier food choices. Their summary is extensive and covers 39 systematic literature reviews and meta-analyses published between 2010 and 2017.

¹⁵ Sendall M.C., Crane P.R., McCosker L., Biggs H.C., Fleming M.L., Rowland B.D. (2016) Workplace interventions to improve truck drivers' health knowledge, behaviours and self-reported outcomes. *Road Transp Res*;25(1):31–43. Cited in Demou et al, 2018.

¹⁶ Wong, J.Y.L., Gilson, N.D., Bush, R.A. and Brown, W.J. (2014) Patterns and perceptions of physical activity and sedentary time in male transport drivers working in regional Australia. *Australian and New Zealand Journal of Public Health*, 38(4): 314-320. Cited in Chapman and Naweed, 2015.

They cite a Cochrane review on the effect of environmental conditions on food choice and consumption (Hollands et al, 2015)¹⁷. This centres on a meta-analysis suggesting that reduced exposure to larger-sized food portions, packages, and tableware could reduce average daily energy consumed by between 144 and 228 kcal per day among the general population. This body of work draws from many environments (ie a range of laboratory and field settings) not just workplaces but these findings are arguably relevant to point of sale or food preparation environments in the rail industry, (wherever these factors are controllable).

Bauer and Reisch (ibid) also cite a review of interventions aimed to increase healthy choices at vending machines (Grech and Allman-Farinelli 2015)¹⁸. Resonant with our fieldwork observations the authors observe that vending machines typically offer ‘energy-dense, nutrient-poor foods and beverages’ and may contribute to ‘overconsumption and subsequent risk of obesity’. But in their analysis of relevant studies they conclude: ‘results of point-of-purchase nutrition information interventions were mixed and, when measured, changes to purchases were small’. But the review offers some evidence that pricing and availability strategies are effective at improving the nutritional quality foods and beverages purchased from vending machines. This provides an evidence base to support making more nutritious options available in vending machine depots and stations and where possible pricing these competitively to incentivise purchase.

Bauer et al also cite Cecchini and Warin (2016)¹⁹, who conducted a meta-analysis of nine RCTs. These examined the impact of different food labels on choice and caloric intake in range of point of purchase environments. They concluded that data on calories reduction were insufficient to bring about change. They deduced that food labelling increased the amount of people selecting a healthier food product by about 18 per cent but no statistically significant effect on calorie intake. Traffic light schemes are reported as marginally more effective in increasing the selection of healthier options. None of the studies they reviewed achieved large changes, but their overarching conclusion is that ‘traffic-light’ labels are more effective than calories and Guideline Daily Allowance (GDA) information.

Significantly they highlight that the effects of this type of priming is sometimes limited to certain subpopulations. For instance, people on a diet are more likely to react to

¹⁷ Hollands, G. J., Shemilt, I., Marteau, T. M., Jebb, S. A., Lewis, H. B., Wie, Y., et al. (2015). Portion, package or tableware size for changing selection and consumption of food, alcohol and tobacco. *Cochrane Database of Systematic Reviews*, 2017(3), 2015–2018. Cited in Bauer et al, 2019.

¹⁸ Grech, A., & Allman-Farinelli, M. (2015). A systematic literature review of nutrition interventions in vending machines that encourage consumers to make healthier choices. *Obesity Reviews* 16(12): 1030–1041. Cited in Bauer and Reisch, 2019.

¹⁹ Cecchini, M., & Warin, L. (2016). Impact of food labelling systems on food choices and eating behaviours: A systematic review and meta-analysis of randomized studies. *Obesity Reviews*, 17(3), 201–210. Cited in Bauer and Reisch, 2019.

health primes than people without the intention to eat more healthily (Buckland et al. 2013²⁰; Coelho et al. 2009²¹; Forwood et al. 2015²²). This is in line with the assumption that priming works through activating long-term goals, such as to eat more healthily. This is a relevant consideration in the rail industry, an apparently diverse working population with diverse age and health status as well as lifestyle goals, ie motivation needs to be present for behavioural change to occur.

In their summing up Bauer et al describes literature on nudging as ‘promising’, with overall tendency towards participants making healthier choices, particularly where there is explicit provision of nutrition information.

But they urge caution in a general sense about extrapolating findings on behavioural insights to applied settings. They-emphasise that many studies supporting ‘nudge’ principles were conducted in controlled laboratory environments and provide little external validity for real-life scenarios.

Another very recent review in this area, focusing on workplaces, was conducted by Al-Khudairy et al, (2019) commissioned by the behavioural insights team at Public Health England to synthesise the evidence on choice architecture interventions to increase healthy purchasing and/or consumption of food and drink by National Health Service (NHS) staff. Interventions involving a proximity element (making behavioural options easier or harder to engage with) appear to be frequently effective at changing behaviour. Labelling alone was generally not effective at changing purchasing behaviour. Interventions including an availability element were generally reported to be successful at changing behaviour, but no included study examined this element alone. There was no strong evidence for the effect of pricing on purchasing or dietary intake.

In a ‘review of reviews’ Schliemann and Woodside (2019) reported on findings of systematic reviews that report dietary intervention components and their effects on diet and health. They draw the broad conclusion that multi-level interventions (those with numerous and different intervention components) are most effective. Among components that should be included they cite environmental changes such as improving food choices in canteens and vending machines and labelling healthy options. Exemplifying characteristics that these authors identify as effective is a large, multicomponent RCT which was conducted in the USA across 24 work sites (Sorensen et al, 1999). The intervention comprised education, food tastings, and family training. ‘Environmental’ aspects included increased offerings of fruits and vegetables in vending

²⁰ Buckland, N. J., Finlayson, G., & Hetherington, M. M. (2013). Pre-exposure to diet-congruent food reduces energy intake in restrained dieting women. *Eating Behaviors*, 14(3), 249–254. Cited in Bauer et al, 2019.

²¹ Coelho, J. S., Polivy, J., Herman, C. P., & Pliner, P. (2009). Wake up and smell the cookies. Effects of olfactory food-cue exposure in restrained and unrestrained eaters. *Appetite*, 52(2), 517–520. Cited in Bauer et al, 2019.

²² Forwood, S. E., Ahern, A. L., Hollands, G. J., Ng, Y. L., & Marteau, T. M. (2015). Priming healthy eating: You can’t prime all the people all of the time. *Appetite*, 89, 93–102. Cited in Bauer et al, 2019.

machines, at 'special-occasion' meals and snacks, and in break rooms. Other interventions were offered 'to stimulate and support individual behaviour change' including point-of-choice labelling of fruits and vegetables and posters, videos, and brochures placed where employees eat. However, the original paper showed family support to be the most important factor behind the observed increase in consumption of fruit and vegetables. An obvious difficulty in applying findings from this type of study is that the intervention contains elements which lies outside the current study remit.

4.4.2 Physical activity

Landais et al (2020) reviewed studies employing choice architecture techniques to address physical activity and sedentary behaviour. They found that the majority of studies reported a significant effect on behavioural intention or behaviour itself. However, this conclusion applies only to stair use, the focus of nearly all of the studies they reviewed.

Several studies are summarised which employed social influence interventions. An example of this approach, which was successful in changing behaviour, was a video of a colleague choosing the stairs instead of the lift to promote stair use (Van Hoecke et al. (2017)²³. However the authors conclude that due to the limited number of studies identified of that type, it is not possible to draw conclusions regarding the most effective type of social influence intervention.

They declare more confidence in the efficacy of 'prompts', for example 'interventions emphasizing the relationship between physical activity and health are particularly effective such as providing information about caloric expenditure and physical fitness or saving time. Prompts can also be in the physical environment, for instance, individuals can be prompted to take the stairs instead of the lift through footprints on the floor that lead to the stairwell.

In a rail environment these principles could potentially be applied to encourage drivers to take walks during breaks. But the authors also acknowledge the limitations of their findings in relation to other activities other than stair use and crucially conclude '*More (controlled) studies are needed to assess the (sustained) effectiveness of choice architecture interventions on sedentary behaviour and other types of physical activity than stair use*'. More generally and based on the number and quality of studies identified, Landais et al conclude that 'the effectiveness of several choice architecture techniques such as social influence, feedback, change of default and anchoring cannot be assessed'.

²³ Van Hoecke A-S., Seghers J., Boen F. (2018) Promoting stair climbing in a worksite and public setting: are footprints enough? Am J Health Promot. 2018;32(3): 527–35.

On a more practical note, Flynn, Gascon, Doyle et al (2018, see below) cite an American study (Schwartz et al 2009)²⁴ showing that the availability of sidewalks, crosswalks, and pedestrian signals surrounding the worksite was associated with a higher proportion of participants taking at least one walking trip from work in the past month. The UK is generally more pedestrian-friendly than the US so arguably transferability is limited. But, in thinking about opportunities for drivers to take exercise during breaks, some station surrounds will inevitably be more appealing or safer than others to walk around particularly at night and this is important for any new initiative encouraging walking to consider.

4.4.3 General lifestyle factors

Flynn et al (2018) conducted a review focussing on interventions to encourage ‘a culture of health’ in the workplace. Much of their wide-ranging review is focussed on safety but contains useful findings about health cultures. They reach similar conclusions to those of other authors, ie that multi-level interventions tend to be the most effective. Example of elements cited include provision of free pedometers, team hydration or ‘step-count’ competitions, on-site exercise classes. The most effective elements of any of the studies cited in this paper are not identified.

In their review of healthy lifestyle workplace interventions for shift workers, Demou et al (2018) concluded that the best evidence for effectiveness is from interventions that work across different levels. In reviewing this and other effective interventions, the authors remark on a lack of solid evidence of their effectiveness of competitive activities because they often formed just one component of wider interventions.

For studies using healthy eating as an outcome (a behavioural outcome) they report that there is ‘insufficient evidence’ to conclude what is most effective. Four studies out of a total of eight reported significant positive impacts on physical activity. However few interventions identified as effective were of direct relevance to the current study as they involved personalised or invasive activities such as individual goal-setting sessions with dieticians, regular weigh-ins and supervised exercise.

One exemption to this, which contained elements more applicable to this review was a ‘Challenge’ studied by Hess et al²⁵ which employed ‘motivational and environmental strategies’, utilising posters with local walking routes and healthy messages, weekly motivational e-mails, ‘footprints’ directing people to use the stairs; and healthy messages on pay slips. Following a 12-week programme, respondents reported a significant increase in minutes walked and in vigorous physical activity to 85 minutes over the previous week. Participants consuming adequate fruit and vegetables per day

²⁴ Schwartz M.A., Aytur S.A., Evenson K.R., Rodriguez D.A. (2009) Are perceptions about worksite neighborhoods and policies associated with walking? *Am J Health Promot.*;24(2):146-151.

²⁵ Hess I., Borg J., Rissel C. (2011) Workplace nutrition and physical activity promotion at Liverpool Hospital. *Health Promot. J Austr* Apr;22(1):44–50.

increased by more than 25 per cent. More participants also consumed breakfast on seven days of the week and consumed one or more litres of water per day.

Once again it is not possible to isolate which of these components were most effective; the programme included a multitude of activities including provision of pedometers, a healthy eating logbook and a cookbook for use at home. Self-report from participants suggests the 'challenge', (competitive) element was the most effective motivator. It is not known whether any positive impact was sustained after the challenge ended.

4.5 General comments

Taken together the findings reported in this section provide support for improving the range of items available in station or depot vending machines and in providing calorie and/or traffic light information about their nutritional content. The effect of pricing is unclear from the research literature, but our fieldwork indicated this an important factor for many rail workers. There is also a suggestion from the literature that visual prompts to take exercise such as suggested walking routes can be effective, but it is not possible to determine whether this would be effective in a station setting. Findings from interventions that comprise long lists of activities are clearly difficult to interpret and prevent drawing other strong conclusions about effective interventions. There are clear evidence gaps, many of which are acknowledged by review authors and these include:

Studies addressing types of physical activity other than stair use (Landais et al 2019)

Further testing of nudging (behavioural) approaches across different populations and contexts (Wilson et al ,2016²⁶; cited in Bauer et al, 2019)

What happens when interventions are removed, ie do they result in a reduction of positive health behaviours (Landais et al, 2019; Demou et al, 2018)

With these reservations in mind, it makes sense to take a cautious approach to applying the findings from the published evidence base to very specific issues identified in a rail industry context. The conclusions and recommendations presented in the next chapter are therefore weighted towards what was learned from the fieldwork, drawing on the above literature where relevant.

²⁶ Wilson, A. L., Buckley, E., Buckley, J. D., & Bogomolova, S. (2016). Nudging healthier food and beverage choices through salience and priming. Evidence from a systematic review. *Food Quality and Preference*, 51, 47–64.

5 Rapid Evidence Assessment methodology

5.1 Search

The University of Brighton (UoB) 'OneSearch' search engine was used for the main phase of the literature search. This allows access to relevant databases such as CINAHL, PsychInfo and PubMed and other specialist sources on public and occupational health.

The search syntax comprised AND/OR combinations of these (a full list of search terms is included later in this section).

- Primary terms: aspects of health and health behaviours: such as diet, eating, hydration, exercise, rest/sleep patterns, tobacco, alcohol.
- Secondary terms: descriptors centring on work environments, such as workplace, employment, organisation, professional, occupational, industrial.
- Tertiary terms: descriptors centring on decision making and relevant influences, such as behaviours, cultures, decision, choice, job design, environment.
- Fourth-level terms: using terms indicating secondary analysis such as 'review' or 'meta'(analysis).

The domain of 'full text' was searched for secondary and tertiary terms while the domain of 'title' was searched for primary and fourth level terms.

The search was limited to review papers published in English in the last ten years. Many secondary sources covered studies from a longer time period than this so in practice this enabled access to studies conducted as early as 2000 or prior to that.

5.2 Sift and data extraction

The first 200 search hits were sifted from the search output using titles and/or reading abstracts of studies. RSSB's original scoping for this work guided this process. In a handful of cases access to the whole paper was needed to determine relevance. Because the output of One Search automatically sorts for relevance, this approach was sufficient to identify all relevant papers returned by the search (a more rapid sift of the titles of hits 201 to 400 showed no further relevant papers).

Figure 1 shows how many papers were reviewed from different categories.

Data was extracted from all papers meeting relevance criteria. A template for data extraction was developed to standardise the process of recording pertinent information from each source.

This specified requirement for information on:

- health behaviours or health outcomes addressed by the review
- author insights regarding the quality/quality of evidence base

- types of relevant health behaviour interventions that have proved successful, for whom and in what context, and the strength of the evidence
- applicability of described interventions to the current study:
 - those that seek to remove identified barriers
 - those that take place in occupational settings comparable to a rail setting and/or with comparable populations
- examples, where applicable, of primary sources for further data extraction of pertinent content.

5.3 Search terms used to identify secondary sources using University of Brighton OneSearch Database

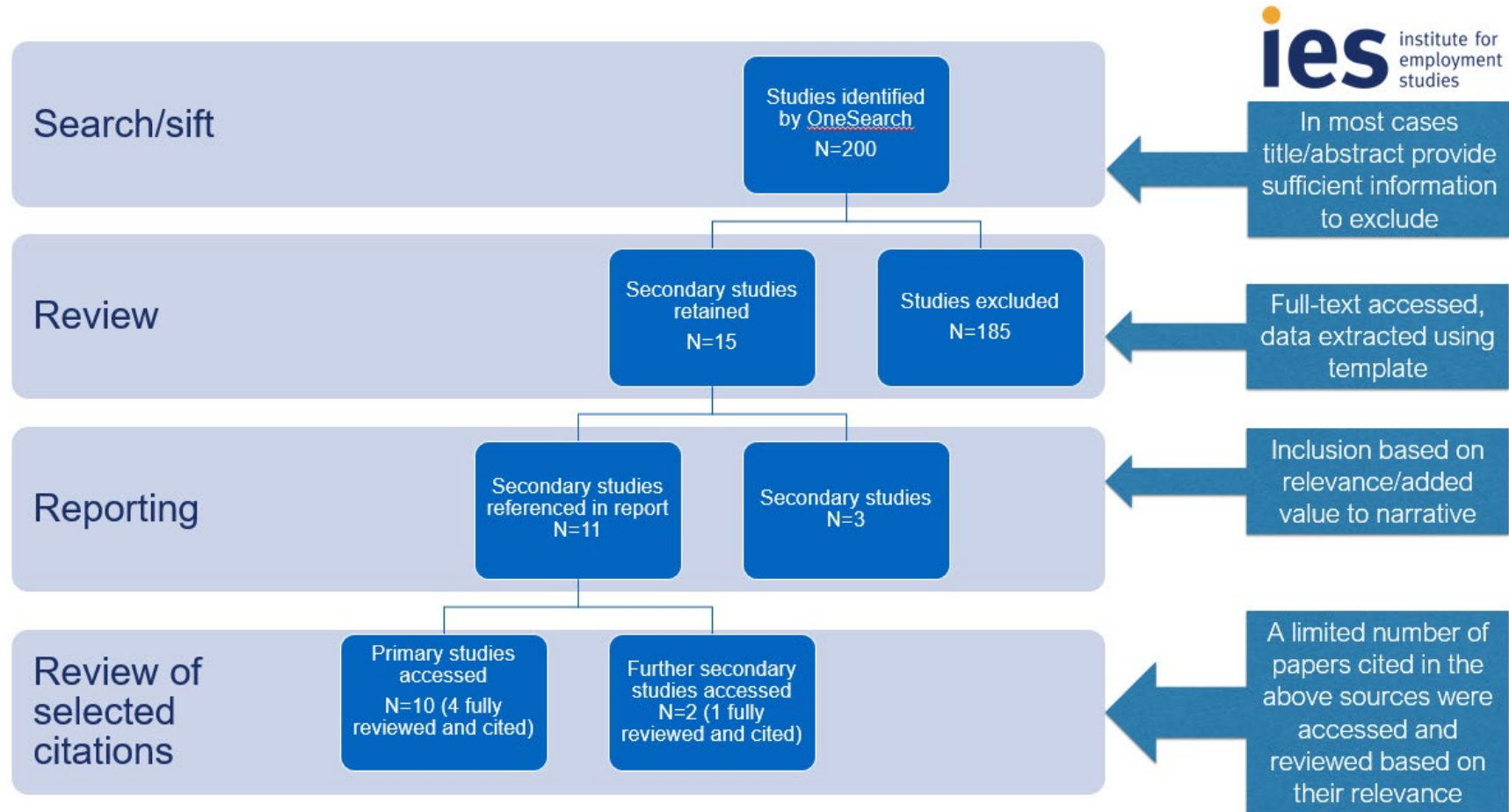
*= free character

Peer review/academic only

English language only

YEAR	2011-2021	
PRIMARY	Title	Health* OR Wellbeing OR "Well-being" OR Well being" OR Diet* OR Nutrition OR Nutritious OR Hydrat* OR Fitness OR "Sedentary behaviour*" OR "Sedentary lifestyle" OR Lifestyle OR Exercis* OR "Work break*" OR Recuper*
	AND	
SECONDARY	Title	Workplace* OR "Work place*" OR "Work-place*" OR Worker OR Working OR Employment OR Employee* OR Employer* OR Organi*ation* OR Organi*ational OR Industr* OR Occupation* OR Sector* OR Labo(u)r* OR Labo(u)rer OR Profession* OR Professional
	AND	
TERTIARY	Full text	Behaviour* OR Behavior* OR Cultur* OR Influenc* OR Decision* or Choice* OR "Job design" OR Environment*
	AND	
FOURTH	Title	Review or Meta

5.4 Rapid Evidence Assessment process chart



5.5 Data extraction template for reviewed papers

EXTRACTION DETAILS
Full reference <ul style="list-style-type: none"> • Author, title, year etc
Overview of scope of paper Statement covering: <ul style="list-style-type: none"> • Number of studies reviewed • Inclusion criteria: topic/type of studies reviewed/timeframe of studies included • Information about type of interventions in scope (eg behavioural, environmental, social, job design) • Whether a review of primary or secondary sources (review of reviews) • Area(s) of health/lifestyle covered- Populations under study (roles, sector etc)
Outcomes of interest <ul style="list-style-type: none"> • Nature of measures, eg health outcomes (eg BMI, weight) or health behaviours/choices (physical activity, type of food consumed, etc), management data, (eg absence, productivity/work function)
Theoretical frame of reference [if mentioned] <ul style="list-style-type: none"> • Such as Mindspace, behaviour change wheel, COM-B, 'nudge' associated vocabulary (see scope reminder box underneath this template) • Comments about the importance of theory-driven work
Author's comments on the quality and nature of the literature <ul style="list-style-type: none"> • Comments about exclusions based on quality • Comments on the predominance of particular types of intervention or approaches to evaluation • Any emerging trends across time period reviewed • Categorisations used by authors to group interventions

Conclusions: -What has been shown to be effective/not be effective

Include:

- *Generalisations* made by the authors about what has been shown to work/not to work, with reference to any typology/groupings of interventions used by the author.
- Areas which are inconclusive.
- Information about *specific* interventions that been effective, where this is available.
- What works for whom and in what circumstances (where available). Consider things such as intensity/duration or particular combinations of intervention.

Limitations/areas which lack clarity from the perspective of the author

- Is this due to a lack of a specific type of study or approach?
- Is this due to methodological limitations/study rigour?
- Is this due to lack of theoretical underpinning?
- Areas where further research is needed, recommendations for future interventions and or methodological approaches to evaluate them.

IES researcher comments about the applicability/generalisability of findings...

- within RSSB's remit
- to the rail industry or similar industries
- with potential practical constraints in mind about rollout (eg cost).

IES researcher suggestions about specific primary sources papers that could merit further investigation (see references section in paper or summary tables)

Any other comments?

- Points worthy of mention in final report, especially insights based on fieldwork findings to date

Reminder:

- **In scope:** behaviour, behaviours, prompt(ing), nudge(ing), environment, environmental, culture, cultural, social, social prompt, peers, peer influence, job design, task design, breaks, rests, visual, visual prompt.
- **Out of scope:** interventions tailored to individuals, counselling, interventions not relevant or transferrable to a work environment.

6 References

The references below were all accessed and reviewed by the research team. Some of the sources cited in the main body of this report were not accessed—their findings were reported directly from review papers where they were cited. Details about those sources are provided in footnotes in the main body of the report.

The appendix to this report details the number of papers retained and excluded at various stages of the search, sift and review process.

- Allan, J., Querstret, D., Banas, K., & De Bruin, M. (2017). Environmental interventions for altering eating behaviours of employees in the workplace: A systematic review. *Obesity Reviews*, 18(2), 214-226.
- Al-Khudairy L, Uthman OA, Walmsley R, et al. (2019). Choice architecture interventions to improve diet and/or dietary behaviour by healthcare staff in high-income countries: a systematic review. *BMJ Open*; 9:023687.
- Bauer, J. M., & Reisch, L. A. (2019). Behavioural Insights and (Un)healthy Dietary Choices: A Review of Current Evidence. *Journal of Consumer Policy*, 42(1), 3-45.
- Chapman, J. and Naweed, A. (2015). Health initiatives to target obesity in surface transport industries: Review and implications for action. *Evidence Base*, 2015(2): 1-32.
- Demou, E., MacLean, A., Cheripelli, L.J., Hunt, K., Gray, C.M. (2018). Group-based healthy lifestyle workplace interventions for shift workers: a systematic review. *Scand J Work Environ Health*; 44:568-584.
- Engbers L.H., van Poppel M.N., Chin A Paw M, van Mechelen W. (2005). Worksite health promotion programs with environmental changes: a systematic review. *Am J Prev Med*; 29: 61-70.
- Engbers L.H., van Poppel M.N., Chin A Paw M., van Mechelen W. (2006). The effects of a controlled worksite environmental intervention on determinants of dietary behavior and self-reported fruit, vegetable and fat intake. *BMC Public Health*; 6: 253.
- French, S.A., Hannan, P.J., Harnack, L.J., Mitchell, N.R., Toomey, T.L. and Gerlach, A.F. (2010). Pricing and availability intervention in vending machines at four bus garages. *Journal of Occupational and Environmental Medicine*, 52(1): 29-33.
- Flynn J.P, Gascon G., Doyle S., Matson Koffman D.M., Saringer C., Grossmeier J., et al (2018). Supporting a culture of health in the workplace: a review of evidence-based elements. *Am J Health Promot.* 32:1755–88
- Geaney, F. et al (2013). The effectiveness of workplace dietary modification interventions: A systematic review. *Preventive Medicine*, 57(5): p. 438-447.
- Landais, L.L., Damman, O.C., Schoonmade, L.J. et al. (2020). Choice architecture interventions to change physical activity and sedentary behavior: a systematic review of effects on

intention, behavior and health outcomes during and after intervention. *Int J Behav Nutr Phys Act* 17, 47.

MacGregor, A 2009. Managing obesity. *Occupational Health*, 61(7): 44-46

Maes L, Van Cauwenberghe E., Van Lippevelde W. et al. (2011). Effectiveness of workplace interventions in Europe promoting healthy eating: a systematic review. *Eur J Public Health* 22, 1–6.

Malik SH, Blake H, Suggs LS. A systematic review of workplace health promotion interventions for increasing physical activity. *Brit J Health Psych.* 2014;19(1):149–80

Schliemann D, Woodside JV. (2019). The effectiveness of dietary workplace interventions: a systematic review of systematic reviews. *Public Health Nutr.*22(5):942-955.

Sorensen G, Stoddard A, Peterson K et al. (1999). Increasing fruit and vegetable consumption through worksites and families in the Treatwell 5-a-day study. *Am J Public Health* 89, 54–60 .