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Research Article:

UNDERGRADUATE UK NUTRITION EDUCATION MIGHT NOT ADEQUATELY ADDRESS WEIGHT MANAGEMENT

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NUTRITION EDUCATION AND WEIGHT MANAGEMENT

DISCLOSURE STATEMENTS

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Conflict of Interest

None

Authorship

David Rogerson conceptualised the investigation, collected and analysed the data and wrote the manuscript. Hora Soltani and Robert Copeland verified the codes, themes, theoretical frameworks and analyses as indicated in the manuscript and assisted with editing.

Ethical Standards Disclosure

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects/ patients were approved by Sheffield Hallam University's Research Degrees Sub-Committee. Written informed consent was obtained from all subjects/patients.

ABSTRACT

Keywords: Weight Management, Weight Loss, Weight Maintenance, Nutrition Education, Qualitative

Objective: Weight management appears to be multidimensional and complex and registered Nutritionists might work to educate, promote and provide weight management services to communities, groups and individuals. However, Nutrition education might not adequately reflect the weight management requirements of individuals and groups. The aim of this study was to investigate if the Association for Nutrition's Undergraduate core competency framework for accredited degrees sufficiently reflects weight management needs and experiences of individuals.

Design: A qualitative investigation, conducted within critical realist ontology, was performed to understand the weight management experiences of dieters and compare these to the Association for Nutrition's accreditation criteria for Undergraduate Nutrition degrees.

Setting: Framework Analysis was used to identify and explain participant's experiences thematically and to compare these to the Association for Nutrition's core competency criteria.

Subjects: Participants (n=8) with weight loss (n=4) and weight maintenance experiences (n=4) were interviewed using semi-structured interviews to understand weight management at the agential level.

Results: Participants described knowledge, exercise, planning, psychological constructs and behaviour-change techniques, determinants of eating and social support as features of weight management. The competency criteria provided clear guidance on all aspects discussed by the group apart from psychological constructs and behaviour change techniques and social support.

Conclusions: Accredited Nutrition courses might not fully reflect the weight management needs and experiences of individuals. Nutritionists might require greater knowledge of psychology and behaviour-change to better understand and accommodate weight management needs.

26 INTRODUCTION

27 Nutritionists work in diverse roles with groups, communities, individuals and within industry to
28 educate about and promote good health ⁽¹⁾. Depending on their specialism, Nutritionists might work
29 with Dieticians and other health professionals in hospitals and clinics, within public health and
30 policy development, or provide consultancy services within private practise ⁽²⁾. To become
31 registered in the UK, Nutritionists must register with the UK Voluntary Register of Nutritionists,
32 which is regulated by the Association for Nutrition ⁽³⁾. The Association for Nutrition (AfN) also
33 accredits Undergraduate Nutrition degrees which must adhere to strict professional and ethical
34 standards and evidence that the AfN's core competency criteria for Undergraduate degree courses
35 have been embedded into the curriculum ^(3,4). These competencies were established to define the
36 areas of knowledge and expertise of U.K Nutritionists ⁽²⁾; reflect an international drive to develop
37 standards for practice and workforce development ⁽⁵⁾ and were developed from research
38 highlighting the breadth of knowledge required by professionals and that the role should be defined
39 in terms of specialist proficiencies ⁽²⁾. The first of the competencies is "Science", which contains 17
40 sub-competencies (CC1a-CC1q) that describe the scientific basis of nutrition and nutritional
41 requirements. The second is "Food Chain" which contains 5 sub-competencies (CC2a-CC2e) that
42 demonstrate knowledge and understanding of the food chain and its impact on dietary choice. The
43 third is "Social/Behaviour", which contains 9 sub-competencies (CC3a – CC3i) that demonstrate
44 knowledge and understanding of food in social or behavioural contexts. The fourth, "Health/
45 Wellbeing," contains 8 sub-competencies (CC4a-CC4h) that describe the application of nutrition
46 science for the promotion of health and wellbeing. Professional Conduct (the fifth), contains 7 sub-
47 competencies (CC5a – CCg) that demonstrate professional conduct and the nutritionist's code of
48 ethics ⁽⁶⁾.

49 While the competency criteria appear to be comprehensive, Nutrition has been criticised by some
50 authors who suggest that Nutrition knowledge has been biased towards positivistic science ^(7,8), that
51 many diet-related issues are underscored by social and behavioural issues ^(7,8), that dietary problems
52 are only partially understood by nutritionists and that nutritionists might not be best-equipped to
53 deal with them ^(7,8). A growing body of evidence indicates that overweight and weight
54 management are multi-dimensional conditions that have physical, social and behavioural
55 dimensions ^(9,10). Weight-loss appears to be equally complex and appears to be dependent on
56 dietary, lifestyle, cognitive and behavioural changes ⁽¹⁰⁻¹²⁾. Dieters, it appears, have individual-
57 specific needs and might require bespoke treatments to be successful ⁽¹²⁾. It is not clear then, on the
58 basis that weight management is multi-factorial and perhaps individual-specific, if Undergraduate
59 education adequately encompasses the multi-dimensionality of weight management, and prepares

60 Nutritionists with the knowledge and skills to work with dieters, who might have complex,
61 individual needs ⁽¹²⁾. The aim of this study was therefore to compare the AfN's Undergraduate
62 degree core competency criteria, which provides a framework for Undergraduate Nutrition
63 curricula, with agential data that highlights the breadth of individual's weight-management
64 experiences using qualitative research methodology.

65

66 **EXPERIMENTAL METHODS**

67 This study was conducted according to the guidelines laid down in the Declaration of Helsinki and
68 all procedures involving human subjects were approved by the Sheffield Hallam University
69 Research Degrees Sub-Committee. Written informed consent was obtained from all subjects. In
70 order to address the aims of this research, this study was performed in two sequential stages. In
71 stage one a group of 8 participants were interviewed to understand their weight loss experiences. In
72 stage two the participants' data was compared to the core competency criteria. Core competency
73 criteria were provided to the principal investigator by the AfN and can be found online ⁽⁶⁾.

74 **Philosophical and Methodological Underpinnings**

75 This study was underpinned by critical realist ontology described by Maxwell ⁽¹³⁾. Critical Realism
76 is a meta-theory that is being increasingly used to underpin applied health research ⁽¹⁴⁾ and allows
77 for the thematic description and explanation of data to be performed concurrently in qualitative
78 research ⁽¹³⁻¹⁴⁾. Data was handled in Nvivo 10 (Qualitative Solutions and Research International,
79 Victoria, Australia) and Microsoft Word (Microsoft Corporation, Redmond, WA) and analysed
80 using Framework Analysis (FA) which is a flexible approach, allowing a systematic management of
81 qualitative data ⁽¹⁵⁾. Framework analysis necessitates the creation of matrices that compare themes
82 (developed during the analyses) and cases (participants vs. competencies) which would enable the
83 comparison of participant's experiences with the competency document ^(18 - 19) and has been used
84 successfully in research with similar aims ⁽¹⁶⁾.

85 **Participants**

86 A purposive sample of four male and four female (n= 8) participants were interviewed using a
87 semi-structured interview to explore their weight loss experiences. Four participants were slimming
88 club members and the remainder were recruited through networking with colleagues. All
89 participants were white, adult and British nationals.

90 **Interview Data Collection**

91 All Interviews were conducted in a quiet, neutral environment. Interviews were conducted face-
92 to-face, prompted with an interview guide that was developed from the literature and supplemented
93 with field notes⁽¹⁷⁾. Respondent validation was sought after each interview⁽¹⁵⁾. Interviews were
94 recorded using a digital recording device (Olympus Digital Voice Recorder, model WS-321M,
95 Olympus Imaging Corp, China) and lasted approximately 60-75 minutes. All audio interview files
96 were saved and backed up to a password-protected external hard drive. To ensure participant
97 confidentiality and anonymity, all participants were allocated a number and all files were saved
98 under the numerical prefix (participant 1, 2, etc.). All interviews were transcribed *verbatim*.

99 **Framework Analysis**

100 Data was analysed thematically using FA conceptualised by Ritchie and Spencer⁽¹⁸⁾. For a
101 detailed, stage-by-stage description of FA please refer to Gale et al.⁽¹⁹⁾. An abbreviated description
102 of the analyses will follow.

103 The first stage was data familiarisation. During this stage the audio-files were replayed multiple
104 times and the transcripts and AfN's competency document were reviewed to become acquainted
105 with the data. The competency document and interview transcripts were combined as raw data and
106 handled in Word. During stage two, initial codes were identified on a line-by-line and paragraph-
107 by-paragraph basis for the dataset (participants and accreditation document). Semantic and latent
108 themes were identified inductively and deductively as described by Braun and Clarke⁽²⁰⁾. Inductive
109 themes were identified using open coding and participant's words were used to generate *in-vivo*
110 codes to remain true to the data, where appropriate. Deductive themes (psychological constructs and
111 behaviour change techniques) were preselected from literature detailing the multidimensionality of
112 weight management^(12, 21). Themes were identified semantically where information accurately
113 reflected an area of knowledge. Latent themes were identified to explain the participant's
114 experiences in the context of known information and were contextualised using literature definitions
115 (provided in the results). Data was then imported into Nvivo to perform indexing (stage three).
116 Text was transposed from the word document into themes and sub-themes (a preliminary
117 framework) which were created as nodes within Nvivo. Using Nvivo's Framework Matrices tool,
118 matrices were then created where each row represented a case (participants or accreditation
119 document) and each column represented a theme or sub-theme, to chart the information (stage four),
120 and tabulate each theme's data and source (participants vs. accreditation document). Data for each
121 participant, criterion and theme was then summarised in the matrices by referring back to the
122 indexed data. The matrices were then exported into Microsoft Excel 2010 (Microsoft Corporation,
123 Redmond, WA) and printed off for interpretation (stage five). Rows (cases: participants vs.
124 accreditation document) and columns (themes and sub-themes) were then compared qualitatively,

125 facilitated by the matrix structure, to identify patterns, similarities and differences between and
126 within data for each theme and subtheme ⁽¹⁹⁾.

127 A separate numerical matrix (table 1) was created to determine where the majority of data resided
128 for each case and theme. This was created using Microsoft Word 2010 and was similar to central
129 labels chart that was used to determine associations in the study by Spencer and Whelan ⁽²¹⁾. While
130 the framework matrices of Nvivo would allow the researcher to determine the quality of
131 associations between the themes ⁽¹⁵⁾, the numerical matrix provided a visual reference as to data
132 clustering and served as supplementary information.

133 **Verification**

134 To reduce bias, the codes, themes, theoretical framework and analyses were verified by two
135 colleagues at two time-points in the data management and analysis process (stages three and five).
136 Both colleagues were noted authors in related fields with extensive research experience. To verify
137 the analyses, meetings were organised and data and outputs were provided to the attendees prior to
138 the meetings who were blind to the findings at each stage. During the meetings feedback was
139 provided and the data analysis and interpretation was verified.

140

141 **RESULTS**

142 Core competencies 1 (Science), 3 (Social/Behaviour) and 4 (Health and Wellbeing) were
143 frequently indexed into the themes during the analyses. An abbreviated summary of these AfN
144 competencies is provided in table 2. Preliminary analyses revealed that AfN accreditation criteria
145 did not specify any competencies that reflected weight management however one competency
146 (CC1j) necessitated an understanding of conditions that require dietary manipulation or can affect
147 physical activity, such as obesity and chronic disease.

148 **Theme 1: Nutrition Knowledge and Education**

149 *Relevant competencies: CC1a – CC1q, CC2a -CC2e and CC3h*

150 The participants (1-8) made 26 references to nutrition knowledge and education and suggested that
151 increasing knowledge improved their eating habits. Knowledge was gained from studying,
152 slimming groups and contact with health professionals; participants explained that understanding
153 how food affects the body, the energy contents of food, the provenance of food and recipes and
154 food choices meant that they were better-able to make informed decisions.

155 *"I started to learn about what we needed as fuel and why we needed it" (6)*

156 The competency document provided 23 criteria from core competencies 1-3 that reflected the
157 participant's explanations. Core competency 1 (science) contained 17 competencies (CC1a-CC1q)
158 in areas such as nutritional science, human physiology, metabolism and dietary analysis, and related
159 mostly to this theme. Competency 3h (theories of nutrition health education and nutrition health
160 promotion) recognised the need to understand educational theories, equipping Nutritionists with
161 educational knowledge to educate client-groups with knowledge.

162 **Theme 2: Exercise and Physical Activity**

163 *Relevant competencies:*

164 *CC1a, CC1j, CC1k: CC3f: CC4a:*

165 The participants (1-4, 6-8) explained that exercise complemented their eating behaviours.

166 *"I can exercise without dieting but I can't do dieting without exercising." (3)*

167 Participants explained that exercise provided structure and discipline, that exercising punctuated
168 reminders to eat well, that deviating from dieting would create the perception that exercise was
169 wasted and that exercise provided goals and reinforced positive behaviours.

170 *"If I go out for a run, which I enjoy doing, and I eat badly, I've ruined that hour that I've spent
171 going out for a run" (3)*

172 Exercise was also articulated to provide an energy expenditure safety net and as a mechanism for
173 promoting flexible restraint. One participant in particular explained that exercise increased his
174 appetite and that he had to manage his eating based on his exercise volume.

175 *"You know, the more exercise I do the hungrier I become" (6)*

176 The course accreditation recognises the requirement to understand, measure and estimate energy
177 balance and physical activity (CC1a, CC4a), the nature of conditions that affect physical activity
178 (CC1j) and how dietary needs change with physical activity levels (CC1k) however these criteria
179 did not specify the need to understand the behavioural effects of exercise in weight management in
180 the terms of hunger and satiety control. Competency CC3f: theories and applications of improving
181 health, behaviour and change, might have some relevance to the behavioural dimensions of exercise
182 however an understanding of this is not made explicit within the criteria.

183 **Theme 3: Planning:**

184 **3.1: Diet Design**

185 *Relevant competencies:*

186 *CC1c - CC1g, CC1i - CC1k, CC3c - CC3e, CC3g, CC3i, CC4b, CC4h*

187 The participants (1-8) manipulated their eating habits to accommodate their weight-management
188 goals (20 references). Participants described that through trial and error and gaining new
189 knowledge, they made adjustments such as calorie counting, carbohydrate manipulation,
190 eliminating foodstuffs and reducing portion sizes to achieve their weight loss goals.

191 *"Just trying to eat relatively healthy but keep under sort of 1,800 calories" (1)*

192 Fourteen references from core competencies 1 (science), 3 (social/behaviour) and 4
193 (health/wellbeing) were interpreted to reflect relevant knowledge and skills required of Nutritionists
194 in this area. These criteria were specific and focussed towards knowledge of nutritional
195 requirements (CC1k, CC3c and CC4d) and reflected the participant's experiences well. This
196 knowledge was specific and based on variables such as age, gender and activity (CC1k) and
197 included knowledge of dietary, activity and nutritional status assessment methods (CC1e, CC1g and
198 CC4e). The ability to design diets that meet clients' needs was explicitly articulated within the
199 criteria (CC3i).

200 **3.2: Self-Management**

201 *Relevant competencies:*

202 *CC3c: CC3e:CC3f:*

203 The participants (2-8) suggested that organising and structuring their lives was important to ensure
204 adherence (9 references) and that when that structure was challenged, adherence became difficult.
205 A lack of structure, organisation and time management led to previous failures for some.

206 *"The difference between now and perhaps in the past is that I was less organised and didn't do
207 that". (2)*

208 Participants devised weekly and monthly shopping lists, had set-meals/menus, cooked and prepared
209 food ahead of time, stocked larders with foods and planned meals and exercise ahead of time. The
210 participants explained that their behaviours needed to be purposefully flexible, to allow for
211 situations that might require digression. This allowed for greater long-term consistency.

212 *"My structure is flexible enough to say that's all right, that's fine. I'm not going to deprive myself*
213 *of anything just because it's not perfect". (3)*

214 The competency document made not references to self-management knowledge and skills however
215 CC3c, CC3e and CC3f of core competency three (social/behaviour) might reflect the need to
216 understand lifestyle circumstances and mechanisms to accommodate lifestyle circumstances,
217 however this was not articulated within any criteria.

218 **Theme 4: Psychological Constructs and Behaviour Change Techniques:**

219 **4.1: Dietary Restraint**

220 *Relevant competencies:*

221 *CC3c: CC3f:*

222 This theme was created using Johnson and Wardle, ⁽²²⁾, Polivy, Heatherton and Herman, ⁽²³⁾,
223 Ruderman, ⁽²⁴⁾ and Teixeira et al. ⁽²⁵⁾ who describe dietary restraint as a dichotomy of rigid and
224 flexible restraint. The participants made 53 references to flexible and rigid restraint and warned that
225 rigidity (for some) lead to obsessiveness, became unsustainable and could lead to disinhibited eating
226 (1-7). The participants explained that flexible restraint allowed them to remain in control and also
227 allowed them opportunities for digressing from their diets when needed.

228 *"I suppose this is where the not going so far that I become obsessive about it comes in, but going*
229 *far enough so that if I do have a bit of a blowout of a weekend that actually I can rationalise that "*
230 *(3)*

231 The accreditation document contained 2 references that might reflect this theme and CC3f of core
232 competency three (social/behaviour) might relate mostly dietary restraint within the criteria. While
233 this competency recognises the importance of knowledge of health behaviour and change, this
234 competency did not stipulate the requirement to understand dietary restraint and how it impacts
235 weight-related behaviours.

236 **4.2: Locus of Control**

237 *Relevant competencies:*

238 *CC3c: CC3f:*

239 This theme was created using Abusabha and Achterberg ⁽²⁷⁾, Adolfsson and colleagues ⁽²⁸⁾ and
240 Balch and Ross ⁽²⁹⁾ who describe locus of control as the extent to which an individual perceives they

241 can control the factors in their lives which affect them. The participants (1-8) provided 56
242 references to locus of control and suggested that an internal locus of control was important to
243 motivation and adherence and was a precursor to success.

244 *"Being in control is something I'm enjoying" (2)*

245 The participants explained that an external locus of control prompted previous failures and that the
246 sensation of control allowed them to make choices and decisions about their eating and exercise
247 behaviours that reflected their wants and needs. Control could be challenged by environmental and
248 circumstantial factors if sufficient coping mechanisms were not present however.

249 *"And normally when I've done diets before; I haven't necessarily felt that in control" (7)*

250 The course accreditation document provided two criteria that might reflect locus of control within
251 the social/behaviour theme (CC3c and 33Cf) however knowledge of locus of control was not
252 indicated within any criteria in the document.

253 **4.3: Self-Efficacy**

254 *Relevant competencies:*

255 *CC3c: CC3f:*

256 This theme was created using information from Abusabha and Achterberg⁽²⁶⁾, Bandura⁽²⁹⁾ and
257 Zulkolsky⁽³⁰⁾ to define self-efficacy within weight management as an individual's belief in their
258 ability to achieve and maintain weight loss. The participants explained that self-efficacy was
259 connected to their eating (1, 2, 6-8), weight loss (1, 4) and exercise goals (3, 5 and 8) and
260 behaviours. Self-efficacy was therefore revealed to be complex. High self-efficacy was related to
261 successful completion or adherence to behaviours (low self-efficacy was not) and 64 references
262 were made to self-efficacy within the interviews.

263 *"And feeling like you're achieving something as well and that you can do it and it makes me feel
264 more positive" (1)*

265 The perception of efficacy promoted motivation and consistency and that efficacy within one area,
266 such as exercise, prompted efficacy to achieve eating and weight-related goals elsewhere.
267 However, some participants revealed that a lack of self-efficacy led to previous failures and might
268 prevent current successes.

269 *"I pretty much if I put my mind to something I can do it, and the only thing that I feel that I don't
270 have that much success with is probably dieting and things that are related to that" (1).*

271 The accreditation document contains two criteria that might be relevant self –efficacy within core
272 competency three (CC3c and CC3f) however knowledge of self-efficacy or self-efficacy within
273 weight management was not clearly articulated within any criteria.

274 **4.4: Self-Monitoring**

275 *Relevant competencies:*

276 *CC3f: CC3h:*

277 The participants provided 38 references to self-monitoring activities. Participants explained that
278 they used food diaries and calorie counters to monitor their diets (1-8). This was facilitated with
279 smart phone apps and mobile technology for some.

280 *"I have my Fitbit bug tracker, whatever, what it is to track my steps on a daily basis and when I get*
281 *on my bicycle I have my Scosche armband...So it's all sort of tracked and the food diary is done as*
282 *part of My Fitness Pal." (6)*

283 Participants explained that self-monitoring was used for self-regulation and educational purposes,
284 that they weighed themselves; took measurements; assessed clothing fit, used subjective feelings
285 and monitored exercise performance as indications of progress. Participants 1 and 4 explained that
286 regular weighing could be discouraging if weight loss plateaued or was not as quick as desired.

287 *"My weight actually hasn't changed anything meaningful since last December, which is*
288 *discouraging" (4)*

289 Competencies CC3f, CC3g and CC3h of core competency three (social/behaviour) might be
290 relevant to this theme however these criteria provided no explicit information about how to develop
291 self-monitoring behaviours in others. Six competencies from science (core competency one) and
292 health/wellbeing (core competency four) specified that courses must include knowledge of the
293 assessment and evaluation of diet, body-composition and nutritional status (CC1e, CC1g, CC1n,
294 CC1o, CC3g, CC4a and CC4e) which might also be relevant to this theme however these criteria
295 did not appear to be directed towards developing self-monitoring activities in others.

296 **4.5: Goal Setting**

297 *Relevant competencies:*

298 *CC3f: CC3h:*

299 This theme was created using information from Sniehotta⁽³¹⁾ to define goal setting as internalised
300 representations of desired outcomes. The participants explained that creating and achieving goals
301 improved motivation and self-efficacy and described goals that drove their behaviour (1-4, 6-8).

302 *“I’m keen to make sure I have some definite goals for continuing my progress”* (3)

303 The participants described weight goals, exercise-related goals, knowledge goals, health-related
304 goals and life-events as motivators for their behaviours.

305 *“Whereas if exercise plays a part then you can set yourself other goals as well”* (8)

306 The competency criteria provided one criterion that might relate to goal setting on the basis of its
307 recurrence in behaviour-change literature (CC3f), and one that may have indirect relevance (CC3h)
308 to assisting with the development and counselling of weight-related goals from core competency 3
309 (social/behaviour). However, no explicit guidance about goal setting theories, methods or
310 techniques and how to implement them with weight management client-groups was provided.

311 **4.6: Coping Strategies**

312 *Relevant competencies:*

313 *CC3c: CC3f:*

314 This theme was created using information provided by Elfhag and Rössner⁽³²⁾ and Stubbs and
315 colleagues⁽³³⁾ that describe coping as cognitive and behavioural factors used to manage internal and
316 external demands. The participants described situations that threatened their compliance and
317 described coping strategies that allowed them to remain adherent given circumstances (36
318 references). Some participants revealed that stressful life events lead to binge-eating in the absence
319 of sufficient coping mechanisms and comfort eating was problem from some. Social situations were
320 revealed unanimously to threaten consistency (1-8) and the following examples were described as
321 coping mechanisms for such occasions: driving instead of drinking, limiting food choices, flexible
322 restraint and increasing exercise.

323 *“Because I knew I was going away and food would be awful, Friday morning I made myself get up
324 and go and have a run”* (7)

325 The course accreditation criteria provided two criteria that might relate to coping from core
326 competency three (CC3c and CC3f) which stipulate the requirement for knowledge of environments
327 and applications of methods of improving behaviour however these criteria provided no information
328 about coping strategies or factors that might require them within weight management contexts.

329 **Theme 5: Determinants of Eating:**

330 **5.1: Environmental Determinants**

331 *Relevant competencies:*

332 *CC3c - CC3e:*

333 This theme was created using Delormier and team⁽³⁴⁾, Gustaffson and Draper⁽³⁵⁾ and Pettoello-
334 Mantovani⁽³⁶⁾ who describes environmental determinants as physical and perceived environmental
335 factors that influence dietary choice. The participants explained how their environments impacted
336 their food choices and behaviours and provided 38 references that described how their
337 environments challenged or benefitted their weight-related goals. Common environmental
338 challenges included the home (1-7), work (1, 5 and 7) and travel (5 and 6). Environments impacted
339 the participants by affecting the availability of food choices, creating time constraints. Participant 6
340 described how his work required him to engage with business lunches and travel. Food choices in
341 these situations were often high in calories and he felt pressured to eat in a certain way when in the
342 presence of colleagues.

343 *"I'm out with work colleagues and they want to go for two pints and an Indian or they want a fish*
344 *and chip supper or they want to, you know. Or we're out at a restaurant and they all want three*
345 *courses, what do you do" (6)*

346 The home presented a number of challenges for participants too and the presence of non-diet foods
347 and appetite stimulating cues in the house created temptations and issues that were described by
348 some.

349 *"There were lots of indulgent type treaty foods knocking around the house, whilst I'm not offering*
350 *up excuses, but that's sort of tough" (4)*

351 Participants 1 and 2 revealed that their work and home environments were beneficial however and
352 for both participants, the structure of these environments facilitated or reinforced their weight-
353 related behaviours positively.

354 *"The things that led to my success right now have been environment changes" (2)*

355 The course accreditation document provided 3 criteria from core competency three (CC3c, CC3d
356 and CC3e) that reflect an understanding of environmental determinants of food choice and eating
357 which might reflect the participant's experiences within this theme.

358

359 **5.2: Social Determinants**

360 *Relevant competencies:*

361 *CC3c - CC3e:*

362 This theme was created using the descriptions of Delormier and colleagues⁽³⁴⁾, Gustaffson and
363 Draper⁽³⁵⁾ and Pettoello-Mantovani⁽³⁶⁾ of social and sociocultural factors that influence dietary
364 choice. The social determinants theme described incidences of where social influences, social
365 environments and situations impacted food choices and behaviours. Participants described in detail
366 parental and social influences (1-8), which could be either positive or negative. Social eating,
367 drinking, family life and family members impacted eating and weight-related choices beneficially
368 or destructively.

369 *“Whenever there’s any kind of social thing going on that I find it really difficult to stick to an*
370 *eating plan” (1)*

371 The course accreditation document provided 3 criteria (CC3c, CC3d and CC3e) from core
372 competency three that related to the social determinants theme. These criteria specified an
373 understanding of religious, cultural and social eating determinants that shape food choice and
374 behaviour and these criteria might therefore reflect the participant's experiences of social
375 determinants within this theme.

376 **Theme 6: Social Support**

377 *Relevant competencies:*

378 *CC3c - CC3f:*

379 This theme was created using information from Bakz and team⁽³⁷⁾ who describe social support as a
380 range of factors including the physical and perceived availability of supportive significant others.
381 The participants (1-7) revealed that social support was an important contributor to their successes,
382 provided 39 references to social support and suggested that weight loss would be impossible
383 without it.

384 *“You can't do a diet I don't believe of any type unless you've got the support of those who live*
385 *around you” (6)*

386 The participants described that having supportive partners, friends, families and work colleagues
387 benefited them by providing support and guidance. One participant in particular revealed that
388 becoming part of slimming club provided her with moral support which had previously been

389 lacking. Participants explained however that weight loss could foster social isolation and described
390 how family members and spouses could be destructive and act as saboteurs through actions such as
391 offering and/or eating forbidden foods in their company. A lack of support was revealed to create
392 social problems, antagonistically.

393 *"If you don't have that structure or that support I suppose within the family environment, whatever*
394 *environment that you're in, then it's a lot, it is just something that just consumes you" (7)*

395 Competencies CC3c, CC3e and CC3f were indexed into this theme from core competency three.
396 While it is possible that CC3f might reflect knowledge of social support, no explicit information
397 about social support in the context of weight management was specified within any criteria.

398 **DISCUSSION**

399 One initial finding from this study was that the competency criteria contained no references to
400 weight management. One of the competency criteria (CC1j) did reflect the requirement for courses
401 to include information about conditions that may require dietary manipulation or affect physical
402 activity such as obesity and chronic disease however this was the only criterion that made any
403 reference to a weight-related issue. This was surprising considering that weight management and
404 overweight are important and well-researched diet-related issues⁽³³⁾ and that dietary counselling
405 and nutrition education are implicit components of weight management interventions and
406 programmes⁽³⁸⁾. Indeed, Public Health Nutritionists and Sport and Exercise Nutritionists
407 registered with the AfN might work with people with weight-management needs^(2, 40-41) and require
408 specialist weight management knowledge and skills. This initial finding is of particular importance
409 in light of substantive population increases in obesity: it is forecasted that by 2030 over half of the
410 UK population will have become obese⁽³⁹⁾ which carries important health and economic
411 implications for future society⁽³⁹⁾. Future revisions of the competency framework might need to
412 reflect a burgeoning obesity problem. The analyses revealed that the nutrition knowledge and
413 education and diet design themes demonstrated parity between the participants and the competency
414 document however; clear criteria were provided for these themes that addressed the participant's
415 experiences. Unsurprisingly, it might be expected that courses develop learners with scientific
416 knowledge and practitioner skills to design bespoke diets.

417 Of all themes identified psychological constructs and behaviour change techniques were referenced
418 most by the participants but referenced fewest by the criteria. Dietary restraint, locus of control and
419 self-efficacy are all factors that have been identified in the literature^(32, 33, 42-43) and were discussed
420 repeatedly by participants. Self-monitoring, goal setting and coping have also been identified
421 elsewhere^(33, 44) and were described by participants too. The accreditation document made few

422 references to information that could be directly interpreted to reflect these concepts. Core
423 competency three (social/behaviour) was most related. Within the sub-components of this
424 competency the only guidance to reflect these issues were criteria CC3F: theories and applications
425 of methods of improving health, behaviour and change and CC3G: design and implementation of
426 intervention projects and programmes. No explicit references to any of the theories, constructs or
427 tools discussed by the participants were provided in any criteria. While it is possible that the
428 competency framework is purposefully brief, the weighting of the document appears to be shifted
429 towards the sciences of food and nutrition rather than the social-science concepts of nutrition and
430 health-related behaviour. Nutrition encompasses many conditions that require sound knowledge of
431 science⁽⁴³⁾ and weight management is only one small aspect of Nutritional knowledge. The lack of
432 detail about psychological and behavioural concepts contrasts markedly from core competency one
433 (science) and core competency three (health and wellbeing) which specified multiple and specific
434 knowledge and skills to be embedded into curricula. Further evaluation via a larger explorative
435 study is required to verify these findings. Such research might facilitate the revision of the current
436 AfN criteria to provide a more comprehensive account of the psychological and behavioural
437 dimensions of Nutrition and weight management.

438 While this ambiguity might also indicate that courses introduce a broad range of theories and tools
439 within social and behavioural contexts, issues with the evidence might necessitate that more explicit
440 guidance is provided to education providers. Behaviour-change interventions are complex and
441 consist of interacting interventions and variables and it is not always clear which interventions are
442 effective⁽⁴⁵⁾. Reporting practises within studies are sometimes inconsistent and interventions are
443 sometimes only partially reported⁽⁴⁵⁾. Study findings are sometimes unpredictable and some of the
444 literature is ambiguous and lacking replicability⁽⁴⁵⁾. Importantly, it also seems that the linkage
445 between behaviour change techniques to their theoretical underpinning and mode of action is also
446 unclear⁽³¹⁾. It has been suggested by some^(31,45) that many behaviour theories do not specify which
447 techniques lead to behaviour changes and that there is uncertainty about how to match behaviour-
448 change techniques onto their underpinning theory⁽⁴⁵⁾. Considering the controversy and ambiguity
449 surrounding behaviour-change research and the important role that it plays in weight management
450⁽⁴⁶⁾, there is an obvious need to identify the most optimal and efficacious behaviour-change
451 interventions and their appropriate theoretical underpinnings. The lack of specificity within the
452 core competency framework might indicate that these tools and theories are not identified and
453 appraised appropriately within education programmes. Education providers might therefore require
454 clearer guidance from the AfN about which theoretical behaviour models and behaviour-change
455 techniques to embed within curricula.

456 Schubert and colleagues ⁽⁸⁾ suggest that social knowledge within nutrition has been biased towards
457 structural concepts that shape food choice and lacks agential understanding. Within this study the
458 clearest guidance relating to social knowledge for accredited courses was demonstrated within
459 competencies CC3c, CC3d and CC3e, which were mapped against the environmental and social
460 determinants themes. These criteria appeared to reflect structural factors that shape food and eating
461 behaviour ⁽³⁴⁾. While the competency criteria appears to embrace some social knowledge this
462 research indicates that knowledge and understanding of behaviour and the behavioural dimensions
463 of exercise and self-management appears to be lacking, perhaps reflecting Schubert and team's
464 suggestions ⁽⁸⁾. A holistic understanding of diet-related issues is perhaps essential to the effective
465 treatment and prevention of many modern dietary challenges ⁽⁸⁾. Overweight and obesity are
466 important societal issues that are impacted by food choice and behaviour ^(43, 46); food and eating are
467 intertwined with behavioural and social factors that affect the antecedents and outcomes of
468 consumption ^(8, 34, 42-43).

469 It should be recognised that the responsibility to embed and evidence the core competencies rests
470 with the education providers and that the goal of this research was to provide a constructive
471 evaluation of the existing AfN criteria. If Nutritionists are to fully understand weight management,
472 based on the AfN's core competency framework only, then it is possible that education providers
473 might be providing learners with insufficient information. It should also be recognised that the
474 possession of an accredited Undergraduate Nutrition degree entitles registration as an Associate
475 Nutritionist only ⁽⁴⁾ and that full registration requires the evidencing of three years' experience when
476 applying to the UKVRN ⁽⁴⁾. It is therefore possible that registered Nutritionists might obtain deeper
477 knowledge of weight management after graduation, during the years prior to achieving full
478 registration.

479 Limitations of this study are that a small sample of white, middle-class UK adults was obtained,
480 that the experiences described might not reflect the breadth of weight management needs and
481 experiences of all populations, and that the sampling methods are insufficient to ensure
482 generalizability. Future research might look to employ larger, more diverse samples from a range of
483 social and ethnic backgrounds using multiple and iterative sampling methods to accommodate these
484 limitations. An additional limitation is that the AfN's core competency document was the only
485 estimate of undergraduate Nutritional knowledge used within this research and that this might not
486 fully reflect what institutions are delivering. Indeed, this explorative study provides in depth
487 information and is sought to generate hypotheses, future studies might look to evaluate accredited
488 and non-accredited course curricula directly to determine if and how weight management is being
489 addressed within Nutrition education directly. To our knowledge this is the first study that provides

490 a detailed comparison of lived experiences of weight management (loss and maintenance) with an
491 educational framework. This research should serve as a catalyst for further evaluation and
492 modification, reflecting the demand for new strands in nutrition education ^(7, 8).

Key Theme	Sub-Themes	Participants References	AfN Document References	Total References
1. Knowledge and Education	None	26 (1-8)	23	49
2. Exercise and Physical Activity	None	35 (1-4, 6-8)	5	40
3. Planning	3.1. Diet Design 3.2. Self-Management	20 (1-8) 9 (2-8)	14 3	34 12
4. Psychological Constructs and Behaviour Change Techniques	4.1. Dietary Restraint 4.2. Locus of Control 4.3. Self-Efficacy 4.4. Self-Monitoring 4.5. Goal Setting 4.6. Coping	53 (1-8) 56 (1-8) 64 (1-8) 38 (1-8) 23 (1-4, 6-8) 36 (1-8)	2 2 2 2 2	55 58 66 40 25 38
5. Determinants of Eating	5.1. Environmental determinants 5.2. Social determinants	38 (1-7) 60 (1-8)	3 3	41 63
6. Social Support	None	39 (1-7)	3	42

Table 2: Abbreviated Core Competencies

Abbreviated Competencies		
CC1: Science	CC3: Social Behaviour	CC4: Health and Wellbeing
<ul style="list-style-type: none"> a. The human body and its functions. b. Mechanisms for the integration of metabolism. c. Nutrients. d. Metabolic demand for nutrients. e. Nutrient usage by the body; deficiency; assessment. f. Non-nutrients. g. Nutrient analysis. h. Digestion, absorption, transportation of nutrients and non-nutrients. i. Nutrition in health and disease. j. Nature of conditions that require dietary manipulation such as obesity and chronic diseases. k. How nutritional needs change. l. Plan, conduct, analyse and report on investigations. m. Carry out sample selection in accordance with basic principles of good clinical practice. n. Obtain and record, collate, analyse, interpret and report nutrition-related data. o. Prepare and process, interpret and present data. p. Health research methods, dietary nutrition methodologies; nutritional epidemiology. q. Practical skills in communication and learning. 	<ul style="list-style-type: none"> a. Food and Nutrition health policy. b. Nutrition in public health agenda. c. Factors that affect nutritional needs and practices. d. Religious and cultural beliefs that impact diet and health. e. Financial/social and environmental circumstances that impact diet and nutritional intake. f. Theories; methods; applications of improving health, behaviour and change. g. Intervention projects and programme design; monitoring and evaluation. h. Nutrition health education and promotion. i. Diet design for a stated situation for an individual, human or animal, or group of humans or animals. 	<ul style="list-style-type: none"> a. Measurement and estimation of energy balance; energy expenditure physical activity and fitness; body mass; body composition; control of body mass and energy balance. b. Theory and methods of investigating diet, nutrient and activity patterns. c. Scientific basis of the safety and health properties of nutrients and non-nutrients based on metabolic effects of nutrients, anti-nutrients, and other agents; nutrient-nutrient interactions, nutrient-gene interactions, 'nutri-ceuticals', functional foods and other dietary constituents d. Measurement and estimation of nutritional requirements, dietary reference values for the general population e. Principles underpinning, strengths and limitations of nutritional status assessments. f. Efficacy, health attributes; claims, safety, and legality of foods, drinks and supplements. g. Ability to critique dietary, nutrition and health research methods. h. Integrate knowledge and propose solutions to improve human health, welfare and/or productivity of animals, food production and sustainability.

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