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i. Factors influencing the opportunities of supporting staff to promote a healthy diet in adults with intellectual disabilities.

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Factors influencing the opportunities of supporting staff to promote a healthy diet in adults with intellectual disabilities.

ABSTRACT

Background: Adults with intellectual disabilities living in residential houses have a high prevalence of obesity which is related to poor dietary habits.

Aim: The aim of this study was to assess supporting staff's thoughts and experiences on factors influencing their opportunities to promote a healthy diet in adults with intellectual disabilities.

Methods: 13 supporting staff members were recruited from 11 different residential houses in a community. Concept Mapping methodology was used, including group interviews, sorting, rating statement and analysing the results.

Results: Seven clusters most accurately captured the ideas of the supporting staff. "Attitudes", "Facilitating a healthy diet", "Practical cooking skills" and "Applied dietary knowledge" were the four most important..

Conclusions: Multiple factors influence the opportunities of supporting staff to promote a healthy diet. A holistic approach addressing all relevant factors is necessary when developing interventions to address this complex issue in persons with intellectual disabilities.

KEYWORDS: Intellectual disability, obesity, healthy diet, nutrition, health promotion, supporting staff.

1. Introduction

Over the last decades overweight and obesity has become a worldwide epidemic (Ng et al., 2014; World Health Organization [WHO], 2000). For persons with intellectual disabilities the prevalence of obesity is even higher than in the general population (WHO, 2011), in particular for adults with mild to moderate intellectual disabilities (Hove, 2004). People with intellectual disabilities are a vulnerable group of people with a higher disease burden, including hypertension, cardiovascular disease, diabetes type 2 (Flygare Wallen, Ljunggren, Carlsson, Pettersson & Wandell, 2018) and premature death (Lauer & McCallion, 2015) compared to the general population. These conditions are related to poor dietary habits and low physical activity (Nordstrom, Paus, Andersen, & Kolset, 2015).

Community- based living for people with intellectual disabilities was implemented in Norway in the 1990s, after de-institutionalisation. About 16 percent of this population lives together with their relatives, the rest in other living arrangements. Today approximately 80 percent of adults with intellectual disabilities live in rented community apartments. Housing is either in shared accommodations consisting of separate apartments with access to common areas, or co- located housing which implies several apartments under the same roof (Tøssebro & Lundebj, 2006). These house arrangements imply supervision and help from service providers from the community, paid by the government. In the Nordic countries, adults with intellectual disabilities have right by law to everyday life support and to be offered assistance to obtain a community residence (Beadle-Brown, Mansell, & Kozma, 2007; NOU 2016:17, 2016)-

Living with an intellectual disability implies cognitive limitations such as reduced short-term memory, reduced ability for abstraction and understanding of consequences of one's behaviour (Kolset, Nordstrom, Hope, Retterstol & Iversen, 2018). Today most adults in their

daily living have the freedom of choice but may lack the ability to reflect on the health implications of their choices (Adolfsson, Fjellström, Lewin & Mattsson Sydner, 2012). In an obesogenic environment, this increases the risk of making unhealthy food choices (Elinder & Jansson, 2009). When addressing nutritional- and health related issues for persons with intellectual disabilities it is of great importance to respect their rights of self-determination but at the same time recognize their needs for lifelong individually adapted assistance (Kolset et al., 2018; Ptomey & Wittenbrook, 2015).

Studies indicate that adults living in residential houses are especially vulnerable with regard to weight disturbances and malnutrition (Draheim, Stanish, Williams & McCubbin, 2007; Ptomey, Goetz, Lee, Donnelly & Sullivan, 2013). There is need for improved nutritional care in community services and for evidence-based measures to promote a healthy diet (Kolset et al., 2018; National Institute for Health and Care Excellence [NICE], 2017; NHS Health Scotland, 2004). A high proportion of supporting staff working in residential houses supporting adults with intellectual disabilities lack relevant education (Melville et al., 2009; Ptomey & Wittenbrook, 2015). Supporting staff working with persons with intellectual disabilities have a unique possibility to influence health behaviours and lifestyle choices (Marks, Sisirak & Chang, 2013). Even so, supporting staff and managers in residential houses have different views of their roles and how to promote a healthy lifestyle (Bergstrom & Wihlman, 2011). To improve services and to ensure predictability between supporting staff, there is a need for more studies on how to promote healthy diet for this group. Health programs targeting this group of population have shown promising results on physical activity, better work routines and improved quality of life, but less effects on weight reduction and healthier eating patterns (Bazzano et al., 2009; Elinder, Sundblom, Zeebari & Bergström, 2018). Therefore, more knowledge is needed to develop evidence-based methods to achieve healthy diets and weight loss for this group of people (Doherty, Jones, Chauhan, & Gibson,

2018). To obtain this goal, it is suggested to make multi-component health interventions accessible for people with intellectual disabilities, by tailoring them to their cognitive, communicative and health literacy abilities, using a framework and certain behaviour change techniques (BCT) (Elinder et al., 2018; Willems, Waninge, de Jong, Hilgenkamp & van der Schans, 2019).

In this study we aimed to assess the supporting staff's thoughts and experiences on factors influencing their opportunities to promote a healthy diet in adults with intellectual disabilities.

2. Methods and materials

2.1. Design

Concept Mapping used in this survey is an explorative research method for generating new hypothesis and develop theory. The method combines qualitative approaches with quantitative analytical tools (Burke et al., 2005). It may be described as a qualitative research method using a conceptual framework to show how a group of people's ideas addressing a specific theme or topic, may be presented. Point maps and clusters are used to describe the relationships between qualitative data- statements or ideas from a group of people (Burke et al., 2005).

2.2. Ethics

This study was approved by Regional Committees for Medical and Health Research Ethics south - east (2019/362) and the Data Protection Officer in the University in Oslo. Participants signed an informed consent form before the interviews started.

2.3. Recruitment and sample

A written consent form was sent by e-mail to all the 10 service managers and their 24 department managers working in all the 34 community residential houses for adults with intellectual disabilities in a municipality in the south eastern part of Norway. The managers were requested to forward the written information to all their supporting staff. This was done

to ensure the participants had experience working with people with intellectual disabilities and to ensure good oral and written Norwegian language skills. We ended up recruiting 13 participants from 11 different residential houses using a convenient sampling frame. Most of them worked in community residences with adults with mild-to moderate intellectual disabilities. However, two participants worked with adults with moderate-to severe intellectual disabilities.

During the first brainstorming interviews, all the participants completed a written questionnaire on their socio- demographic characteristics.

2.4. The Concept mapping procedure

The procedure consists of five main phases. Step 1: brainstorming, step 2: sorting, step 3: rating, step 4: statistical analysing and representation and step 5: interpretation.

2.4.1 Step 1: Brainstorming interviews-generation of ideas

There were two separate brainstorming interviews organized with five and eight people attending in each. The participants decided themselves which of the two groups they wanted to attend, based on which dates were most convenient. All the 13 participants physically attended these interviews which lasted 1 ½ hours each. All the group sessions were held in a neutral place outside the residential houses.

In the beginning, before generation of ideas started, the participants were asked if they were familiar with the official Norwegian Health Directorate's dietary advices (Norwegian Directorate of Health, 2015). They were also reminded that these advices were to be followed in their work as health professionals in the community.

The participants were asked the following research question: "What factors do you think may influence your opportunities to promote a healthy diet for people with intellectual disabilities in the residential house you are working"? They were further instructed to think about both barriers and facilitators, which could influence the possibilities for having a healthy diet. The

focus question was both read out loud and given to the participants in a written form. They were told there were no right or wrong answers to the question and requested not to criticise or discuss the statements of other participants. They were given 15 minutes to individually write down their ideas on a paper. Then each statement was read out loud by each of the participants in front of the rest of the group. All the answers were documented and shown directly on a projector to all the participants. This was done to assure the quality of the statements and that all inputs were correctly documented and understood. The 84 statements were collected from the two brainstorming sessions. After summarizing the statements, removing duplicates and clarifying some of the content in the statements, we ended up with a total of 73 statements (Supporting information). This generated a list of items to be used in the subsequent data collection and analysis.

2.4.2 Step 2 and 3: Second group interviews- sorting and rating of statements

There were two second group interviews held 3 and 4 weeks after the brainstorming interviews. In these group sessions the 73 statements were printed out on small cards, one statements on each card and handed out to all the participants. The participants were asked to sort the statements into piles based on their perceived similarities. There were no requirements on how many piles or number of statements in each pile. Each statement could not be put in more than one pile. Then the participants were asked to rate each statement according to importance to the focal question on an ordinal scale from 1 (not important) to 5 (very important). Finally, the participants were asked to individually give each pile a name or sentence reflecting the overall theme of the contents of the piles.

Four and six participants physically attended these two second group interviews which also lasted 1 ½ hours each. Three of the participants were physically prevented to attend them. They completed the tasks of sorting, rating and giving names to the piles by themselves and delivered their results afterwards. These results were included in further analyses.

2.4.3 Step 4 Statistical analyses and visual representation

The 73 statements, their ratings and the overall names of the piles were entered into the Concept Mapping computer software (Concept Systems, Incorporated, 2017) for analysis of the data collected from the participants. The results given from the data program summarize the quantitative data and visualize the relationship between the statements using multidimensional scaling (point maps) and hierarchical cluster analysis (cluster maps) (Concept Systems Incorporated, 2017).

The point map shows each idea as a point on a map. The position of each point shows the relationship and closeness of each idea to one another as viewed by the participants. The cluster map graphically shows how the statements have been grouped together by similarities by the participants. Each cluster of items represents a separate conceptual domain hierarchy, made by the cluster analysis, based on the point map analysis. The number of layers of each cluster illustrates the average ratings of the statements in each cluster, as perceived by the participants. The more layers and higher cluster, the higher relative average score of its unit. The higher value, the more important the participants weighted the statements in the cluster as factors they thought may influence their opportunities to promote a healthy diet.

The bridging indices (BI) values of statement was used (always ranging from 0 to 1). A low value (closer to 0) indicates that the statements in the cluster are close to each other and more likely represent the same opinion or context. Clusters with low average bridging values are usually more cohesive and easier to interpret as reflecting the content well. Finally, a high average BI value (closer to 1) indicates the statements in the cluster may just as well “bridge” with other clusters on the map (Burke et al., 2005; Concept Systems Incorporated, 2017).

Paired sample t-tests were used to compare the average importance values (means) of the seven clusters, exploring if they were significantly different (significant level set to $p < 0.05$). Such a difference would confirm participants rating the statements differently, implicating

some clusters rated to be more important than others, in promoting a healthy diet (Concept Systems Incorporated, 2017).

2.4.4 Step 5 Interpretation of the results

This last step was done as a collaboration between the members of the research group. The optimal number of clusters was discussed, and different cluster solutions evaluated. We used three criteria of selecting numbers of clusters; capacity to interpret cluster content, parsimony and preservation of the variety of the meaning of the items (Lévesque, Jean, & White, 2002, p. 151). We started out with a five cluster solution, progressively moved up to a seven cluster solution. It was decided that the arrangement of seven items and cluster domains most accurately captured the content of the clusters and the overall meaning to answer the focus question. Seven clusters were also the number of clusters the 13 participants in average had made. The name of the clusters suggested by the Concept Mapping software did not reflect the content of the cluster statements or their overall meaning. The names of the clusters were therefore changed by the research team to more appropriate names.

3. Results

3.1 Socio- demographic information

Table 1 shows the socio- demographic results of the 13 participants attending the group sessions. Most of the participants were women and ethnic Norwegians. Three out of four participants were between 40- 60 years old and about 2/3 of all the participants had more than 10 years of working experience. Approximately half of the participants had the level of upper and secondary school education.

3.2 Point maps

The statements from the participants were analysed and presented as points on a map, using multidimensional scaling to sort these data. The distance between the points describes the degree of similarities between them (Figure 1). As an example statement 40: “Predictability

make it clear on weekly basis for the residents so they are prepared for what is about to happen”, and statement 70: “Common house rules on what is allowed in the common areas”, are considered closely related by the participants. The point legend on the map, represents the average importance values, visualized by layers on each point. Exemplified by point 48: a five-point stack, indicating five layers and a legend between 4.22 and 4.62. This implicates the statement is viewed by the participants as being of great importance. The point rating map shown provided the basis for the subsequent cluster map analyses.

3.3 Cluster maps

In further analysis, the points were grouped together into separate conceptual cluster domains, based on the participants perceptions of the thematic relationship of the statements (Figure 2). There was difference in the number of layers between the clusters and this visualizes the different relative importance values of each cluster, rated by the participants.

In all clusters the range between minimum and maximum rating values were small (less than 2.00) and demonstrates high consistency in the participants views of the importance of the statements in each cluster (Table 2). Broadest difference between minimum and maximum rating values was 1.62 and 1.61 in “Attitudes” and “Self- determination”, respectively. In contrast, the lowest difference between minimum and maximum rating values was 0.54 in “Structure” and 0.69 in “Prerequisite for change”. The results showed that the clusters with most statements (1, 2, 3 and 7) had the broadest range between minimum and maximum importance values within each cluster (Table 2).

When testing the average importance values (means) between the clusters using paired sample t-tests statistical differences between “Attitudes” and “Structure” ($p < 0.02$), “Attitudes” and “Prerequisite for change” ($p < 0.01$) and “Attitudes” and “Self- determination” ($p < 0.01$) were found. The same was also the case when testing “Facilitating a healthy diet” with “Prerequisite for change” ($p < 0.02$) and “Self- determination” ($p < 0.05$). This confirms that

the participants perceived “*Attitudes*” and “*Facilitating a healthy diet*” to be more important to address in interventions to promote a healthy diet, than “*Structure*”, “*Prerequisite for change*” and “*Self-determination*”. There were no significant differences in average importance values between the four highest rated clusters, “*Attitudes*”, “*Facilitating a healthy diet*”, “*Practical cooking skills*” and “*Applied dietary knowledge*” indicating small difference between these themes (results not shown).

Based on these statistical tests we have divided the seven clusters into two different groups consisting of the four most important and the three less important clusters.

3.3.1. The four most important clusters

The informants rank “*Attitudes*” as the most important cluster for promoting a healthy diet in adults with intellectual disability living in residential houses, given five layers. BI average score of the cluster (0.48) was below average, which interprets that the 13 statements are not consistently sort by the participants (Table 2).

The statements in the cluster implies the supporting staff and their leaders’ need of commitment and priority for a healthy diet. It involves them as role models and pertains a prerequisite of a mutual understanding on what is a healthy diet, achieved through improved nutrition knowledge. This is exemplified by statement 54: “The supporting staff are good role models for promoting a healthy diet” (average importance score 4.62, BI 0.51), statement 57: “The will and commitment among supporting staff to have a priority and focus on a healthy diet” (average importance score 4.46, BI 0.39) and statement 8: “Attitudes among the employees in carrying out a healthy diet” (average importance score 4.46, BI 0.38). The high scores demonstrates that the statements are of great significance in answering the focal question.

“*Facilitating a healthy diet*” and “*Practical cooking skills*” were also highly ranked by the participants. These clusters were given approximately the same average importance values and four layers each (Table 2). The BI average scores of clusters were low (0.23 and 0.08,

respectively) indicating high consistency between the participants in how they sorted these statements. The two clusters are also located close to each other on the map, demonstrating the statements in the clusters are related (Figure 2). The statements in the cluster “*Facilitating a healthy diet*” highlights the need for different types of guidance by the supporting staff to the people with intellectual disabilities before and in preparing of meals, as facilitators to promote a healthy diet. The participants stated that this could be achieved by more predictability, as having house rules, written common routines, frequent and regular meals and a meaningful everyday life with activities. This is exemplified by statement 17: “Guidance when ordering food” (average importance score 4.23, BI 0.00), statement 20: “Guidance in creating week menus” (average importance score 4.15, BI 0.06) and statement 70: “Common house rules on what is allowed in the common areas” (average importance score 3.92, BI 0.03).

The statements in the cluster “*Practical cooking skills*” emphasize the importance of exposing and teaching people with intellectual disabilities to new and healthy food items and dishes and that they must taste healthy food and repeatedly be exposed to obtain a healthy diet. Exemplified with statements 24: “Introduce and taste new healthy food which is easy to make” (average importance score 4.00, BI 0.04), statement 53: “Training the residents in how to make a healthy meal” (average importance score 4.15, BI 0.18) and statement 10: Introduce something new, a new ingredient in a well-known dish (average importance score 3.69, BI 0.02).

“*Applied dietary knowledge*” had few statements and given two layers. The cluster had a BI average score of 0.44 which indicates the statements are not to consistently sort by the participants. The statements in this cluster highlight the importance of having the knowledge of healthy foods and dishes. This includes the importance of a mutual understanding between the family members of persons with intellectual disability and supporting staff of what is a

healthy diet, so they promote the same message. This is exemplified by statement 3: “Knowledge of simple recipes and how to prepare healthy and tasty food” (average importance score 3.85, BI 0.37) and statement 71: “The food must be easy to prepare within the time schedule” (average importance score 3.62, BI 0.28).

3.3.2 The three least important clusters

“*Structure*” had fewest statements and was given two layers. The high BI average score (0.70) indicates low coherence between the statements in the cluster and that the statements are less likely to reflect the overall theme of the cluster. The statements could therefore as likely bridge with other clusters on the map. This is also the case for the cluster “*Prerequisite for change*” which was given only one layer and a high BI average score (0.69) (Table 2).

“*Self- determination*” is ranked as the least important cluster related to the focus question given the lowest average values, thereby only one layer. The average BI 0.30 indicating quite good coherency between the statements reflecting the overall theme quite well.

4. Discussions

In this study we found several factors influencing the supporting staff's opportunities to promote a healthy diet for people with intellectual disabilities in the residential houses they work. When using paired sample t-tests we found no significant differences between average importance values (means) of the four highest ranked clusters: “*Attitudes*”, “*Facilitating a healthy diet*”, “*Practical cooking skills*” and “*Applied dietary knowledge*”. The overall theme of these clusters are, according to the participants, all important factors and should be taken into consideration when tailoring future nutritional interventions for this population.

The results of this study are in accordance with previous multi- component health intervention studies including specific measures, targeting both supporting staff and the residents, to be most effective (Elinder et al., 2018; Elinder, Bergstrom, Hagberg, Wihlman & Hagstromer,

2010; Marks et al., 2013). Translations of nutrition knowledge into behaviour might be difficult for persons with intellectual disabilities (Adolfsson et al., 2019). People with intellectual disabilities need guidance and social support in their daily activities and often make decisions together with the staff (Melville et al., 2009).

4.1 The four highest ranked clusters

In the highest ranked cluster: “*Attitudes*” it is emphasized that insufficient education regarding nutrition knowledge and health needs for their residents are barriers to facilitate a healthy diet in the residential houses. Lack of education contributes to difficulties in establishing common attitudes and rules in these residential houses. Previous studies have documented this to be a major barrier for promotion of a healthy diet (Elinder et al., 2010; Marks et al., 2013; Melville et al., 2009). Different national guidelines confirm the importance of commitment by the management in the communities to ensure quality in nutritional work and the communities’ responsibility for contributing to adequate nutrition education for supporting staff (NICE, 2017; NHS Health Scotland, 2004). The statements in the cluster “*Attitudes*” points out that it is of great importance that the supporting staff are motivated and show positive attitudes when promoting healthy behaviours for the residents (Hamilton, Hankey, Miller, Boyle & Melville, 2007). To facilitate this, increased awareness of positive attitudes, measures for facilitating healthy diets and practical cooking skills by educating both staff and residents are needed (Elinder et al., 2018; Melville et al., 2011).

The statements in the second highest ranked cluster: “*Facilitating a healthy diet*” highlight the need people with intellectual disabilities have for different type of guidance in planning, shopping and preparing their meal. This is supported by other studies which emphasises guidance from the supporting staff to the people with intellectual disabilities as crucial to facilitate and achieve a healthy diet. (Adolfsson et al., 2012). This is also supported by studies which have focused on suitable BCT’s facilitated for individuals with mild to moderate

intellectual disabilities (Willems, Hilgenkamp, Havik, Waninge & Melville, 2017; Willems et al., 2019). Those BCTs involves guidance encouraging planning for a healthy lifestyle behaviour, instructions and demonstrations on how to perform the behaviour. In addition to this, help to find recipes, make a shopping list, and do the shopping are also important factors (Willems et al., 2019). An increased use of such measures may increase the effect of health promoting lifestyle interventions (Willems et al., 2017; Willems et al., 2019).

The third highest ranked cluster: *“Practical cooking skills”* highlights the importance of exposing and training the residents in tasting and preparing healthy food. This is supported by studies which confirm that increased focus on food work in cooperation or initiated by the staff may increase both use of fresh ingredients, intake of fruit and vegetables and decrease use of ready prepared meals (Adolfsson et al., 2012). Increased capacity of practical food preparation and of cooking may increase nutrition status and broaden dietary variety for people with intellectual disabilities (Goldschmidt & Song, 2017). Cooking skills are strongly related to food choices and food preparation is an ideal area for health promotion (Hartmann, Dohle & Siegrist, 2013). Many adults with intellectual disabilities lack the ability to manage food related tasks alone, and staff might mistakenly believe these adults are able to manage them without support (Adolfsson et al., 2019). If persons with intellectual disabilities are left to take on all responsibility for their food consumption without the abilities and knowledge to handle it, the result may be suboptimal dietary intakes and subsequent nutritional risk (Adolfsson et al., 2012).

The fourth highest ranked cluster: *“Applied dietary knowledge”* focuses on the need for practical nutrition knowledge. Other studies confirm that people with intellectual disabilities and their caregivers may have limited dietary knowledge (Melville et al., 2009) but positive changes in nutritional intake has been demonstrated by appropriate planned education. (Humphries, Pepper, Traci, Olson & Seekins, 2009; Ptomey et al., 2017).

In this study, “*Attitudes*” among staff and “*Facilitating a healthy diet*” was rated as the most important factors influencing the possibilities to promote a healthy diet for adults with intellectual disabilities and “*Self- determination*” as the least important factor. This is quite different from what Ruud, Raanaas and Bjelland (2016) found in their study, where “*Guidance and autonomy*” were more highly emphasized as barriers to promote a healthy diet. This was outlined as potential conflicting duties and ethical dilemmas for the supporting staff, balancing between their responsibility to take care of the residents’ health, and at the same time respect their autonomy and right to choose unhealthy food (Ruud et al., 2016). When this challenge is not as highlighted in our study, it might indicate supporting staff in this study have a broader understanding of their possibilities to influence residents’ health behaviours, by achieving more knowledge and being more coherent in their work, without undermining the autonomy of the residents.

4.2 Methodological considerations

There were some strengths and limitations in this study. One should be careful about generalizing the findings in this study to other supporting staff working in the field because of the non-random sampling, few participants attending (n=13) and recruitment from only one community in Norway. The broad representation of supporting staff coming from 11 different residential houses, their long work experience, typical level of education and the fact that community residencies in the Nordic countries are quite similar in structure, strengthens the relevance of the participant’s statements (NOU, 2016:17, 2016; The National Board of Health and Welfare, 2013). Most of the participants worked with adults with mild- to moderate intellectual disabilities, and the results presented are therefore most relevant for this group. Concept Mapping methodology used in this study seems to be a useful method collecting a large and interesting amount of statements and reshape them into concrete themes of ideas in a quite short amount of time (Burke et al., 2005). In the brainstorming sessions the

participants were asked to read out loud their own statements in front of the whole group. This was a good way to assure the quality of the statements being correctly understood and documented. However, it might have prevented some of the participants from revealing all their thoughts. This would have been easier if they had delivered the statements anonymously. The quantitative sorting, rating, and analysis gives more objective results, instead of using a qualitative method where the researcher individually emphasise the findings. Sorting and rating of 73 statements was experienced by some of the participants to be a quite exhausting and labour-intensive process. This might have influenced how precise they did the tasks and the accuracy of the results. However, even with small changes, it does not influence the main findings of the four highest rated clusters. The final decision of seven clusters best interpreting the overall themes of ideas was a collaborated decision between the authors. This strengthens the internal validity. Some clusters had a low BI, which confirms the decision, but others retained a high BI, regardless of different cluster solutions. One could have chosen another clustering of the data, but the same main message remains standing.

5. Conclusions

In this study we found that multiple factors influence the opportunities of the supporting staff to promote a healthy diet in the residential houses they work with adults with intellectual disabilities. In development of interventions to improve healthy dietary habits and reduce overweight in adults with intellectual disabilities, several factors should be taken into consideration. Interventions should include measures to promote positive attitudes of the supporting staff, guidance to facilitate a healthy diet, practical cooking skills and adapted dietary knowledge.

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Table 1

Socio- demographic information of the 13 participants in the focus group interviews

Variable	Category	N	%
Gender	Women	9	69
	Men	4	31
Ethnicity	Norway	11	85
	Another country in Europe	1	7,5
	Outside Europe	1	7,5
Age	20-39	3	22
	40-59	10	78
Education	Primary- and lower secondary school (In Norway 1-10 grade).	0	0
	Upper- secondary school	6	46
	College and / or university of three years or less	5	39
	College and/ or university for four years or more	2	15
Work experience	0-5 years	3	23
	6-10 years	2	15
	Over 10 years	8	62

Table 2

The seven -clusters statements, layers, average importance values and average bridging indices (BI) of each cluster as they were rated by the participants

Cluster title	Layers	Number of statements In each cluster	Average importance values (min-max)	BI
Attitudes	5	13	4.10 (3.00- 4.62)	0.48
Facilitating a healthy diet	4	17	3.94 (3.23- 4.23)	0.08
Practical cooking skills	4	11	3.90 (2.92- 4.31)	0.23
Applied dietary knowledge	2	6	3.79 (3.46- 4.31)	0.44
Structure	2	5	3.72 (3.38- 3.92)	0.70
Prerequisite for change	1	6	3.65 (3.31- 4.00)	0.69
Self-determination	1	15	3.60 (2.62- 4.23)	0.30

Figure 1

Figure 1
 Point rating map of the 73 statements, their stack layers, and relative values of each layer. The point legend represents the average importance values and are visualized by layers on each point.

Figure 2

Figure 2

The seven-cluster rating map illustrates the statements gathered in separate clusters with layers reflecting the legend of average importance values. This to visualize the importance of the clusters, as perceived by the participants.

Supporting information

Number	Cluster	Importance	BI
Cluster 1 – Attitudes			
54	The supporting staff are good role models for promoting a healthy diet	4.62	0.51
57	The will and commitment among supporting staff to have a priority and focus on a healthy diet	4.46	0.39
4	Knowledge among the supporting staff about what is a healthy diet	4.46	0.47
8	Attitudes among the supporting staff to implement a healthy diet	4.46	0.38
48	That management has focus and priority on what is a healthy diet	4.31	0.55

64	Mandatory nutrition courses are available for the employees	4.31	0.43
51	The supporting staff limited knowledge of what is a healthy diet and the consequences of an unhealthy diet	4.23	0.57
7	Change the attitudes among the supporting staff and the residents by increasing their knowledge	4.23	0.46
56	Structure in everyday life (supporting staff) in making plans for the menus and procurement of food	4.00	0.49
11	Limited knowledge of supporting staff in how to make a dish healthier	3.77	0.61
63	Availability and regular nutrition internal courses in the municipality for the supporting staff	3.77	0.57
14	The same understanding and attitudes among the supporting staff in what is a healthy diet	3.69	0.36
38	The supporting staff need energy to carry out the cooking	3.00	0.53
Cluster 2- Facilitating a healthy diet			
17	Guidance when ordering food	4.23	0.00
37	Meaningful everyday life may prevent emotional eating and vice versa	4.23	0.06
72	Facilitate available deliciously, tasty and healthy food	4.23	0.25
20	Guidance in creating week menus	4.15	0.06
40	Predictability- make it clear weekly plan for the residents so they are prepared for what is about to happen	4.08	0.08
19	Guidance in making a shopping list for procurement of food	4.08	0.12
49	Individually facilitating for the meal situation	4.08	0.08
73	Individually adapted texture to the food- if possible, cut or bog the food	4.08	0.11
70	Common house rules on what is allowed in the common areas	3.92	0.03
16	Guidance in the grocery store	3.92	0.05
18	Guidance during cooking	3.85	0.12
Number	Cluster	Importance	BI
Cluster 2 - Facilitating a healthy diet, continuing			

28	Visual methods- symbols- to choose a healthier alternative	3.85	0.02
55	Guidance of the residents in what is a healthy diet	3.85	0.04
65	Active guidance in how to order healthy foods on the internet	3.77	0.07
9	Security and predictability are prerequisites to introduce something new	3.69	0.14
67	Frequent and regular meals prevent snacking	3.69	0.00
27	Keyhole hunting	3.23	0.09
Cluster 3- Practical cooking skills			
22	The residents need many repetitions to change their habits	4.31	0.34
12	Limited knowledge by the residents in how to make a dish healthier	4.31	0.47
53	Training the residents in how to make a healthy meal	4.15	0.18
5	Information and guidance to the residents about what is a healthy diet	4.08	0.45
29	Availability of healthy foods in the residential houses	4.08	0.10
24	Introduce and taste new healthy foods which is easy to make	4.00	0.04
2	Knowledge of the residents in what is a healthy diet	4.00	0.61
23	Taste new food and dishes	3.85	0.11
10	Introduce something new, a new ingrediency in a well-known dish	3.69	0.02
25	Taste new foods together	3.54	0.06
26	Role models are important for change- watching a celebrity or a professional making healthy and nice food	2.92	0.19
Cluster 4- Applied dietary knowledge			
6	Change attitudes among supporting staff and the residents by tasting new and healthy food	4.31	0.40
47	Enough time for guidance to promote what is a healthy diet	3.92	0.52
3	Knowledge of simple recipes and how to prepare healthy and tasty food	3.85	0.37
68	The same understanding of the families and in the residential houses in what is a healthy diet	3.62	0.55

71	Conscious actions in the residential houses, for examples to do the shopping after eating dinner	3.62	0.28
35	The food must be easy to prepare to make it within the time schedule	3.46	0.49
Number	Cluster	Importance	BI
Cluster 5 - Structure			
13	Need for educational guidance to introduce healthy food	3.85	0.68
15	Equal guidance and implementation of a healthy diet to the residents	3.92	0.67
39	Plan and implement one thing at a time	3.38	0.43
46	The house residents need financial support for a customized diet	3.69	1.00
59	The legislation helps the resident regulate their food intake when there is danger for their life and health	3.77	0.75
Cluster 6- Prerequisite of change			
30	Old habits in the residential houses must be changed	3.46	0.62
32	It is not enough time to provide good guidance, planning or to do the cooking	3.77	0.68
33	The finance in the municipal limits time set for guidance	3.54	0.78
34	Too few supporting staff at work to perform good guidance for a healthy diet and to teach cooking skills	3.69	0.62
36	The relation between the resident and the supporting staff may promote or inhibit a healthy diet	4.00	0.76
66	It is often easier to make an unhealthy dish	3.31	0.68
Cluster 7- Self-determination			
1	Self- determination may prevent a healthy diet	4.08	0.25
21	Many residents follow their impulses	4.15	0.28
31	Bad habits are maintained because of self-determination and the sense of achievement this provides	3.38	0.22
41	To big availability of confectionery in the apartments of the residents	4.08	0.19
42	Unhealthy food is often cheaper than healthy food	3.08	0.73

43	Lack of understanding of money	3.00	0.23
44	The residents have access to food round the clock	4.15	0.15
45	The residents have the right to buy whatever they want	4.23	0.36
50	The residents lack the understanding of what an unhealthy diet leads to	4.08	0.29
52	The residents are picky which makes it difficult to introduce new food items	3.85	0.18
58	The legislation prevents the residents from having a healthy diet	2.92	0.57
60	The living situation for the residents makes it difficult to guide them for a healthy diet	3.15	0.20
61	Economic self-determination may prevent a healthy diet	3.62	0.32
62	The residents do not want guidance from the supporting staff	3.62	0.18
68	Online food ordering is a barrier for those who need visual guidance to expand their food repertoire	2.62	0.31