



A qualitative exploration of the shift work experience: the perceived effect on eating habits, lifestyle behaviours and psychosocial wellbeing

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1 **Title page**

2 **TITLE**

3 A qualitative exploration of the shift work experience: the perceived effect on eating habits,
4 lifestyle behaviours and psychosocial wellbeing.

5

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41 **Abstract**

42 Background: Approximately 17% of the European workforce is engaged in shift work. How
43 the experience of shift work impacts on the dietary and lifestyle practices of workers is
44 unclear.

45 Methods: Fifteen focus groups were conducted by two researchers, with 109 participants. The
46 initial focus group was carried out with both researchers present, to ensure consistency in
47 facilitation. Both researchers thematically analysed all data collected.

48 Results: Shift work was described as affecting many areas of workers' lives. Three
49 overarching themes were identified; 1) impact on eating behaviour, 2) impact on other
50 lifestyle behaviours including physical activity, sleep, alcohol consumption, smoking and 3)
51 impact on psychosocial health and wellbeing. There appeared to be overlap between the
52 effect of shift work and the effect of individual internal factors in influencing workers'
53 decision-making with regard to lifestyle practices.

54 Conclusions: Shift work affects many areas of workers' lives, negatively impacting on eating
55 and lifestyle behaviours and psychosocial health. This study augments the current literature
56 as it highlights the role internal motivation plays in workers' lifestyle choices. The research
57 should help inform the development of public health strategies to minimise the impact of shift
58 work, such as specialist behavioural change interventions specific to this group.

59

60 **Introduction**

61 Approximately 17% of the workforce in Europe is engaged in shift work¹. Shift work is
62 defined as “*any method of organising work in shifts whereby workers succeed each other at*
63 *the same work stations according to a certain pattern, including a rotating pattern, and*
64 *which may be continuous or discontinuous, entailing the need for workers to work at different*
65 *times over a given period of days or weeks*”². This typically involves evening, weekend and
66 rotating shift patterns. Shift work is prevalent across a range of occupational sectors: 24-hour
67 emergency, security and utility services, production lines, leisure and entertainment industries
68 and when working across time zones.

69 Shift work typically leads to an altered routine; such disruption can lead to changes in
70 circadian rhythms. These biological rhythms normally adhere to a 24-hour cycle and regulate
71 behavioural, endocrine and neurophysiological processes such as sleep-wake cycles, body
72 temperature, blood pressure and the release of several hormones. When sleep patterns are out
73 of synchrony with light and dark, as can occur in shift work, circadian rhythms may become
74 disrupted.

75 Abnormal circadian rhythms appear to have adverse implications for health. Moreover, eating
76 at night can alter glucose metabolism³. Internationally, studies have reported higher risk of
77 overweight/obesity⁴⁻⁶, metabolic syndrome⁷, type 2 diabetes mellitus⁸, cardiovascular
78 diseases^{9,10}, cancers¹¹⁻¹³, particularly breast and colorectal, and gastrointestinal disorders¹⁴ in
79 shift workers compared to those working standard hours. However, inconsistencies
80 surrounding definitions of shift work and shift work exposure exist¹⁵, making the true health
81 risk attached to shift work difficult to ascertain. Poor dietary and/or lifestyle behaviours may
82 potentiate the problem. Shift workers are reported to have poorer quality diets^{16,17}, irregular
83 eating patterns^{6,18,19}, higher alcohol consumption²⁰⁻²² and smoking rates^{23,24}, and less physical
84 activity^{20,25}. Up to 30% are reported to suffer from a sleep disorder²⁶. Few studies exist which
85 qualitatively explore how and why shift work impacts on lifestyle. To develop effective
86 lifestyle interventions for this group, insight into how and why shift work influences lifestyle
87 habits is required.

88

89 **Subjects and Methods**

90 *Study design*

91 The aims of this research were to qualitatively explore the shift work experience and the
92 impact of shift work on dietary and lifestyle practices in shift workers living in Ireland.

93 Fifteen semi-structured focus groups (FGs) were conducted, with a total of 109 participants.

94 Topics integral to the aim of the study were discussed while facilitating the identification and
95 consideration of unforeseen or overlooked issues. FGs included 5-12 participants (mean of 7)
96 per group. Nine FGs took place in the Republic of Ireland (ROI) and six in Northern Ireland
97 (NI). FGs in ROI and NI were carried out by two separate researchers. The initial FG was
98 carried out with both researchers present to ensure consistency in FG facilitation. To ensure
99 quality control, both researchers analysed all data collected in each jurisdiction.

100 Ethical approval was received from the Ethics Committee at the Dublin Institute of
101 Technology (DIT), Ireland; the application and approval from the DIT was agreed to by the
102 University of Ulster Research Ethics Committee. All participants were provided with a study
103 information sheet and a verbal explanation of the study was also given at the start of each FG.
104 Participants had the opportunity to ask questions or to withdraw from the study. Written
105 informed consent was given by each participant.

106 *Recruitment of participants*

107 Participants were recruited based on sector of employment and geographical location. The
108 three largest sectors employing shift workers in Ireland were targeted; accommodation and
109 food services (AFS; n=5 FGs), health and social care (HSC; n=6 FGs) and
110 manufacturing/industry (M/I; n=4 FGs). Specific occupational roles within each group
111 varied, with a mix of manual versus sedentary roles, often reflective of grade of employment
112 rather than employment group. The overall sample was broadly representative of the ROI and
113 NI, rural/urban location, gender, age and public/private sector employment. Each group was
114 comprised of employees (M/F; 18+ years old) from the same organisation. A designated
115 person of authority at each organisation disseminated information on the study to employees.
116 Participants were offered a gift voucher valued at £15/€20 as a discretionary honorarium for
117 participating.

118 *Focus group discussion guide*

119 Discussion points for the FGs were based on the published literature identified during an
120 extensive literature review¹³. The draft discussion guide was piloted with HSC workers in
121 ROI (n=6), with both facilitators present. The finalised discussion guide (Table 1) allowed for
122 discussion of issues of particular importance to each group as they arose.

123 **Insert Table 1**

124 *Data collection and analysis*

125 FGs took place within each workplace in a quiet space. FG discussions were recorded using a
126 digital dictaphone; each lasted between 40 and 70 minutes. Participants' demographic and
127 household characteristics, lifestyle practices and work patterns were obtained using a short

128 questionnaire, the key elements of which are summarised in Table 2, before starting the group
129 discussion. Rotating shift work was defined as any work pattern when the participant
130 alternated between day, afternoon or night shifts, as opposed to fixed shifts. FG recordings
131 were professionally transcribed verbatim and individual/company names removed to protect
132 anonymity. The transcripts were compared to FG recordings to ensure accuracy. Transcripts
133 were imported into the qualitative data analysis software package, Nvivo 10²⁵. An inductive
134 thematic analysis procedure²⁶ was applied to the data to identify common themes. Initially,
135 transcripts were read repeatedly and initial trends within the data generated. Two researchers
136 independently and systematically coded the transcripts, and then discussed the codes to verify
137 their application to the data. Overarching themes and sub-themes were identified. Both
138 researchers reached consensus on the assignment of all themes (inter-rater reliability equal to
139 1.00) and extracted quotations to illustrate typical views.

140 **Insert Table 2**

141 **Results**

142 The demographic profile of the 109 participants is presented in Table 3. The sample
143 population was composed of 65 males and 44 females, aged between 18-64 years. Almost
144 half (48%) were overweight or obese based on self-reported height and weight, while 30%
145 were physically active once or less weekly. Three overarching themes were identified; 1)
146 impact of shift work on eating behaviour, 2) impact of shift work on lifestyle behaviours
147 including physical activity, alcohol consumption, smoking and sleep and, 3) impact of shift
148 work on psychosocial health and wellbeing. An overlap was observed between the effects of
149 shift work and the effects of internal factors specific to the individual, such as motivation
150 level, on participants' decision-making about their lifestyle practices.

151 **Insert Table 3**

152 ***Theme 1: the effects of shift work on eating behaviours***

153 A number of sub-themes were identified within this theme (Table 4). There was consensus
154 that shift work has negative consequences for dietary habits, predominantly related to its
155 impact on eating patterns and on the nutritional quality of foods consumed.

156 ***Impact of shift work on meal pattern and snacking***

157 The FG discussions indicated that eating patterns were heavily influenced by shift work
158 (Table 4). Eating habits were described as “*irregular*”, “*erratic*” and “*rushed*”. Some made
159 efforts to maintain their perceived “*normal*” eating patterns during daytime hours (i.e.
160 breakfast, lunch and dinner at standard UK/Irish eating times) and to minimise night-time
161 eating. Difficulty planning healthy meals and maintaining a regular meal pattern was most

162 commonly due to an inconsistent routine “*your routine is completely gone*”, a lack of time to
163 purchase groceries and prepare food “*I don’t have enough time to prepare anything*” and
164 work-related tiredness “*when I go home from shift work I’m too tired*”. Meal skipping or long
165 gaps between meals were common, with a “*feast and famine*” type pattern of eating
166 frequently reported. Many workers expressed frustration at the difficulty of matching appetite
167 to opportunity to eat. This led to viewing food as fuel and eating for the sake of eating,
168 consuming a large meal before work as a break was not guaranteed, followed by a long
169 period without eating during working hours. Many reported “*the tiredness can be quite*
170 *nauseating*”; thus, loss of appetite was encountered, particularly during or coming off night
171 shifts. This further compounded erratic eating patterns. Typically, this “*famine*” period
172 resulted in poor dietary choices later with hunger-driven food binges of processed
173 convenience or takeaway foods often relied upon. Many workers acknowledged that snacking
174 increased as a consequence of skipped meals. High energy snacks such as crisps, chocolate
175 and biscuits were typically chosen because they provided a “*quick fix...because you haven’t*
176 *eaten in so long*”.

177 *Impact of shift work on diet quality*

178 Many workers believed that dietary quality was adversely affected by shift work (Table 4).
179 Over-reliance on convenience or takeaway foods, due to lack of time or energy for meal
180 preparation and/or eating, or to poor availability of healthy options within the workplace
181 environment, and heavy reliance on coffee to stay alert during long or night shifts were
182 reported. Difficulty shopping when working a long day shift, with takeaways eaten as a
183 consequence, was discussed. Some workers expressed frustration that despite bringing
184 healthy meals to work, this effort was hampered due to missing or disturbed break times.

185 *Impact of individual internal factors on eating behaviour*

186 While it was evident that shift work was important in dictating what and when workers eat,
187 individual internal factors, such as motivation to eat healthily, were also apparent (Table 4).
188 Many justified poorer dietary choices on the basis that they were working shift work, or that
189 they “*deserve*” a reward. This was compounded by the self-rewarding behaviours of
190 colleagues, making it necessary to eat unhealthily in order to conform. A small number
191 highlighted the positive effect of shift work on eating behaviours, stating that they had more
192 control over what they ate due to limited access to food and restricted eating times within the
193 workplace environment. Some described how shift work forced them to become more
194 organised when planning meals; these would batch cook meals perceived as healthy in
195 advance.

196 **Insert Table 4**

197 ***Theme 2: the effects of shift work on other lifestyle behaviours***

198 *Physical activity*

199 Workers expressed mixed opinions on the impact of shift work on their ability to participate
200 in physical activity (Table 5). Occupational activity was also discussed; while many workers
201 were on their feet or active for much of their shift, occupational activity levels varied
202 dependent on workers' specific roles. There was consensus that occupational activity is the
203 wrong type of activity, as it does not provide a cardiovascular workout or increase fitness
204 levels. Those who engaged in regular physical activity described better recovery from shift
205 work and improved sleep. Individual internal factors, such as motivation to improve or
206 maintain health, again appeared to affect workers' motivation to exercise.

207 *Alcohol consumption*

208 Opinions were also mixed about the effect of shift work on alcohol consumption (Table 5).
209 For some, shift work lead to reduced alcohol consumption, due to a mismatch of work and
210 social occasions involving alcohol. Some purposely avoided alcohol, as a hangover would
211 compound the tiredness already experienced from shift work. However, some workers stated
212 that their drinking at home increased. Others required alcohol to help them sleep when
213 coming off shift and would have "*a glass of wine to go to sleep... to relax*". Alcohol
214 consumption was perceived by those in the AFS sector as higher among their group, due to
215 the social nature of working in this sector and the ready availability of alcohol in the
216 workplace environment.

217 *Smoking*

218 A small number of workers described how smoking influenced their eating behaviour "*to*
219 *stop you eating rubbish...you would smoke*". For some, smoking allowed them a break from
220 work that they may otherwise not get. Others stated that their workload did not lend itself to
221 taking smoking breaks (Table 5).

222 *Sleep*

223 Workers across all groups unanimously agreed that shift work impacted negatively on both
224 sleep quality and quantity (Table 5). For some, their shift pattern did not allow for adequate
225 rest between shifts. Particular difficulty was reported with trying to sleep when coming off
226 night duty, or when rotating between day and night shifts. Difficulty getting to sleep, due to a
227 need to "*wind down*", was particularly problematic for those working in a noisy or chaotic
228 environment. Staying asleep was also an issue, especially when trying to sleep during the

229 day, due to daylight and noise. Many reported that they accept poorer sleep as part of shift
230 work.

231 **Insert Table 5**

232 *Theme 3: the effects of shift work on psychosocial health*

233 *Social and family life*

234 Social and family life was affected by shift work (Table 6). A mismatch of routine with those
235 around them resulted in difficulty maintaining relationships for some. Frequently missing
236 social gatherings was difficult for many. For some, working shifts meant giving up team
237 sports and missing out on the associated social aspects. Others, however, found a new social
238 outlet by meeting up with workmates during time off.

239 The impact on family life was strongly expressed. For some, the stress of shift work created a
240 strain on relationships. Missing special occasions was particularly difficult, especially for
241 those with children. Difficulty tending to the needs of the family was expressed, mostly due
242 to lack of time or tiredness related to shift work. Females, in particular, expressed guilt about
243 not being there for their families. The negative impacts were accepted because more money
244 was earned compared to working standard hours. A small number described a positive effect
245 on family life; working shifts allowed them time during the day to complete household
246 errands and attend appointments, and more time off that could be spent with children which
247 decreased childcare needs. For some, these positive aspects offset the adverse effects of
248 working shifts. Achieving a balance between shift pattern and particular family/personal
249 circumstances was evident.

250 *Mood*

251 Many workers experienced feelings of isolation due to working anti-social hours. In
252 conjunction with poor sleep, this had a negative effect on mood with implications for mental
253 health (Table 6). Work-related stress was reported, particularly in HSC groups, with this also
254 affecting them outside working hours. Reduced exposure to daylight was also perceived to
255 influence mood.

256 **Insert Table 6**

257

258 **Discussion**

259 **Main findings of this study**

260 This study is the first to qualitatively explore the day-to-day and longer-term impact of shift
261 work on the lifestyle behaviours of shift workers across a range of employment sectors in
262 Ireland. Overall, shift workers perceive that shift work impacts on many aspects of their lives.

263 The effect on diet was predominant, with further discussions centring around the effect on
264 other lifestyle behaviours and psychosocial wellbeing.

265 Shift workers perceive that their work pattern impacts negatively on their eating routine and
266 on the nutritional quality of their diets. Erratic eating patterns were a predominant feature of
267 the diets of many workers, with meal skipping and increased snacking common. Although
268 many brought meals from home in an effort to eat healthily, elements of the job meant that
269 they either got insufficient breaks in which to eat, or breaks were disturbed resulting in food
270 becoming spoiled; this left many feeling powerless to improve their eating habits. Energy
271 dense and sugary snacks typically compensated for disrupted meals; examples identified by
272 participants included “*chocolate*”, “*chips*”, “*fast food*”, “*biscuits*”, “*cakes*” and named brand
273 soft drinks. Some made efforts to be “*good*” on days off owing to better structure and routine;
274 for others, however, days off were seen as a “*treat*” and a licence to eat poorly.

275 Both sleep and physical activity were also negatively influenced by shift work, but the effects
276 of shift work on alcohol consumption were mixed. The psychosocial impact of shift work
277 was apparent, with negative implications for both social and family life and subsequent
278 effects of this on mood. Sleep was frequently disrupted, and the negative impact of shift work
279 on sleep patterns was unanimous. Sleep was particularly badly affected for those on rotating
280 shifts or when coming off a period of night shifts. Most stated they were not in one shift
281 system long enough to adjust before their routine was altered again. Broken, poor quality
282 sleep was a source of frustration for many; workers often woke not feeling rested. Sleep was
283 prioritised above all other activities after a shift, including eating. Many would like guidance
284 on improving sleep patterns to benefit their health. Catching up on sleep during days off also
285 had a negative impact on routine and led to many viewing food as fuel, eating for the sake of
286 eating. This altered view of food removed the enjoyment from eating, and eating on the run
287 or in isolation removed the social aspect attached to eating. For some, shift work prevented
288 social drinking, due to the anti-social nature of atypical working hours. In contrast, due to the
289 social nature of their work environment and the ready availability of alcohol, many in the
290 AFS sector admitted drinking heavily with colleagues after work. Other shift workers
291 described drinking at home either with family or in isolation to relax either after work or on
292 days off.

293 **What is already known on this topic**

294 The results of this study support findings from previously published studies which report that
295 shift work affects the distribution of energy intake, namely a decrease in hot meals and an
296 increased frequency of snacking^{6, 19,29,30}. There is evidence to show that eating whilst on shift

297 work, particularly during the night shift, is driven more by scheduling constraints than by
298 actual hunger²⁹; this theory is supported by the present study findings. This mindless eating
299 may have a negative psychological impact on the eating experience. Eating alone is a risk
300 factor for depressive symptoms³¹ as well as being associated with unhappiness³². Missing out
301 on the social aspects of mealtimes may increase risk for mental health issues, particularly
302 important in the context of anti-social working hours. The heavy reliance on
303 convenience/processed snack foods, at the expense of fresh and unprocessed foods, concurs
304 with previously published literature which reports increased intake of saturated fat¹⁶ and
305 processed foods³³, and decreased intake of fruit, vegetables³³ and dietary fibre³⁴ after
306 commencing shift work. In addition, lower intakes of vitamins A, D and E, and zinc have
307 been documented among shift workers, relative to day workers¹⁷. There are three previous
308 qualitative studies investigating the impact of shift work on the diet; two were in nurses (in
309 Sweden³⁵ and South Africa³⁶) and one in Australia firefighters³⁷. In all studies, disruption to
310 circadian rhythms had a negative influence on workers' dietary choices. Choosing unhealthy
311 or takeaway foods due to convenience, long working hours, peer-pressure or as a means to
312 stay awake at night were apparent. Occupational stress influenced eating habits with many
313 snacking throughout the day as a coping strategy³⁶. The workplace environment itself
314 influenced eating habits, with the food available reported as being predominantly
315 unhealthy^{36,37}. In addition, lifestyle habits were influenced both positively and negatively by
316 work colleagues^{35,37}. Workers perceived that shift work has an impact on their dietary and
317 lifestyle habits outside of working hours³⁷, with irregular eating habits continuing into days
318 off due to circadian disruption, and many refraining from exercise during time off in favour
319 of sleep³⁵.

320 Previous studies on activity levels among shift workers have produced equivocal results,
321 possibly owing to varying definitions of activity (e.g. total physical activity, occupational
322 activity or planned structured leisure time activity) and different measures to record
323 activity¹⁵. Shift work may reduce long-term adherence to leisure time physical activity owing
324 to altered biological responses to exercise which result in changes in perceived exertion
325 during exercise³⁸. Many in this study avoided exercise during the day before a night shift in
326 order to preserve energy, or following a night shift in order to catch up on rest. Similar
327 sentiments were reported by the Swedish nurses³⁵. All studies report a fine balance between
328 having enough time for rest, family, household and social commitments, and activity.
329 The psychosocial health and wellbeing of many shift workers was negatively affected by
330 their shift patterns. Complaints about work-life balance are the main cause of maladaptation

331 to shift work and influence the development of psychosomatic disorders³⁹. Due to the
332 unpredictable and unconventional working hours associated with shift work, workers' social
333 and family lives were frequently and adversely affected. Conflict between work and family
334 life has previously been reported among shift workers, with work demands and a lack of
335 family time having a negative influence on marital relationships, parental roles and children's
336 education³⁹. In the qualitative study of South African nurses, shift work negatively affected
337 participants' ability to tend to family responsibilities, causing high levels of stress, which
338 may impact on mental health³⁶. Qualitative work with Iranian nurses reported night shift
339 work had negative socio-cultural impacts as it detracted from expected duties within the
340 family home⁴⁰.

341 **What this study adds**

342 This study augments the current literature in that it highlights the important role of internal
343 motivation in shift workers' lifestyle choices. Shift work can be used as an excuse for less
344 healthy dietary choices; it was "*easy to blame shift work*" and use shift work to justify
345 unhealthy behaviours. Those who were less motivated to lead a healthy lifestyle appeared to
346 believe that the negative influence of shift work on their lifestyle was beyond their control,
347 and were less likely to make attempts to negate this influence. Individuals differ in their
348 tolerance to shift work, with some developing better coping mechanisms than others. Internal
349 motivation to improve health decreases the likelihood of shift work adversely influencing
350 lifestyle behaviours. Acknowledging the role of internal motivation can inform the
351 development of public health strategies to minimise the impact of shift work, and identify
352 specialist interventions tailored to help facilitate healthier choices in this group. Furthermore,
353 explanations offered on how physical activity was affected by shift work may shed light on
354 the differences in previous study results. As team sports and exercise classes are generally at
355 convenient times for those working standard hours (in UK/Ireland, this is typically Monday
356 to Friday, 09:00 to 17:00), these are often not an option for shift workers, who must
357 undertake physical activity alone. Extra motivation was required to "*force*" engagement in
358 activity. Participation was influenced by workers' other commitments such as childcare and
359 household duties, and by their internal motivation to be active and improve health.

360 **Limitations of this study**

361 This study includes only participants from the three largest sectors employing shift workers
362 in Ireland and findings may not be applicable to other groups of shift workers. The research
363 quality of qualitative research is dependent on the skills of the researcher and can be
364 influenced by the researcher's personal approach. The effect of this was minimised by using

365 two researchers who developed a standardised approach and independently analysed the data.
366 The findings of this qualitative study should be substantiated by a large quantitative study.
367 Internal motivation to make lifestyle changes and improve health is complex, and may
368 require specialist behavioural change interventions to overcome barriers.
369

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476 **Figure legends**

477 None

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479 **Table headings**

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486 **Table 3**

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489 **Table 4**

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495 **Table 6**

496 The effects of shift work on psychological health

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Table 1. Focus group discussion guide

Introduction and ice-breaker	
1: Dietary practices	<p>How would you describe your attitude to healthy eating? How important is health to you?</p> <p>How do you feel about your diet?</p> <p>Which factors influence how you manage your diet?</p> <p>How much control do you feel you have over your diet? (and why?)</p> <p>How do you find managing your diet while working shift work? (<i>if not already identified as an influencing factor</i>)</p> <p>How would you describe your eating patterns when you are working?</p> <p>How would you describe your eating patterns on days off?</p>
2: Other lifestyle practices	<p>Are there any other areas of your life that are affected by your working patterns? (<i>Explore only those that come up in depth</i>) e.g.:</p> <p>Exercise; smoking; alcohol intake; sleep; food choice; mood/stress; relationships; quality of life</p>
3: Effects of different shift work patterns	<p><i>For those who work different patterns of shift work</i>), do different shift patterns affect your lifestyle in different ways? How so?</p>
4: Work place environment	<p>Tell me about your work place environment</p> <p>What facilities are available to you at meal times in your work place?</p> <p>Describe the selection and availability of foods at your work place</p> <p>How supportive do you feel your workplace environment is of healthy eating?</p> <p>Thinking back to other places you may have worked previously, what do you think makes a work environment supportive (or not) of healthy eating?</p>
5: Perceived barriers to a healthier lifestyle for shift workers	<p>Can you identify any barriers you find to leading a healthier lifestyle?</p> <p>Do you think these barriers are within your personal control?</p> <p>Do you feel you have the knowledge and information to overcome these barriers?</p> <p>Have your working patterns ever affected (positively or negatively) your attempts to lead a healthier lifestyle?</p>
6: Opportunities for a healthier lifestyle among shift workers	<p>What motivates you to improve your lifestyle?</p> <p>Do you have any suggestions for overcoming the discussed barriers (if any) to a healthier lifestyle?</p> <p>What do you feel could work for you personally or for your work place as a whole?</p> <p>Have you any experience (positive, negative or otherwise) of work place initiatives for improving employee health?</p>

7: Prospective health communication for shift workers	In terms of managing your diet and lifestyle, are there any aspects you feel you need more information on? What form would you like to see this information in? (e.g. leaflet, poster, social media)
Opportunity for participants to raise any other relevant issues	
Close of discussion	

Table 2. Questions on demographic and lifestyle practices

<p>Details about you</p>	<p>Gender: male/female Age group: 18-25; 26-35; 36-45; 46-55; 56-64 Height (without shoes) Weight Marital status: single (never married); living with partner; married; divorced/separated; widowed Highest level of education attained: none; primary school; secondary school to age 15/16; secondary school to age 17/18; additional training (e.g. apprenticeship schemes); undergraduate university; postgraduate university Current shift work pattern: full-time/part-time Day; night; rotating Number of shifts per week Number of hours per week Most recent occupation Smoker: current; ex; never Over the last year, have you tried to: lose weight; eat less fat; eat more fruits and vegetables; take more exercise Special diet: no; diabetic; cholesterol lowering; slimming diet prescribed by healthcare professional/self; vegetarian; vegan; other medical diet Physical activity per week: less than once; once a week; 2-3 times a week; 4-5 times a week; 6 times a week or more Amount of time spent per session of physical activity Type of physical activity</p>
<p>Details about your household</p>	<p>Number of people living in household: live alone; two; three; four; five (+) Who is lived with: parent(s); partner(s); daughter(s)/son(s); brother(s)/sister(s); other(s) Household reference person (owns/rents accommodation or highest income): self; partner; parent Occupation of household reference person (if other than self) Employment status of household reference person (if other than self): full-time; part-time; home-maker; not employed; student; never worked Responsibility for food and grocery shopping: most; joint; done by someone else Responsibility for meal preparation/cooking: most; joint; done by someone else</p>

Table 3. Demographic characteristics of focus group participants (n = 109)

Demographics	n= (%)	Demographics	n= (%)
Gender		Smoking status	
Male	65 (59.6)	Current smoker	17 (15.6)
Female	44 (40.4)	Ex-smoker	36 (33.0)
Age range		Never smoked	53 (48.6)
18-25	18 (16.5)	Unspecified	3 (2.8)
26-35	34 (31.2)	Frequency of physical activity	
36-45	25 (22.9)	<once per week	23 (21.1)
46-55	27 (24.8)	Once per week	10 (9.2)
56-64	4 (3.7)	2-3 times per week	39 (35.8)
Unspecified	1(0.9)	4-5 times per week	25 (22.9)
Nationality		≥6 times per week	8 (7.3)
Irish / Northern Irish	88 (80.7)	Unspecified	4 (3.7)
Other	20 (18.3)	Those who have made an attempt in the last year to:	
Unspecified	1 (0.9)	Lose weight	51 (48.1)
Marital Status		Eat less fat	61 (57.5)
Single	40 (36.7)	Eat more fruit and vegetables	70 (66.0)
Living with partner	13 (11.9)	Take more exercise	79 (74.5)
Married/civil partnership	52 (47.7)		
Divorced/separated	3 (2.8)		
Widowed	1 (0.9)		
Highest education level			
Secondary school to age 15/16	6 (5.5)		
Secondary school to age 17/18	14 (12.8)		
Additional training	35 (32.1)		
Undergraduate university	35 (32.1)		
Postgraduate university	19 (17.4)		
% with experience of types of shift work			
Day shift	39 (48.1)#		
Night shift	38 (47.5)#		
Rotating shift	56 (69.1)#		
Employed full time / part time			
Full time	94 (86.2)		
Part time	11 (10.1)		
Unspecified	4 (3.7)		
BMI (kg/m²)*			
<18.5 kg/m ²	1 (0.9)		
18.5 - 24.9 kg/m ²	43 (39.4)		
25.0 - 29.9 kg/m ²	38 (34.9)		
>30 kg/m ²	14 (12.8)		
Unspecified	13 (11.9)		

#A large proportion of participants did not answer this question (n=28) so results are presented as valid percentages

*BMI based on self-reported height and weight

Table 4. The effects of shift work on eating behaviours

Theme 1: the effects of shift work on eating behaviours	
Sub-theme	Representative quotes
Impact of shift work on meal pattern and snacking	<p>“I often don’t eat breakfast. Just dinner, that’s the main kind of, the whole day. The one main meal a day and then snacks in between...coffee.” (HSC worker)</p> <p><i>“...I just skip lunch and just have a coffee and a bit of toast and then I’d then be starving and by the time I get home but inevitably you’re tired I’d just get a Chinese [takeaway] or something on the way back.” (HSC worker)</i></p> <p>“I find personally I munch more on a night shift than I would on a day shift (...) there’s temptation around every corner, you know what I mean” (M/I worker)</p> <p><i>“...sometimes you don’t get a chance of eating healthy food because you’re working and you don’t get the same... you know, the same time or you’re just too busy, you just pick and eat all the things you shouldn’t be eating” (AFS worker)</i></p>
Impact of shift work on diet quality	<p>“if you’re working on the weekend it’s normally pub grub across the road or [named fast food chain]. Or else if you’re on night duty it’s takeaways” (HSC worker)</p> <p><i>“Night shift, well that’s a totally different matter, you’ve buns, biscuits, steal them out of the fridge, and then ham, cheese and toast and sausages and chips because that’s – because it’s there, it’s easy and it’s readily available” (AFS worker)</i></p> <p>“And I think that I’ve been doing loads of coffee and tea which is not very healthy (...) I’ll have several cups of coffee that’ll keep me going” (HSC worker)</p> <p><i>“...some days during the week you’re getting a takeaway or you’re doing things that are easy and quick” (HSC worker)</i></p> <p>“So you’re continuously leaving your food behind you, and then eventually you just get sick of looking at it...then that’s when you’ll hit the machine when you’re hungry for a bar of chocolate to keep you going because you haven’t had time to eat” (HSC worker)</p>
Impact of individual internal factors on eating behaviour	<p>“It’s really what you want to do with it...it’s a choice. (...) I’d have had the chef, particularly at this time of year, would’ve, you know, made up platters of sandwiches and kept containers of soup over which you would deem as the healthy option, but they [younger staff] didn’t touch them, they went to the pizza place instead or went to [named fast food restaurant], that’s what they wanted to do. It’s really your own choice and mind set what you really want to do.” (AFS worker)</p> <p><i>“...sometimes say ah sure it’s ok I’m on nights, I can have one [in reference to fast food/food from vending machine], let myself go like” (M/I worker)</i></p> <p>“Someone will bring in cake on Saturdays, everyone feels sorry for themselves working on Saturday. So you’re pulled in to have cake” (HSC worker)</p> <p><i>“...otherwise you’re having to get up and think about cooking...So I cook on a Monday, I cook 4 or 5 portions of things and just freeze them all so I might have 2 or 3 weeks of stuff in the freezer at any one time” (MI worker)</i></p>

Table 5. The effects of shift work on lifestyle behaviours

Theme 2: the effects of shift work on lifestyle behaviours	
Sub-theme	Representative quotes
Physical activity	<p>“I used to take a, a martial arts class on a Monday (...) but because you’d have you know a run of weeks where you’d be say on in the working late on a Monday and then like say we’d be on nights and you go, “Well there’s no point going the week in between” and it just sort of falls apart.” (HSC worker)</p> <p><i>“I think if you’re just working Monday to Friday 9:00am – 5:00pm I would be doing less [exercise] because you’ve been at home at night and you’re coming to that time in the evening you want to wind down (...) But when you, you’ve more time to yourself to exercise, walk and do outdoor activities if you’re working shift patterns...” (HSC worker)</i></p> <p>“I think you’re constantly moving but you’re not actually fit, that’s what it is... You’re not fit, I’m so unfit it’s insane and I constantly walk here, 50, 60 hours like.” (AFS worker)</p>
Alcohol consumption	<p>“I find I drink far less... if I’m off four days during the week, I won’t have a drink at all, because all my friends work Monday to Friday so I wouldn’t have a drink on my own... When I was working Monday to Friday, I’d be out every weekend” (M/I worker)</p> <p><i>“To be really honest, like hospitality is quite a sociable industry, you know, and we... Because we were working in the bars, you know, we would do quite a lot of drinking” (AFS worker)</i></p>
Smoking	<p>“...it’s very hard to smoke I’d say if you’re working (...) If you were a heavy smoker disappearing every hour at nights, then it would be like that guy is doing nothing.” (HSC worker)</p>
Sleep	<p>“I’m working now ‘til ten o’clock tonight and I’m in at half five tomorrow morning ... we don’t get out at ten, you know yourself, it could be half ten, by the time you get home it’s eleven o’clock, time you maybe make something to eat for yourself (...) before I know it I’m up at a quarter to five in the morning and into work for half five” (AFS worker)</p> <p><i>“Because when you come off, when you do night duty as well, you’re sleeping pattern is all interfered with so the morning you come off nights, you’re trying, you want to go to bed and you want to sleep but you have to stay awake for a long period of time because you’re going to be going to bed that night.” (HSC worker)</i></p> <p>“If you get 4 hours during the day that’s considered a decent amount of sleep.” (M/I worker)</p>

Table 6. The effects of shift work on psychosocial health

Theme 3: the effects of shift work on psychosocial health	
Sub-theme	Representative quotes
Social and family life	<p>“...when I was younger, you’d get involved in clubs, again shift work doesn’t lend itself to getting involved with things.” (M/I worker)</p> <p><i>“You might miss the Christmas concert, and there’s nothing you can do about it”; “You know you miss their birthdays, you genuinely do”; “Christmas is dreadful” (HSC workers)</i></p> <p>“...what will my kids be like, like I won’t be there on a Tuesday, Wednesday, Friday so will they be getting pizza on a Tuesday just because I’m not there...” (HSC worker)</p>
Mood	<p>“You’re feeling tired. You’re more grumpy if you’re tired...stuff that wouldn’t annoy you normally if you were off, but agitates you on day three or day four, when you’re tired and your sleep pattern’s been disrupted, it goes hand in hand...”</p> <p><i>“I’m sure our other halves can all tell when we’re working and when we’re off, that’s for sure...it’s like we’re different people.” (M/I workers)</i></p> <p>“You know you’re in bed, the curtains are drawn like so you’re in the dark during the day as well, you go to work you’re in the dark”;</p> <p>“Yeah, there is a certain amount of, you can get affected by that” (M/I workers)</p>
Positive aspects	<p><i>“...you’ve days off during the week or whatever. It has its plus and minuses...bring your kids to school and collect them on days off” (HSC worker)</i></p> <p><i>“You know we’d have a request book so maybe there’s a particular hospital appointment or something that you need to be off for...and generally that request is upheld. So that does make working in this work environment easier” (HSC worker)</i></p> <p><i>“When you’re here you’re here for a long time but when you’re off, you’re off for a relatively long time” (M/I worker)</i></p> <p><i>“Yeah, I could never do 5 days, 8 to 4 or 9 to 5, because I’ve been on 4 cycle shift for 15 odd years and the days off you get during the week because the way the shift falls, you know you’d have to, whatever go to the bank or whatever you have to do, mow the lawn, if you have DIY jobs to do around the house, you can get them done. Because if you’re working all week long, during days, you’ve only a small space of time at the weekend to do these things” (M/I worker)</i></p>