Health behaviours of forensic mental health service users, in relation to smoking, alcohol consumption, dietary behaviours and physical activity – A mixed methods systematic review

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Abstract

Introduction: People with mental disorders have increased risk of dying from diabetes and cardiovascular diseases, both of which can be prevented by lifestyle. Aim: To review existing research, in order to investigate the characteristics of, and factors that influence forensic mental health service users’ (FMU) health behaviours. Method: We searched PubMed, CINAHL, PsycInfo, and Scopus for primary research on FMU’s health behaviours regarding smoking, alcohol consumption, physical activity, and dietary behaviours, and factors that influence them. Results: We found 13 eligible studies. The findings consistently indicated the presence of unfavourable health behaviours in FMU: Smoking, problematic alcohol consumption, physical inactivity, and a high-calorie diet of poor nutritional value. Changing smoking and dietary habits was perceived as difficult, but nicotine replacement and practical advice were suggested to support change. Discussion: The existing research on FMU’s health behaviours is sparse. In particular, there is a lack of research on factors that influence health behaviours. From our findings, it seems likely that FMU’s unfavourable health behaviours contribute to their increased risk of dying from diabetes and cardiovascular diseases. Implications for practice: FMU’s health behaviours should be improved to prevent diabetes and cardiovascular diseases in this high-risk group.
Relevance statement

Forensic mental health service users are at high risk of developing lifestyle diseases and eventually die from them. Therefore, it is important to investigate how lifestyle diseases can be prevented in this high-risk group. Since lifestyle is a modifiable factor, that affects the risk of lifestyle diseases, it is an obvious target for prevention. This paper reviews forensic mental health service users’ health behaviours and factors that influence them. The knowledge is important in the development of future prevention of lifestyle diseases.

Introduction

Globally, mortality among people with mental disorders has been found to be 120% higher than in the general population (Walker, McGee, & Druss, 2015). There are multiple reasons for their increased mortality, e.g., suicide and lifestyle diseases. Mortality from unnatural causes of death, such as suicide and unintentional injury, is significantly higher in people with mental disorders compared to the general population, with a relative risk of 7.2. However, in relation to natural causes of death, there are also substantial differences, with 80% higher risk in people with mental disorders compared to the general population (Walker et al., 2015). In people with mental disorders, diabetes and cardiovascular diseases are significant natural causes of death, with a mortality approximately two-fold that of the general population, although varying with regard to gender, country and psychiatric disease (Nordentoft et al., 2013). Given that the global number of deaths due to cardiovascular diseases alone is more than twice the number of deaths due to suicide, even a small increase in relative risk of mortality from cardiovascular diseases and diabetes entails many deaths (Meier et al., 2019; Naghavi, 2019).
In people with mental disorders on antipsychotic medication, diabetes and cardiovascular diseases are partly caused by medication side effects (De Hert, Detraux, van Winkel, Yu, & Correll, 2011; Whicher, Price, & Holt, 2018). However, the risk of developing diabetes and cardiovascular diseases is also affected by lifestyle. In a meta-analysis of the association between lifestyle and type 2 diabetes, adhering to a healthy lifestyle was associated with a 78% reduced risk for type 2 diabetes compared with low adherence to a healthy lifestyle. In this study, a healthy lifestyle was defined by the mostly favourable diet, physical activity, non-smoking, moderate alcohol intake, and normal weight. Furthermore, the meta-analysis showed 57% reduction in all-cause-mortality in people with type 2 diabetes, when healthy lifestyle was compared to low adherence to healthy lifestyle (Schlesinger, Neuenschwander, Ballon, Nothlings, & Barbaresko, 2020). Therefore, the lifestyle is important in the prevention of diabetes, but it is also important when the disease is already present. As for diabetes, no smoking, moderate alcohol consumption, physical activity, and a healthy diet reduce the risk of cardiovascular diseases (Rippe, 2019).

Since health behaviours are modifiable, these are obvious targets for prevention of elevated mortality in people with mental disorders. Accordingly, several studies recommend that people with mental disorders should improve their lifestyle (De Hert et al., 2011; Holt & Mitchell, 2015; Kumar et al., 2017; Nyboe, Vestergaard, Moeller, Lund, & Videbech, 2015).

Forensic mental health service users (FMU) constitute a subgroup of people with mental disorders, who have been referred for psychiatric treatment or placement at a mental health facility following a juridical sentence by a court. The health care system and treatment of FMU varies between countries. However, forensic mental health services need to address symptoms of the mental illness and the offending behaviour, and the purpose of treatment in forensic mental health services is to treat a person’s mental illness, improve quality of life, facilitate reintegration into community, and ultimately to reduce the likelihood of further offending. If the FMU refuses to cooperate, coercion may occur e.g. in regard to medication. Furthermore, there are security restrictions adjusted to each FMU while in hospital, e.g. limitations regarding leave.

The number of FMU increases both in Denmark and internationally (Jansman-Hart, Seto, Crocker, Nicholls, & Côté, 2011). In Denmark, the number of FMU was 4246 in 2016, and the number of new FMU has been growing with an annual growth rate of 6.8% from 1980 to 2000 and 15.7% from 2003 to 2006 (Danske-regioner, 2016; Gabrielsen & Kramp, 2007). The duration of the sentence and thereby treatment...
A large proportion of FMU are prescribed antipsychotic medication, which increases the risk of cardiovascular diseases and diabetes, and there is frequent use of antipsychotic polypharmacy (Farrell & Brink, 2020). Furthermore, studies indicate that weight control is a problem in these service users. In a survey from the UK, 81.6% of the FMU in a secure psychiatric hospital were overweight or obese. Furthermore, approximately twice as many of the FMU in this study had gained weight during the previous three months, compared to those FMU who had lost weight (Haw & Rowell, 2011). A considerable weight gain was also found in a Canadian study of FMU in inpatient care, where the mean weight change per month was +3.67 kg, and it was not associated with use of atypical antipsychotics (Hilton, Ham, Lang, & Harris, 2015). The presence of overweight, obesity and weight gain indicate a need for change in FMU’s health behaviours.

FMU are often treated over extended periods of time and are required by the sentence to attend consultations by the treating psychiatrists and nurses. This provides an opportunity to affect health behaviours over a substantial period. To understand the potential for improvement, it is fundamental to know about FMU’s current lifestyles, which will help to target prevention. Furthermore, an understanding of factors influencing FMU’s health behaviours will inform how these factors are taken into consideration in prevention planning.

In the present review, we seek to combine research on health behaviours regarding smoking, alcohol consumption, physical activity, and dietary behaviours to create an overview of FMU’s lifestyles and the factors that influence them. In our review, the term health behaviours will cover the following four health behaviours: Smoking, alcohol consumption, physical activity, and dietary behaviours. To the best of our knowledge, this is the first review of FMU’s health behaviours and the factors that influence them.

Aim

The aim of this paper is to review existing research, in order to investigate the characteristics of, and factors that influence FMU’s health behaviours. The aim was operationalized into two research objectives:

1. To describe FMU’s current health behaviours
2. To identify factors influencing FMU’s current health behaviours
Methods

To gain the best possible understanding of the research questions, we included papers with various research methodologies, resulting in a mixed methods systematic review, guided by the Joanna Briggs Institute. According to the Joanna Briggs Institute, the core intention of a mixed methods systematic review “is to combine quantitative and qualitative data (from primary studies) or integrate quantitative evidence and qualitative evidence to create a breadth and depth of understanding” (Lizarondo, 2019). We conducted a systematic literature search in November and December 2019 in PubMed, CINAHL, PsycInfo, and Scopus (Figure 1). The searches were furthermore rerun on March 30th, 2020. The searches were built of two blocks combined with the Boolean operator “AND”. The words in the first block were combined with the Boolean operator “OR”, and it contained subject headings and free text words related to the study population. The words in the second block were also combined with the Boolean operator “OR”, and it contained subject headings and free text words related to health behaviours. When the databases allowed for filtration of publication date and/or language, these filters were applied. The search terms and filters used in PubMed are presented in Table 1. The search history of the searches performed in CINAHL, PsycInfo, and Scopus are to be found in Supporting information 1. The findings regarding each health behaviour were synthesized using a convergent segregated approach, where quantitative and qualitative findings were synthesised separately in a narrative summary (Lizarondo, 2019). Subsequently, the findings were integrated, also in a narrative summary.

Study selection

The software system Covidence was used for the selection process (Covidence). The first and second authors independently screened the titles and abstracts, in a process where choices of inclusion/exclusion were blinded to the other author. In cases of disagreement, the entire group of authors were included in the discussion. Full-text assessment was conducted in a similar process. When the eligible papers were identified, their reference lists were screened for further studies to include in the present review, by the two authors who did the preceding selection process. Furthermore, the corresponding author of one eligible study (Meiklejohn & Sanders, 2003) was contacted to seek clarification on some questions that arose.
Eligibility criteria

The following criteria were established for inclusion in the present review:

- Published in a peer-reviewed journal after December 31st 1999
- Written in English, Danish, Swedish, or Norwegian
- Reported original data
- The paper should contain a methods section
- The study population should be convicted FMU
- The study population was not in prison
- The study population should be 18 years or older
- The study population was not intellectually disabled

Further criteria applicable only to the first research objective were:

- Reported data on FMU’s health behaviours while in forensic mental health treatment
- Reported data on the health behaviours of FMU who were unaffected by research interventions (i.e. data from observational studies or baseline data from intervention studies)

Further criteria applicable only to the second research objective were:

- Reported data on factors influencing FMU’s health behaviours while in forensic mental health treatment
- A relation between FMU’s health behaviours and the factors influencing them should be explicitly stated by the respondent or the author of the paper in question.

Quality appraisal

The quality of the eligible studies was assessed by use of the Mixed Methods Appraisal Tool (Hong, 2018). The first and second authors independently evaluated the quality. Disagreements were discussed and consensus reached on final decisions.

Some studies had primary outcomes other than the outcomes relevant for the present review. To target the quality appraisal, the category of the eligible studies was evaluated in regard to the methods used for collection of the data included in the present review. For example, in a mixed methods study where only qualitative data was relevant for the present review, only the qualitative data would be appraised.

Furthermore, only the measurements used to collect data relevant for the present review were appraised in item 4.3 “Are the measurements appropriate?” in the appraisal tool. The results of the quality appraisal
did not affect the selection process, as all studies fulfilling the previously stated eligibility criteria were included.

Data extraction

Data was extracted from the original papers onto a pre-formed data extraction sheet (to be found in Supporting information 2). The process was done independently by the first and second authors. Subsequently, the completed data extraction sheets were compared, and the original papers were checked in cases of disagreement. The data extraction sheet contained information on study design, data collection method, characteristics of the sample, and findings relevant to the research objectives of the current review.

Results

Results of study selection and characteristics of the studies

The search in the four databases resulted in 3397 hits (Figure 1). When duplicates were removed and the abstracts screened, 2854 remained for full-text screening. Of these, 12 studies were included in the present review. The rerun of the database search resulted in 81 additional records; 49 from PubMed, 18 from Cinahl, 4 from PsycInfo, and 10 from Scopus. These 81 records were screened by title and abstract, and two were full-text assessed for eligibility. One of the studies from the rerun of the database search met the eligibility criteria and was included. The screening of reference lists did not reveal any new studies to include. A list of the studies that were excluded after full-text assessment and reasons for exclusion is to be found in Supporting information 3.

Of the 13 eligible studies, six studies concerned smoking, three concerned alcohol consumption, four concerned physical activity, and three concerned dietary behaviours (Table 2). Two of the studies presented data on more than one health behaviour.

The sample size in the quantitative studies ranged from 19 to 291, with only two studies sampling more than 92 FMU (Hilton et al., 2015; Smajoljers, Bulten, Buitelaar, & Verkes, 2018). Most studies were performed in the English speaking countries: UK (Dickens, Stubbs, Popham, & Haw, 2005; Long, Brillon, Schell, & Webster, 2009; Long & Jones, 2005; Meiklejohn & Sanders, 2003; Qurashi et al., 2019; Sender-Galloway & Clark, 2013); New Zealand (Forsyth, Elmslie, & Ross, 2012; Huthwaite, Elmslie, Every-Palmer, Grant, & Romans, 2017); Australia (Hehir, Indig, Prosser, & Archer, 2012; Ogloff, Lempers, & Dwyer,
In 11 studies, the participants were FMU in inpatient care (Bergman et al., 2018; Dickens et al., 2005; Forsyth et al., 2012; Hehir et al., 2012; Hilton et al., 2015; Huthwaite et al., 2017; Long et al., 2009; Long & Jones, 2005; Meiklejohn & Sanders, 2003; Ogloff et al., 2004; Qurashi et al., 2019), whereas only two studies were performed on FMU in outpatient care (Sender-Galloway & Clark, 2013; Smeijers et al., 2018). Both of the two latter studies presented data on alcohol consumption.

The age of the participants was presented as mean age in most studies, and the mean was between 32.7 and 42 years. Overall, most participants were men, and three studies were performed exclusively on men (Hilton et al., 2015; Qurashi et al., 2019; Sender-Galloway & Clark, 2013); however, one study was performed exclusively on women (Long et al., 2009).

Results of quality appraisal

Most methodological quality criteria were met (Table 3). However, risk of non-response bias was present in seven studies. The risk of non-response bias was due to low response rates, FMU who refused to participate, and differences in characteristics between FMU who participated and those who did not. Furthermore, it was not possible to appraise the quality of the measuring tool in three studies due to lack of information in this regard: Two studies collected data from medical records, but the way the data in the records was measured was not described (Hilton et al., 2015; Meiklejohn & Sanders, 2003). The third study collected data by way of a questionnaire, but it was not stated whether the questionnaire was validated (Dickens et al., 2005).

Results of data synthesis and integration

In the following presentation and synthesis of the findings, the studies are grouped according to the health behaviour they inform.
Smoking

Of the six studies concerning smoking in FMU (Table 4), four studies presented data from questionnaires or structured interviews; one study did not state the data collection method, and one study presented both data collected from questionnaires and data collected from focus groups. All studies regarding smoking were conducted on FMU in inpatient care.

The proportion of smokers was found to be between 53% and 84%. However, in the study with 53% smokers, the hospital was smoke-free, and smoking was therefore only possible for FMU with community leave. Additionally, this study found that current smokers had been FMU for longer than current non-smokers. Only one study reported the degree of smoking among smokers. This study found the mean number of cigarettes smoked per day to be 25.

Two studies quantitatively investigated factors influencing smoking cessation. That smoking cessation is perceived as challenging among FMU was confirmed in a study on current smokers, where 73.5% agreed that “it’s just too difficult to give up smoking”. In that study, 79.4% of the FMU stated that “seeing other patients smoking would make it difficult to stop smoking”. This is in accordance with the findings of the second study, which was performed on previous smokers who were hospitalized in a smoke-free hospital. Most FMU in this study indicated that “it was easier to stop when nobody else smoked”. Furthermore, perceived consequences of smoking cessation were boredom and weight gain. Despite barriers to smoking cessation, 58% of FMU who were discharged from the smoke-free hospital remained non-smokers after an average of 1 year from discharge (Hehir et al., 2012). This considerable proportion of FMU who remained non-smokers is, however, contradictory to another study of FMU who were transferred from a non-smoking high secure hospital to a medium secure hospital where smoking was allowed. In that study, 24% of the FMU who were transferred from the smoke-free hospital remained non-smokers.

In the study of current smokers, lack of encouragement from staff (29.4%) and lack of information about smoking cessation (26.5%) were less frequent answers compared to the above-mentioned effect of seeing others smoking. Accordingly, a smoking cessation group and general support and advice were respectively perceived as most helpful among only 32.4% and 17.6%. Instead, most FMU (70.6%) perceived nicotine replacement therapy to be most helpful (Dickens et al., 2005).

In a qualitative study of inpatients in a smoke-free forensic hospital, most expressed that nicotine replacement therapy helped with their withdrawal and cravings when they arrived: “Patches helped to give up; quick and easy. Don’t need them now” (Hehir et al., 2012). However, challenges with nicotine
withdrawal was mentioned, and some service users were concerned that staff confused symptoms of nicotine withdrawal with mental illness. Furthermore, some expressed a need for support to remain smoke-free when they were discharged: “You’ve got to find something that’s going to replace it, like quitting the cigarettes. Maybe activities or something, you know. But I don’t know what there is out there” (Hehir et al., 2012).

To summarize, only one study presented qualitative findings; however, the quantitative and qualitative findings were in accordance. Smoking cessation was perceived as challenging, and this was reflected in a high proportion of smokers. The findings indicated a self-perpetuating pattern with a high proportion of smokers, where most smokers found it difficult to stop smoking when others smoked. Furthermore, challenges regarding nicotine withdrawal were found. This was in accordance with the finding that most FMU would find nicotine replacement therapy most helpful if they decided to stop smoking.

Alcohol consumption

Three studies presented data on FMU’s alcohol consumption, and all data were quantitative (Table 5). One study was performed on inpatients, who have limited access to alcohol. This study found that 7% of males and 10% of females had current alcohol abuse or a dependence disorder according to DSM-IV (SCID-IV). The remaining two studies investigated alcohol consumption in FMU in outpatient care. One of these studies was designed to investigate aggression treatment, and they excluded service users with current severe addiction, current major depression, or lifetime bipolar disorder or psychosis (Smeijers et al., 2018). Therefore, the finding of a mean alcohol consumption of 7.99 units/week represents FMU with no severe addiction. The second study on FMU in outpatient care exclusively included men. This study found that 18.5% of the service users used alcohol problematically; in 3.3% of the service users, there was always evidence of associated problems or dangerous use, whereas this was sometimes the case in 13%. In addition, 1.1% had alcohol dependence syndrome, and a further 1.1% was alcohol dependent with problems so severe that non-institutional living was difficult.

Altogether, we found no qualitative studies and no studies investigating alcohol consumption or factors that influence it.
1 Physical activity

2 Four studies presented data on physical activity in FMU. These are presented in
Table 6. All studies investigated FMU in inpatient care by use of quantitative methods. Three collected information through questionnaires and one study used data from medical records.

The latter was a study with a sample size of 297 male FMU, of whom 34% were found to be physically inactive. It should be noted though, that the way the data in the records was measured was not described, and it was therefore not possible to appraise the quality of data. A much smaller study of 28 FMU found that 32% had a physical activity level below the recommended 150 mins/week. In this second study, the FMU were physically active approximately 4.5 hours per week on average. This is in line with the third study, where 27% of the FMU rated their physical activity as occurring rarely or never and 37% were categorized as insufficiently active, resulting in low health benefit, according to a health benefit score (Godin, 2011). The same study categorized 47% as active, resulting in substantial health benefit according to the health benefit score, with 16% categorized as moderately active. This polarization in the health benefit score was nevertheless not evident in the answers regarding physical activity frequency, where more than half of the FMU rated their physical activity as occurring sometimes.

One possible explanation for the abovementioned findings of inactivity is limited opportunities to exercise. In a small study of female FMU, 75% of those whose risk status allowed little off-ward activity reported having few opportunities to exercise. Furthermore, 82% of the entire sample expressed a desire to exercise more. This desire was nevertheless not apparent in actions, since only 21% of the FMU participated in the weekly physical activities available.

We found no qualitative studies investigating physical activity level or factors that influence it in FMU.

Dietary behaviours

The three studies concerning dietary behaviours are presented in Table 7. Dietary behaviours were investigated by use of personal menu choice cards in one study of 42 FMU. A second study investigated dietary behaviours by use of observations and a questionnaire in 41 female FMU. The third study investigated barriers and factors that reduce barriers to healthy eating in FMU. All three studies were conducted on FMU in inpatient care.

Both studies investigating dietary behaviours found several indicators of a high energy intake. The data from the menu choice cards showed that the diet was characterized by energy-dense and nutrient-poor food choices. Furthermore, large portion size was preferred over standard portion size, and some FMU
ordered two lunches. Accordingly, the observations showed that most FMU ate meals consisting mainly of carbohydrates and fat, while vegetables and fruit were eaten infrequently. Even though the calorific value of meals provided on wards was such that additional energy intake would result in weight gain, 57% reported having two or more takeaway meals per week, often in addition to provided meals. The calorie content of takeaway meals was often equivalent to one day’s recommended calorie intake (Long et al., 2009).

Snacking was also prevalent in both studies. In one study, 86% of the FMU purchased, at least once a week, energy-dense, nutrient-poor, foods in addition to hospital meals. In that study, the average additional calories from purchased foods was 420 kcal per day (Long et al., 2009). The survey showed similarly a high frequency of energy dense food purchasing and snacking. According to this survey, almost half of the FMU were most likely to snack in the evening. Regarding more health-promoting food, 75% reported that they ate one or more pieces of fruit per day, although fruit sometimes was available only at certain times.

Besides large portion sizes, additional take-away meals, and snacking, beverages also contributed to the energy intake in both studies. The menu choice cards showed that 75% chose the regular soft drinks in preference to the sugar-free ones. The other study showed a noteworthy intake of milk, carbonated drinks, and sugar in tea or coffee.

Despite the abovementioned unfavourable dietary behaviours, 82% of FMU in the survey responded that they would like to eat a healthier diet. Nevertheless, only 35% stated that they were following advice from a dietician, even though 51% had received advice from a dietician.

Barriers and factors reducing barriers to healthy eating were investigated in a study where nine nurses of FMU in inpatient care were interviewed. This study found that lack of nutritional knowledge among both FMU and staff was a barrier to healthy eating. Furthermore, the nurses found it difficult to promote awareness and understanding of healthy eating, and FMU were perceived as resistant to change: “... Even though it’s [nutrition information] being fed to them, they’re not really taking it on board. They still haven’t grasped it . . . [they think] this is what I have to do because I’m told to.” (Forsyth et al., 2012). Changing eating habits was found particularly problematic when institutionalisation and medication had influenced FMU’s eating habits. The nurses suggested that simple, practical information would help to reduce barriers to healthy eating: “And meal ideas. What to make. That would be a great help.” And “Bread, how many slices are we allowed for breakfast and lunch? And what’s the equivalent? Are two slices of bread equivalent to one pita pocket?” (Forsyth et al., 2012).
Overall, the findings of dietary behaviours consistently indicated a high energy intake in FMU. The diet was characterised by large portion sizes of energy-dense food of poor nutritional value, supplemented by energy-containing drinks and snacks. This is in accordance with the qualitative findings of lack of nutritional knowledge and difficulties in changing eating habits.

Discussion

The research on characteristics of, and factors that influence FMU’s health behaviours was found to be scarce. Overall, the findings indicated the presence of unfavourable health behaviours in the target group: smoking, problematic alcohol consumption, physical inactivity, and a diet of poor nutritional value and rich in calories. Thus, it seems likely that lifestyle is one reason for the excess mortality from diabetes and cardiovascular diseases in people with mental disorders (Nordentoft et al., 2013). Furthermore, a substantial average weight gain of 3.7 kg/month was observed in one of the eligible studies (Hilton et al., 2015), which is consistent with a high energy intake and little physical activity. Besides the finding of unfavourable health behaviours, we found several research gaps.

Smoking

The studies concerning smoking generally found a high proportion of smokers. However, one study found the proportion of smokers to be notably smaller than the other studies investigating smoking (Huthwaite et al., 2017). The study with the fewest smokers was performed on FMU in a smoke-free hospital, and smoking was therefore only possible for those on community leave. One could therefore deduce that smoke-free hospitals reduce smoking. Nevertheless, this would probably be a temporary effect, since another study showed that 74% of FMU commenced smoking when they were transferred from a smoke-free unit to a unit where smoking was allowed (Qurashi et al., 2019).

Another approach to smoking cessation in FMU is smoking cessation programmes during hospitalization. This has been done in a study that was not included in our review because it did not meet our eligibility criteria. The study was performed on 79 intellectually-disabled patients resident in a forensic unit (Chester, Green, & Alexander, 2011). In that study, 60.8% of the patients were smokers when they were admitted, of whom 31% gave up smoking during their treatment. Furthermore, the patients who continued smoking did so to a lesser extent; the average number of cigarettes fell significantly from 30.65...
to 10.95 cigarettes per day in these patients. The smoking cessation programme consisted of a smoking
timetable allowing a maximum of one cigarette per hour during waking hours, voluntary nicotine
replacement, voluntary one-to-one sessions with a nurse, voluntary group sessions, and health
information from the patients’ general practitioner (Chester et al., 2011). Unfortunately, the study design
did not allow for attribution of the effect to a specific part of the intervention. However, most of the
interventions in that study relate to the questionnaire answers of one of the studies included in this
review (Dickens et al., 2005): One intervention was nicotine replacement. In the questionnaire, 70.6% of
the smokers answered that nicotine replacement would be most helpful if they decided to stop smoking.
Another intervention was group sessions, and 32.4% of the smokers responded in the questionnaire that
they would find this most helpful. The health information from the patients’ general practitioners relates
to the questionnaire response that general support and advice was expected to be most helpful, which
only 17.6% of the smokers agreed on.

Alcohol consumption

During the selection process, we excluded several studies that investigated alcohol consumption in FMU
by use of data from medical journals. These were excluded because diagnoses of alcohol abuse or
dependence registered in medical journals have been found to differ from current alcohol abuse or
dependence (Ogloff et al., 2004). The decision to exclude such studies, however, meant that only three
studies concerning alcohol consumption were included.

One of the studies excluded those with current severe addiction (Smeijers et al., 2018). The
representativeness of this study is therefore questionable, and the use of alcohol is most likely
underestimated as a consequence. Lack of representativeness is also an issue in one study, because it was
performed exclusively on men (Sender-Galloway & Clark, 2013).

The study of FMU in inpatient care found that 7% of males and 10% of females had a current alcohol
abuse or dependence disorder. This study did not state whether abuse or dependence contributed most
to these numbers. Nevertheless, we assume that alcohol is limited for FMU in inpatient care, and the
results may therefore represent alcohol dependence rather than alcohol abuse. We also question the
validity of the findings of the study conducted in FMU in inpatient care. In that study, the number of
participants that can be calculated from the results is different from the number of participants given as
the sample size (Ogloff et al., 2004).
The conditions for health behaviours regarding alcohol consumption is different from the other health behaviours reviewed, since alcohol is limited during hospital stay. Nevertheless, FMU in inpatient care may have alcohol dependence, and alcohol should therefore also be considered during the hospital stay. In a study on FMU in inpatient care, substance treatment was provided during the hospital stay with the aim of minimizing future substance use (Ritchie, Weldon, Freeman, MacPherson, & Davies, 2011). In that study, the treatment consisted of a range of group sessions and individual sessions. At the end of the programme, each participant had developed an individual plan, including coping strategies. This programme resulted in increased confidence in resisting substances. However, we don’t know whether the increased confidence lasted when the FMU were discharged from the hospital. In addition, we don’t know whether the increased confidence affected alcohol consumption.

Physical activity

The studies on physical activity indicated that approximately one third of FMU in inpatient care were inactive. The method of data collection was not stated in one study (Hilton et al., 2015) and all the remaining studies collected data by use of questionnaires. Self-reported data on physical activity have been found to be less precise, compared to direct measures (Prince et al., 2008). With one study using an unknown data collection method and the rest using self-reported data, the data in the eligible studies might have been imprecise. However, we do not expect that the methodological issues skewed the results, since both overestimation and underestimation can arise from self-reported data (Prince et al., 2008). The impact of the method on the findings is exemplified in one of the eligible studies (Huthwaite et al., 2017). In that study, 53% of the FMU rated their physical activity as occurring sometimes (category two of three), whereas only 16% were categorized as moderately active (also category two of three), according to the health benefit score.

One of the eligible studies indicated that FMU wished to exercise more, despite little participation in weekly physical activities (Long et al., 2009). It was not stated what the weekly physical activities consisted of in that study, but the limited participation could indicate that the content was not suitable for the FMU. In contrast, a study on people with intellectual disabilities in secure settings implemented community football successfully (Hudson et al., 2018). In that study, the participants reported substantial psychosocial benefits besides the physiological effects. Furthermore, a small exploratory study on two FMU in inpatient care successfully implemented Wii-Fit, which is a videogame involving physical activity for the player (Bacon, Farnworth, & Boyd, 2012). In that study, the FMU changed their attitudes towards...
physical activity, as they experienced that it can be fun. The Wii-fit was considered a motivating, enjoyable, and meaningful activity. These two studies underline the importance of a holistic approach when planning physical activities for FMU.

Dietary behaviours
The studies concerning dietary behaviours indicated a high energy intake in FMU; the portion sizes were large, the food was energy-dense, and snacking was prevalent. Furthermore, the food was of nutritional low value, and knowledge of healthy eating was sparse. The study that found sparse knowledge, however, only interviewed nurses working with FMU (Forsyth et al., 2012). Since FMU were not interviewed or otherwise investigated in regard to nutritional knowledge, one could question the validity of the finding of sparse nutritional knowledge. Furthermore, this study interviewed only nine nurses. The results regarding factors influencing dietary behaviours should therefore be extrapolated with caution.

The studies investigating dietary behaviours did so by observations, a questionnaire, and data from personal menu choice cards. In contrast to the studies investigating physical activity, we do not consider self-report bias to be a considerable issue in the studies concerning dietary behaviours. One study explicitly tried to compensate for potential self-report bias in their questionnaire answers by also observing the FMU (Long et al., 2009). The other study did not use a self-report method (Huthwaite et al., 2017). The latter study, however, only collected data on what was ordered; we do not know what was actually eaten. Furthermore, the study found that 86% of FMU purchased foods and beverages in addition to hospital meals at least once a week. However, it was not stated how this data was collected. Therefore, it is not possible to evaluate the validity of this finding.

With the goal of improving diet, some studies implemented healthy eating groups or advice from a dietician (Cormac, Hallford, Hart, Creasey, & Ferriter, 2008). Both of these interventions require effort from the FMU if they are to succeed. On the other hand, what is learned during the intervention can be used by the FMU when he/she is no longer in psychiatric treatment. In addition to healthy eating groups and advice from a dietician, one of the eligible studies described other ways of changing FMU’s diets. The study found that FMU did most of their snacking in the evening. As an attempt to reduce snacking, dinnertime was changed from 5 pm to 6.30 pm, leaving less time for evening snacking. Furthermore, the food served in the hospital was adjusted to be healthier, and meals were dispensed by staff to promote appropriate portion size (Long et al., 2009). These latter interventions will probably improve the diet without effort from the FMU; however, the FMU are not actively participatory in the intervention, and the
Effect is therefore likely to be low, or not present, after the hospital stay. Furthermore, components of successful lifestyle programmes have been investigated in a meta-review. That study found that successful lifestyle programmes employed multiple components, personalization, longer duration, more frequent contact, and trained treatment providers (Ward, White, & Druss, 2015).

Implications

Given that FMU are at high risk of developing diabetes and cardiovascular diseases, and subsequently experience adverse health and may die, prevention is required. We found few studies on factors that influence FMU’s health behaviours, thus such studies should be conducted to give the opportunity for health professionals to implement evidence-based prevention. It seems reasonable to incorporate the prevention into the treatment, as the treatment usually spans a substantial period of time. It seems likely that the prevention needs to be differentiated between FMU in inpatient care and FMU in outpatient care, e.g. the treatment setting affects the amount of support from health professionals. Furthermore, we found studies on FMU from smoke-free hospitals. That is an example of regulation of FMU in inpatient care which is not possible in outpatient care. Likewise, physical activity, alcohol use, and dietary behaviours can be regulated in FMU in inpatient care however, FMU’s autonomy should be considered.

We suggest a holistic approach when planning prevention activities, because activities that are perceived as fun are more likely to succeed. We also suggest implementing both interventions that require active FMU participation, which have potential to affect health behaviours after the treatment, and interventions requiring little effort from FMU. Furthermore, multiple components, personalization, longer duration, more frequent contact, and trained treatment providers have been found to be elements in successful lifestyle programmes (Ward et al., 2015).

Strengths and Limitations

Our review used the methodology of mixed methods systematic reviews (Lizarondo, 2019). The methodology is a strength of our study, since it has the potential to provide a more complete picture of a specific area, compared to single method reviews (Grant & Booth, 2009). Furthermore, databases and reference lists were thoroughly and systematically searched for studies to include. The processes of study selection, data extraction, and quality appraisal were also thoroughly and systematically performed independently by two of the authors. Despite this exhaustive process, we found only 13 studies that were eligible for inclusion, and a limitation of our review is therefore the low number of eligible studies.
Overall, most methodological quality criteria were met in the quality appraisal of the eligible studies. This present review might nevertheless have issues in regard to the representativeness of the samples. First, the risk of non-response bias was present in several studies. Furthermore, item 4.2 of the quality appraisal tool “Is the sample representative of the target population?” was answered in regard to the target population of the study. In some studies, the target population was a subpopulation of the population in our review, e.g., some studies only investigated one gender, whereas other studies excluded FMU with certain mental diagnoses.

Another issue regarding representativeness is geography. Most studies were from English-speaking countries, mainly the UK, and we found no studies from Asia, Africa, USA, or South America. Different countries provide different settings, and these settings will probably affect the health behaviours. One example of this is smoke-free hospitals in some countries, which is also represented in the present review (Hehir et al., 2012; Qurashi et al., 2019). Therefore, an extrapolation of our results to geographic areas not included in our review should be done with caution. The legal system and health care system also differ between countries. One issue in this regard is differences in the treatment setting of people with psychiatric diagnoses who commit a crime. We chose to exclude studies on prisoners with psychiatric diagnoses to increase the comparability of the included studies, resulting in fewer eligible studies.

Variation in cultures within each country may also affect health behaviours. Therefore, we extracted information about ethnicity of the samples in the eligible studies. This data was nevertheless limited, since only two studies gave information about ethnicity of the sample (Huthwaite et al., 2017; Ogloff et al., 2004). Consequently, we did not include information about ethnicity in this review, which limits the evaluation of representativeness.

As previously mentioned, most studies were performed on FMU in inpatient care and, as a consequence, our findings regarding smoking, dietary behaviours and physical activity represent FMU in inpatient care rather than FMU in general. However, this was not the case regarding alcohol consumption.

**Conclusion**

The research on FMU’s health behaviours is sparse, and several research gaps were identified. The existing literature consistently reported unfavourable health behaviours regarding smoking, alcohol consumption, physical activity, and dietary behaviours. Smoking cessation was perceived as challenging, especially when FMU were surrounded by smokers. Nutritional knowledge was perceived as sparse by
nurses, and they suggested information about various practical nutritional issues to reduce the barriers to
healthy eating. Studies investigating factors that influence alcohol consumption and physical activity were
not found. Overall, more studies are needed on FMU’s health behaviours and the factors that influence
them. In particular, there is a lack of studies on factors influencing FMU’s health behaviours and studies
conducted in FMU in outpatient care.
References


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Table 1: Search terms exemplified by the search in the electronic database PubMed.

<table>
<thead>
<tr>
<th>Search Term</th>
<th>Search Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;forensic psychiatry&quot; [mesh]</td>
<td>&quot;life style&quot; [mesh]</td>
</tr>
<tr>
<td>OR</td>
<td>OR</td>
</tr>
<tr>
<td>&quot;forensic psychiatry&quot;</td>
<td>&quot;life style*&quot;</td>
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<tr>
<td>OR</td>
<td>OR</td>
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<tr>
<td>&quot;forensic nursing&quot; [mesh]</td>
<td>&quot;lifestyle*&quot;</td>
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<td>OR</td>
<td>OR</td>
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<tr>
<td>&quot;forensic nursing&quot;</td>
<td>&quot;health behavior&quot; [mesh]</td>
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<td>OR</td>
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<td>&quot;forensic patient*&quot;</td>
<td>&quot;health behavior*&quot;</td>
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<td>&quot;forensic psychiatric patient*&quot;</td>
<td>&quot;health behaviour*&quot;</td>
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<td>OR</td>
<td>OR</td>
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<tr>
<td>&quot;Forensic inpatient*&quot;</td>
<td>&quot;diet, food, and nutrition&quot; [mesh]</td>
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<tr>
<td>OR</td>
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<tr>
<td>&quot;forensic outpatient*&quot;</td>
<td>&quot;diet*&quot;</td>
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<td>&quot;forensic mental health&quot;</td>
<td>&quot;food*&quot;</td>
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<td>OR</td>
<td>OR</td>
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<td>&quot;forensic service*&quot;</td>
<td>&quot;exercise&quot; [mesh]</td>
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<td>OR</td>
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<td>&quot;secure service*&quot;</td>
<td>&quot;physical activity&quot;</td>
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<td>&quot;civil commitment&quot;</td>
<td>&quot;physical inactivity&quot;</td>
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<td>OR</td>
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<td></td>
<td>&quot;smoking&quot;</td>
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<td>&quot;smoking*&quot;</td>
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<td></td>
<td>&quot;alcohol*&quot;</td>
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<td>OR</td>
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<td>&quot;drinking&quot;</td>
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</tbody>
</table>
Table 2: Overview of health behaviours investigated, and research methodologies used in the eligible studies

<table>
<thead>
<tr>
<th></th>
<th>Dietary behaviours</th>
<th>Smoking</th>
<th>Alcohol consumption</th>
<th>Physical activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantitative</td>
<td>Qualitative</td>
<td>Quantitative</td>
<td>Qualitative</td>
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<tr>
<td>(Bergman et al., 2018)</td>
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<td>(Dickens et al., 2005)</td>
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<td>(Forsyth et al., 2012)</td>
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<td>(Hehir et al., 2012)</td>
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<td>(Hilton et al., 2015)</td>
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<td>(Huthwaite et al., 2017)</td>
<td>X</td>
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<tr>
<td>(Long &amp; Jones, 2005)</td>
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<tr>
<td>(Long et al., 2009)</td>
<td>X</td>
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<tr>
<td>(Meiklejohn &amp; Sanders, 2003)</td>
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<tr>
<td>(Ogloff et al., 2004)</td>
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<tr>
<td>(Qurashi et al., 2019)</td>
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<tr>
<td>(Sender-Galloway &amp; Clark, 2013)</td>
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<tr>
<td>(Smeijers et al., 2018)</td>
<td></td>
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<tr>
<td>Category of study design</td>
<td>Methodological quality criteria</td>
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<tr>
<td></td>
<td>1. Is the qualitative approach appropriate to answer the research question?</td>
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<td>2. Are the qualitative data collection methods adequate to address the research question?</td>
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<td>3. Are the findings adequately derived from the data?</td>
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<td>4. Is the interpretation of results sufficiently substantiated by data?</td>
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<td>5. Is there coherence between qualitative data sources, collection, analysis and interpretation?</td>
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<tr>
<td>1. Qualitative</td>
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<tr>
<td>4. Quantitative descriptive</td>
<td>4. Is the sampling strategy relevant to address the research question?</td>
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</tbody>
</table>
4.2. Is the sample representative of the target population?  

| Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

4.3. Are the measurements appropriate?  

| Yes | Can’t tell | Yes | Can’t tell | Yes | Yes | Yes | Can’t tell | Yes | Yes | Yes | Yes |

4.4. Is the risk of nonresponse bias low?  

| No | No | No | Yes | No | Yes | No | Yes | No | Yes | Yes | No |

4.5. Is the statistical analysis appropriate to answer the research question?  

| Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Appraisal by use of the Mixed Methods Appraisal Tool (Hong, 2018). The studies were only appraised in regard to the methodologies used to collect data included in our review, leaving blank spaces elsewhere.
Table 4: Studies concerning smoking in forensic mental health service users

<table>
<thead>
<tr>
<th>Author, year</th>
<th>Method(s) of data collection</th>
<th>Sample</th>
<th>Results</th>
</tr>
</thead>
</table>
| (Dickens et al., 2005) | Structured interview | **Sample size:** 45  
**Diagnosis:** NA  
**Age:** Mean 36.0 years (SD 9.7)  
**Gender:** 58% male, 42% female  
**Country:** UK  
**Treatment setting:** Inpatients | 75.6% of participants reported themselves as current regular smokers (19 males and 15 females).  
**Current smokers’ views about giving up smoking:**  
79.4% agreed that “seeing other patients smoking would make it difficult to stop smoking”.  
73.5% agreed that “it’s just too difficult to give up smoking”.  
58.8% agreed that “the smoky atmosphere would make it too difficult to stop smoking”.  
55.9% agreed that “seeing members of staff smoking would make it difficult to stop smoking”.  
29.4% agreed that “there isn’t enough encouragement from staff to give up smoking”.  
26.5% agreed that “there isn’t enough information about giving up smoking”.  
70.6% would find nicotine replacement therapy most helpful if they decided to stop smoking.  
32.4% would find a smoking cessation group most helpful if they decided to stop smoking.  
17.6% would find general support and advice most helpful if they decided to stop smoking. |
<p>| (Hehir et al., Focus groups) | Focus groups | <strong>Sample size:</strong> | <strong>Focus groups:</strong> |</p>
<table>
<thead>
<tr>
<th>Year</th>
<th>Methodology</th>
<th>Sample Size</th>
<th>Diagnosis</th>
<th>Age</th>
<th>Gender</th>
<th>Country</th>
<th>Treatment Setting</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>Questionnaire</td>
<td>45</td>
<td>NA</td>
<td>78% in the range 30-49 years</td>
<td>Focus groups: 81% male, 19% female</td>
<td>Australia</td>
<td>Inpatients in a smoke-free hospital</td>
<td>Most participants felt that nicotine replacement therapy helped with their withdrawal and cravings when they arrived although some were still struggling with withdrawal and using nicotine replacement therapy months after admission. Some participants were concerned that symptoms of nicotine withdrawal were confused with mental illness by staff. Some participants suggested support strategies that would assist them to remain smoke-free when discharged.</td>
</tr>
<tr>
<td>2017</td>
<td>Structured interview</td>
<td>51</td>
<td>78% schizophrenia, 12% schizoaffective disorder, 4% bipolar affective disorder, 2% Psychotic disorder, 2% PTSD, 2% no diagnosis</td>
<td>Mean 38.0 years (SD 10.4)</td>
<td>78% male, 22% female</td>
<td>New Zealand</td>
<td>Inpatients</td>
<td>53% were current smokers. Current smokers had been in inpatient care for significantly longer than current non-smokers (30.7 months c.f 6.7 months, p &lt; 0.001).</td>
</tr>
<tr>
<td>Study</td>
<td>Method</td>
<td>Sample Size</td>
<td>Diagnosis</td>
<td>Treatment setting</td>
<td>Smoking Characteristics</td>
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</tr>
<tr>
<td>Long &amp; Jones, 2005</td>
<td>Questionnaire</td>
<td>19</td>
<td>47% schizophrenia, 53% personality disorder</td>
<td>Inpatients.</td>
<td>Mean smoking per day = 25 cigarettes.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Meiklejohn &amp; Sanders, 2003</td>
<td>Method NA</td>
<td>56</td>
<td>NA</td>
<td>Inpatients</td>
<td>84% were smokers.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Qurashi et al., 2019</td>
<td>Data from clinical notes</td>
<td>46</td>
<td>100% schizophrenia</td>
<td>Medium secure inpatients transferred from a non-smoking high secure unit</td>
<td>76% of the participants commenced smoking after transfer from non-smoking unit. 24% of the participants remained non-smokers after transfer from non-smoking unit.</td>
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</tbody>
</table>

Abbreviations: NA=Not available, SD=Standard deviation, PTSD=Post-traumatic stress disorder.
Table 5: Studies concerning alcohol consumption in forensic mental health service users

<table>
<thead>
<tr>
<th>Author, year</th>
<th>Method(s) of data collection</th>
<th>Sample</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Ogloff et al., 2004)</td>
<td>Structured interview:</td>
<td>Sample size: 73</td>
<td>7% of males had current alcohol abuse or dependence disorder.</td>
</tr>
<tr>
<td></td>
<td>DSM-IV (SCID-IV)</td>
<td>Diagnosis: 85% schizophrenia, 5% other psychotic disorders, 4% depression, 3% organic disorders, 2% personality disorders</td>
<td>10% of females had current alcohol abuse or dependence disorder.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Age: 40.19 years (SD 14.53)</td>
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<tr>
<td></td>
<td></td>
<td>Gender: 83% male, 17% female</td>
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<tr>
<td></td>
<td></td>
<td>Country: Australia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Treatment setting: Inpatients</td>
<td></td>
</tr>
<tr>
<td>(Sender-Galloway &amp; Clark, 2013)</td>
<td>Interview with each service user's community psychiatric nurse using a clinician rating scale</td>
<td>Sample size: 92</td>
<td>18.5% were using alcohol problematically:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diagnosis: 77% schizophrenia, 11% bipolar affective disorder, 8% schizoaffective disorder, 4% other mental illness diagnosis</td>
<td>13% used alcohol sometimes with impairment(^a).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Age: 42 years</td>
<td>3.3% used alcohol always with impairment(^b).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gender: 100% male</td>
<td>1.1% had alcohol dependence(^c).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Country: UK</td>
<td>1.1% had alcohol dependence with institutionalisation(^d).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Treatment setting: Outpatients</td>
<td></td>
</tr>
<tr>
<td>(Smeijers et al., 2018)</td>
<td>Structured interview:</td>
<td>Sample size: 169</td>
<td>Mean alcohol consumption = 7.99 units/week (SD 15.34).</td>
</tr>
<tr>
<td></td>
<td>MATE-Crimi</td>
<td>Diagnosis: 40% antisocial personality disorder, 21% borderline personality</td>
<td></td>
</tr>
</tbody>
</table>
disorder, 4% narcissistic personality disorder, 86% intermittent explosive disorder, 27% ADHD

**Age:** Mean 35.79 years (SD 10.94)

**Gender:** 94% male, 6% female

**Country:** Netherlands

**Treatment setting:** Outpatients

**Abbreviations:** SD=Standard deviation, ADHD=attention deficit hyperactivity disorder.

†: Characteristics of the entire group (n=95) of service users who responded (n=73) and service users who did not (n=22). According to the paper, there were no statistically significant differences between the respondents and the entire group.

‡: Definition of “Use sometimes with impairment”: Patient has used alcohol and there is sometimes evidence of associated problems or dangerous use.

§: Definition of “Use always with impairment”: Patient has used alcohol and there is always evidence of associated problems or dangerous use.

¶: Definition of “Dependence”: In addition to satisfying criteria for use always with impairment, there is evidence of the dependence syndrome.

††: Definition of “Dependence with institutionalization”: As well as being dependent, the related problems are so severe that they make non-institutional living difficult.
Table 6: Studies concerning physical activity in forensic mental health service users

<table>
<thead>
<tr>
<th>Author, year</th>
<th>Method(s) of data collection</th>
<th>Sample size</th>
<th>Sample</th>
<th>Results</th>
</tr>
</thead>
</table>
| (Bergman et al., 2018)| Questionnaire: IPAQ          | 28          |        | **Sample size:** 28  
**Diagnosis:** 68% psychotic disorder, 14% affective disorder, 11% personality disorder, 4% anxiety disorder, 4% autism  
**Age:** Mean 33.6 years (SD 9.6)  
**Gender:** 89% male, 11% female  
**Country:** Sweden  
**Treatment setting:** Inpatients  
Mean physical activity per week = 268 min/week (SD 272.4).  
Mean metabolic equivalent of task (MET) = 1183.8 MET min/week (SD 1107.1).  
9 participants had a physical activity level below the recommended 150 min/week. |
| (Hilton et al., 2015)  | Medical records              | 291         |        | **Sample size:** 291  
**Diagnosis:** 47% schizophrenia, 20% other psychotic disorders, 12% personality disorder, 8% mood disorder, 4% substance related disorders, 8% others, 2% no psychiatric diagnosis  
**Age:** mean 35.1 years (SD 12.5)  
**Gender:** 100% male  
**Country:** Canada  
**Treatment setting:** Inpatients  
34% of the participants was inactive.                                                                 |
| (Huthwaite et al.,    | Questionnaire:               | 51          |        | 27 % rated their physical activity as occurring rarely or never.                                                                       |

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<table>
<thead>
<tr>
<th>Author, year</th>
<th>Method of data collection</th>
<th>Sample</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forsyth, 2012</td>
<td>Semi structured</td>
<td>Sample size: 9</td>
<td>Perceived Barriers:</td>
</tr>
<tr>
<td>(Long et al., 2009)</td>
<td>Questionnaire</td>
<td>Sample size: 28</td>
<td>21% of participants participated in the weekly physical activities available.</td>
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<td></td>
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<td>82% expressed a desire to exercise more.</td>
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<td>75% of participants whose risk status allowed little off-ward activity reported having few opportunities to exercise.</td>
</tr>
</tbody>
</table>

**Table 7:** Studies concerning dietary behaviours in forensic mental health service users

Abbreviations: SD=Standard deviation, HBS = Health benefit score (Godin, 2011).
Interviews with nurses of FMU in inpatient care. In pairs (n = 6) or individually (n = 3).

**Diagnosis:** NA (Nurses of FMU in inpatient care)

**Age:** 1 20-50 years, 3 31-40 years, 2 41-50 years, 3 50+ years

**Gender:** 33% male, 67% female

**Country:** New Zealand

**Treatment setting:** Inpatients

- FMU were perceived to have a lack of basic knowledge about food and nutrition owing to upbringing, socioeconomic status, culture, education, mental illness and being institutionalised.

- Lack of nutritional education was seen as a barrier to helping FMU make healthier food choices.

- Differences in staff's nutrition knowledge contributed to a lack of consistency in supporting FMU to make healthier choices.

- FMU were perceived resistant to change, expressed in their reluctance to ask questions and their avoidance of responsibility for their food choices.

- Promoting understanding and awareness of healthy eating practices and encouraging FMU to apply their learning was an ongoing battle.

- Breaking old habits and familiar practices was difficult, especially when this was combined with medication-induced alterations in food intake and behaviours learned from being institutionalised.

**Reducing barriers:**

- Simple, practical information was seen as the key to reducing barriers to healthier food choices for FMU and creating an environment in which the staff and FMU could learn together.

- Healthy meal and snack ideas, healthy takeaway options, meal ideas tailored to other cultures, healthy food on a budget, healthy versions of FMU's familiar or preferred foods and healthier 'treats' were all seen as important topics to
Huthwaite, 2017  
Personal menu choice cards  

| Sample size: 42  
Diagnosis: 78% schizophrenia, 12% schizoaffective disorder, 4% bipolar affective disorder, 2% Psychotic disorder, 2% PTSD, 2% no diagnosis  
Age: 38.0 (SD 10.4)  
Gender: 78% male, 22% female  
Country: New Zealand  
Treatment setting: Inpatients  
62.5% (n=25 of 40) chose a large packed lunch (712 kcal).
75% (n=30 of 40) chose a large cooked lunch (702-776 kcal).
100% (n=40 of 40) chose both large dinners (501 kcal) and large desserts (248 kcal).
0% (n=0 of 40) chose the small portion size in any of the four meal choices.
86% (n=36 of 42) purchased foods and beverages in addition to hospital meals at least once a week.
Additional kcal from purchased foods and beverages averaged 420.3 kcal per day (SD 342.6).
75% (n=12 of 16) chose the regular not the available, sugar free soft drinks.

Long, 2009  
Observations + questionnaire  

| Sample size: Observations: 41 (27 meals over 3 months) questionnaire: 28  
Diagnosis: 51% borderline, 24% schizophrenia and schizoaffective disorder, 12% affective disorder, 13% others  
Age: 32.7 years (SD 8)  
Gender: 100% female  
Country: UK  
Observations:  
Most FMU ate meals consisting mainly of carbohydrate and fat. Vegetables and fruit were eaten much less frequently.  
Foods rich in Omega 3 were available only once in 27 meals randomly observed.  
Meals were high in carbohydrate two puddings being provided each day.  
40% of meals were eaten without a drink.  
FMU consumed jugs of flavoured squash in preference to water.  
Milk consumption per FMU per day was over two pints.  
Fruit was provided on all wards but was sometimes available only at certain times, for
<table>
<thead>
<tr>
<th>Treatment setting: Inpatients</th>
<th>example when drinks were dispensed.</th>
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**Questionnaire:**
82% of the sample expressed a desire to eat a healthier diet.
51% of the sample had been advised by a dietician to follow a particular diet but only 35% stated that they were following that advice.
57% reported having two or more takeaway meals per week (often in addition to meals provided).
46% had eight or more cups of tea/coffee per day.
64% had fewer than two drinks of fruit juice or water per day.
60% had two or more teaspoons of sugar in their tea/coffee.
65% drank two or more cups of carbonated drinks.
Typical food purchases at the hospital shop were: Crisps (46%), chocolate (36%), sweets (25%), chips (21%), non-diet carbonated drinks (46%), fruit (1.9%).
50% consumed one or more standard chocolate bars per day.
52% ate one or more bags of crisp per day.
75% ate one or more piece of fruit per day.
36% reported being most likely to snack in the afternoon.
46% reported being most likely to snack in the evening.

Abbreviations: FMU=Forensic mental health service users, NA=Not available, SD=Standard deviation, PTSD=Post-traumatic stress disorder.
Figure 1: Flow chart inspired by the PRISMA flow chart (Moher, Liberati, Tetzlaff, Altman, & The, 2009). †: Some studies presented data from more than one health behaviour.
Figure 1: Flow chart inspired by the PRISMA flow chart (Moher, Liberati, Tetzlaff, Altman, & The, 2009). †: Some studies presented data from more than one health behaviour, and some studies presented both quantitative and qualitative data.