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Nutrition knowledge and influence on diet in the carer–client relationship in residential care settings for people with intellectual disabilities

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Abstract

People with intellectual disabilities generally have poorer health outcomes compared with those who do not, including outcomes related to nutrition-related noncommunicable diseases. Carers support people with intellectual disabilities in many aspects including habitual shopping and preparation of food, but their own nutrition knowledge and the influence this may have on dietary intakes of clients is unknown. We explored the nutrition knowledge of carers of people with intellectual disabilities in residential care settings, their dietary habits and their influence on clients' food shopping and preparation and therefore the diet consumed by their clients. Ninety-seven carers belonging to a large independent care sector organisation specialising in the care of people with an intellectual disability completed a validated general nutrition knowledge and behaviour questionnaire. Seventeen carers from the residential care settings were interviewed to contextualise practice. Knowledge about key dietary recommendations scored highly. Carers who had more work experience were found to have higher scores in 'making everyday food choices' ($p = 0.034$). Daily consumption of fruit and vegetables (at least one portion per day) was observed (for fruit by 46% of the carers and for vegetables by 60% of the carers), whilst most carers reported avoiding consuming full-fat dairy products, sugary foods and fried foods. The concept of a healthy diet; typical dietary habits of clients; role in food acquisition; and training in nutrition emerged as themes from the interviews. Carers discussed various topics including the importance of a balanced diet, cooking fresh foods and control of food portion sizes for clients relative to the care philosophy of a client-centred approach, which encapsulates client autonomy. Gaps in knowledge around specific nutrients, making healthy choices and cooking skills remain. Carers have an influence on clients' dietary choices; they are able to provide healthy meals and share good dietary habits with clients. Further training in nutrition is recommended for impact on clients' health.

KEYWORDS
carers, dietary practices, eating behaviour, intellectual disability, person-centred care

INTRODUCTION

According to the World Health Organization (WHO), intellectual disability (ID) constitutes 'a condition of arrested or incomplete development of the mind characterised by the impairment of skills and overall intelligence in areas such as cognition, language, and motor and social abilities. Intellectual disabilities are often referred to as learning disability, although the term 'intellectual disabilities' is preferred. Intellectual disabilities can occur with or without any other physical or mental disorders' (WHO, 2013). People with an ID need care and support based on their personal requirements. Adults with an ID should benefit from preventative healthcare services in the same way as the general population (Lorentzen & Wikstr, 2012). However, despite this, there are barriers to ordinary healthcare needs being met, such as learning and communication difficulties, poor carer and professional awareness, discrimination, physical and administrative barriers, as well as emotional barriers such as fear or anxiety (Doherty et al., 2020a; Lindsey, 2002; Raymaker et al., 2017).

According to the Office for National Statistics (2020), there are 1.5 million people with an ID living in the UK (the Office for National Statistics, 2020). Epidemiological data collated by Public Health England suggested that there were 1 087 100 adults and children with an ID living in England, yet General Practitioner (GP) databases only recorded 252 446 children and adults who have an ID on their practice-based registers (Hatton et al., 2016). It is well documented that people with an ID live in poorer health and are at a greater risk of premature death when compared to the general population, often from preventable causes (Heslop et al., 2013; Hosking et al., 2016). Despite some recorded improvement in life expectancy over time (Coppus, 2013), people with an ID continue to live, on average, 20 years less than those without an ID (NHS England, 2019).

When compared to the general population, people with an ID are three times more likely to die from a respiratory disease due to complications caused by dysphagia (Bowness, 2014). Although accurate data are limited, it is accepted that people with an ID are more likely to have swallowing difficulties than other people. The prevalence of epilepsy and dementia are also greater than that of the general population (Public Health England, 2016) as is obesity. Obesity levels are rising nationally and according to data collated from those that were registered with GPs between 2017 and 2018, obesity was found to be twice as common in people aged between 18 and 35 years with an ID as in those without (NHS Digital, 2021). According to Dick and Clough (2019), several factors may account for this increase, such as a poorly balanced diet, a sedentary lifestyle, genetic predisposition to weight gain (such as Prader-Willi Syndrome and Downs Syndrome) and side effects attributed to the use of some anti-psychotic medications (Dick & Clough, 2019). Concerns regarding preventable illnesses can be further exacerbated since obesity is associated with co-morbidities such as cardiovascular disease (Guh et al., 2009), some cancers and type 2 diabetes (Finer, 2015).

In addition to experiencing poorer health, people with an ID can face barriers to accessing health care (Bowness, 2014) and health services can be slow to make reasonable adjustments to meet their needs (Hosking et al., 2016), thus maintaining health inequity and inequality (Public Health England, 2021). Early detection and intervention, in addition to the effective and timely treatment of more complex physical and mental health conditions, is key to improving the quality of life and longevity for this group (Hemm et al., 2015). The NHS Long Term Plan (Alderwick & Dixon, 2019) pledges to improve the experience of accessing health care for people with an ID by educating staff, making reasonable adjustments to services and ensuring a person-centred approach by listening to the voices of this client group and their carers.

The implementation of a person-centred care approach with people who have an ID has been supported by national reviews and policies for some years (HM Government, 2021, Department of Health, 2013, Department of Health, 2012, Department of Health and Social Services, 2001), and this approach is used as a means to support people with IDs to achieve their aspirations and to experience better health outcomes (Leoncio & Martin, 2022). Adopting a person-centred approach is to focus on the needs of the individual, recognising people's differences and taking the time to understand their preferences and values. The focus of ID services has historically been around protection (Stainton & Boyce, 2004) but more recently, it is considered that concepts of autonomy, which focus on freedom of choice and independence, should be key considerations when caring for people with an ID (Dowling et al., 2019).

In practice, the individual and the carer work in partnership, ensuring that the information gathered informs a personalised, coordinated and empowering co-produced care plan (Health Education England, 2017). Being rooted in the values of autonomy, rights and personal choice, person-centred planning and care have contributed to an encouraging development in learning disability services (Kaehne & Beyer, 2014). It can, however, be recognised that barriers to this approach do exist, such as limited resources, funding, communication issues and access to services (Leoncio & Martin, 2022).

The role of carers in supporting individuals with an ID has been recognised as an important factor in meeting the needs of this population group (Truesdale & Brown, 2017). Carers have a strong influence on the dietary patterns of people with an ID by making food choices on their behalf (when they cannot or do not want to do so themselves) based on their knowledge or preferences (Rodgers, 1998). Accordingly, carers' influence on clients should involve empathy, respect, engagement, communication, shared decision-making, holistic and individualised focus and coordinated care (Eklund et al., 2019). Studies exploring the relationship between people with learning disabilities and diet generally have focused on their health needs, living conditions and dietary habits (Adolfsson et al., 2008; Hamzaid et al., 2019; McGuire et al., 2007). However, carers may have poor knowledge in relation to appropriate healthy eating and physical activity patterns (Melville et al., 2009). There is an increasing prevalence of obesity in people with IDs, especially whose ages are between 18 and 35 years (NHS England, 2016). Even though sample sizes are small, studies in this group (De Winter et al., 2012; Haider et al., 2013; Hsieh et al., 2014; Koritsas & Iacono, 2016; Stedman & Leland Jr, 2010) show that the prevalence of obesity varies between 25.6% and 51.2%, which is greater than the rate of 25.3% found in the general population (Public Health England, 2022). Furthermore, according to a study which was conducted in the north of England, people with ID are also at increased risk for being underweight as well as obese and leading sedentary lifestyles (Emerson, 2005). People with IDs are also more likely to have diseases of metabolic disorders (e.g. diabetes and cardiovascular diseases) and gastrointestinal disorders (e.g. dysphagia and gastro-oesophageal reflux), which are related to nutritional problems than the general population (Truesdale & Brown, 2017; Turner & Robinson, 2011).

There is uncertainty as to what should be done by carers and other health staff when ID adults have a nutrition-related problem. According to the findings of a cross-sectional study, carers show a lack of knowledge about nutrition and population-based food guides (e.g. the Eatwell Guide in the UK), food portion sizes and food labelling (Smith & White, 2011). There have been a number of studies conducted in supported living residential care settings, which have reported that carers in these facilities have inadequate nutritional knowledge levels (Beattie et al., 2014; Lea et al., 2017). Lea et al. (2017) reported that carers of older people in residential settings had good knowledge of nutrition but a lack of awareness of the consequences of malnutrition and dehydration. In another study, an interviewer-administered questionnaire examined carers' knowledge of public health recommendations on diet and physical activity and found that, in general, the carers had low levels of knowledge of public health recommendations on diet and physical activity (Melville et al., 2009). A more recent study has also reported limited nutritional knowledge among carers of people with IDs (Hamzaid et al., 2018).

However, it is also important to appreciate that inconsistent approaches among staff can be a barrier towards health promotion activities (O'Leary et al., 2018). These inconsistencies can be attributed to several areas, one being the potential ethical juxtaposition between staff empowerment and resident choice.

According to the Office for Disability Issues London (2008), independent living should be about ensuring that people with a disability have the same level of choice, control and freedom in their everyday lives as the next person (Issues, 2008). There are a range of housing options available to people with learning disabilities, but supported living environments have seen some considerable growth as a preference (Wood & Grieg, 2010). The main principles of supported living are that people with intellectual disabilities own or rent their home and have control over the level of support they receive. With the closure of institutions and the inflexibility and cost associated with a group home model, it is suggested that the supported living model goes some way to separate housing from support and can enhance the quality-of-life outcomes for residents (Bigby et al., 2017). It is assumed that all people with an ID, regardless of the level or type, can make choices and it is recognised that those choices may be expressed through less conventional methods.

Residents with ID require different levels of support to meet their specific needs. Some residents have greater independence and can leave the property as required for employment or leisure activities, whereas others have more complex care needs and may require 24-h support with their activities of daily living. Challenges with communication are not uncommon although residents are supported to make as many choices as possible using whatever means are available to them, so that they remain in control. However, carers (support staff) work closely with the individual and family or friends as appropriate, to create and develop person-centred care.

More recently, there has also been more focus on promoting health and wellbeing among those with ID to address the inequalities in health outlined above. Given the importance of the role of the carer for ID clients and the opportunity for this role to support healthy lifestyle choices, this research aims to examine the role of the carer in relation to their influence on the diets of their clients. The study assessed knowledge and dietary practices of carers in residential care settings and their role in influencing their ID client's food choices and diet using a mixed-method approach to determine the level of nutritional knowledge and explore the influence of carers of adults with an ID on their clients' dietary habits. Recommendations for future practice are made.

The research addressed the following research questions:

1. In a sample of carers for clients with an ID in a residential setting, what is the level of knowledge and awareness in relation to nutrition and healthy

diets? How does this knowledge compare to public health recommendations?

2. In what way does the knowledge of the carers influence the dietary choices of their ID clients in a person-centred relationship?

METHODS AND MATERIALS

Using a pragmatist approach (Hall, 2013), a mixed-methods, explanatory sequential, study design in two phases was implemented for this study, as outlined in Figure 1 and described by Creswell (2015). The quantitative approach utilised a cross-sectional survey design using a questionnaire for data collection on a sample of carers belonging to a large independent care sector organisation specialising in the care of people with an ID (phase 1). The data collected were analysed statistically and conclusions drawn. The findings of this phase form part of the further exploration of this topic using a qualitative semi-structured interview with carers for phase 2. This latter phase also explored the use of carer knowledge in context, that is, how this knowledge was used to assist the everyday food choice decisions of people in residential care who have an ID (called clients in this research). The study was designed by a multidisciplinary team of nurses (ID and mental health fields), a nutritionist, a dietitian and a representative from the residential setting following a comprehensive review of the literature.

Research setting

The study was carried out collaboratively with a registered charity in the health and social care sector with whom staff from the Faculty of Health and Social Care had prior links through nursing student placements. The organisation currently provides supported living, residential provision for people with an ID nationwide, although primarily in the north-west of England. The organisation recently appointed someone responsible for research and was keen to partner with the University to promote local research that was practically related to people with learning disabilities. They wanted to explore nutrition due to its importance for their residential care clients.

Supported living as a service model is designed to help people who have a wide range of needs to maintain their independence. Each unit involved in the study is a small, shared house, home to between four and eight residents. In addition to the usual accommodation consisting of a bedroom with shared communal areas, two of the homes were able to provide a self-contained flat to those residents who were more independent. The level of care and support in each of the homes is assessed and determined according to the resident's ability, risk and management, their ability to self-advocate and their motivation. This gives the resident as much flexibility, control and choice as is possible in relation to how they live their lives (Department of Health and Social Care, 2006). The residents had a variety of needs ranging from care and support with all activities of daily living, to a small number of residents who have some independence and could access their local community to visit the shops and local pubs, or as for one resident, engage in part-time work. Promoting choice, engaging with the local community, and supporting the development of new skills are encouraged with all residents.

Carers are always on site. Their role is to assist residents to manage their own living space, develop budgeting skills, help with shopping and cooking skills, and support finance-related needs as necessary. They also support residents with personal care as needed and encourage participation in making choices and life decisions (United Nations, 2022). Residents are encouraged to engage in everyday leisure, social, work and home activities as appropriate (Hatton et al., 2002). Health promotion and improving access to healthcare facilities, health checks and screening are also important components of the carer role, as is working with other professional agencies to ensure holistic care (Alborz et al., 2005).

Data collection

The questionnaire used for data collection in phase 1 was developed from the validated general nutrition knowledge questionnaire published by Parmenter and Wardle (1999). This questionnaire has been used widely with various groups such as adults in different regions (De Vriendt et al., 2009; Hendrie et al., 2008a), athletes (Heaney et al., 2011) and vegetarian populations (Hoffman et al., 2013). A shortened version of the questionnaire was developed by the research group and face and content validity was checked. The full questionnaire already has good construct validity (Hendrie et al., 2008b;

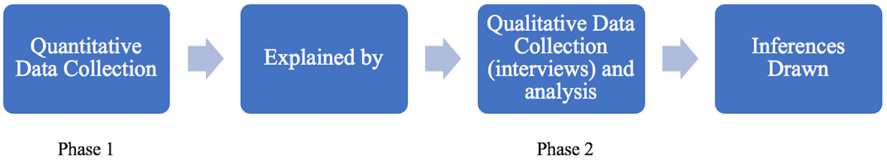

FIGURE 1 Mixed-method explanatory, sequential study design (based on Creswell 2015)

Jones et al., 2015; Kliemann et al., 2016; Putnoky et al., 2020) but face, content and construct validity of the shortened version were tested in a pilot phase using university ID tutors and carers from other third sector established contacts and the participating organisation (the latter carers being excluded from the survey roll-out). This informed the final version of the questionnaire, as it gave insights into areas of knowledge which helped focus the final data collection tool. This also enabled the use of the scoring guide to assess answers and data analysis considerations to be finalised. The face and content validity were deemed to be good. The final questionnaire contained a series of questions which enabled the researchers to determine carers' level of knowledge and awareness of nutrition and their dietary habits. Additionally, dietary intakes of subjects were also assessed by using a short, non-validated food frequency questionnaire that focussed on consumption of foods from the different food groups. Food frequency questionnaires are widely used in nutrition studies for better understanding of dietary behaviours and choices of people (Cui et al., 2021; Mumu et al., 2020; Vilela et al., 2019) and in this study were used to understand whether carers put their knowledge into practice. We looked at knowledge of carers and checked how this impacted on reported consumption behaviours for carers. If a carer was interested in good nutrition and tried to eat a healthy diet themselves, we would argue that they had the knowledge to assist their clients to make healthier choices. We sought to understand how they applied this knowledge in practice working with clients' diets in a residential care setting.

The sample included any member of the organisation employed as a carer for those with an ID. This included males and females aged over 18 years. Those involved in the pilot were excluded. Overall, we aimed for a sample size of $n = 100$ as this represented 20% of the organisation. All carers employed by the participating organisation were informed about the study through weekly team meetings on different sites and provided with a copy of the participant information sheet, the data collection tool and a labelled envelope. Those who wished to participate in the study were asked to complete the questionnaire (anonymously) and return to the named key contact through the organisation's internal post system, using the envelope provided.

For phase 2 of the research, the third-party sector organisation granted us consent to approach their community homes in the region to conduct interviews. All carers who were on duty at the time of our pre-arranged visit consented to being interviewed. A descriptive qualitative research approach utilising semi-structured interviews facilitated by a topic guide was undertaken. Previous literature (Avgerinou et al., 2019; Ruud et al., 2016) and the data from the survey analysis informed the interview schedule. The interview explored carers' views of a healthy diet and how this influenced their own dietary intake, as well as the meal planning and preparation of food for the clients that they care for and were undertaken over a 3-month period.

Data analysis

Quantitative data were analysed using the Statistical Package for the Social Sciences (SPSS) program (IBMS version 24.0). Questionnaire data was processed with correct answers identified and scored in line with the instructions from Parmenter and Wardle (1999 and coded into a SPSS data file. Data normality was tested using Shapiro–Wilk test before further analysis. Descriptive analysis presenting mean ± standard deviations (SD), median, minimum and maximum values, and percentage scores was undertaken. After descriptive analysis, Kruskal–Wallis one-way ANOVA and Mann–Whitney *U*-tests were performed with a value of $p < 0.05$ accepted for statistical significance.

For the qualitative data, interviews were transcribed verbatim and cross-checked with recordings by research team members. Thematic analysis of the interview transcripts following the six-step method of Braun and Clarke (2006) was undertaken by two researchers. Comprehensive immersion in the transcripts was undertaken which were read (1) and re-read to generate initial codes (2). This is a key stage with the links between them later explored to develop themes. Further steps included searching for themes (3) reviewing themes (4) and defining and naming themes (5) resulting in subsequent consolidation of themes. Following this, the process resolves with analysis in the context of the wider literature and referral back to the original transcripts where necessary. The qualitative software package NVivo (QSR International version 12 Plus) was employed to assist the analysis, particularly useful in the storage and subsequent organisation of the data and facilitating the necessary structure to enhance rigorous analysis.

Ethics

Ethics approval was obtained from the Faculty of Health and Social Care Research Ethics Sub-Committee at the University of Chester (RESC0117796). Participation was voluntary, and all participants were provided with an information sheet explaining research aims, the interview process, how data would be treated, anonymity and confidentiality issues. Return of the completed questionnaire was used as consent to participate in the survey. All interview participants were carers and signed a consent form prior to participating and were free to withdraw from the study up until the point of analysis. Interviews were audio-recorded, transcribed and assigned a pseudonym to maintain anonymity. All data were handled in accordance with the Data Protection Act 1998 and are compliant with the General Data Protection Regulation (UK Public General Acts, 2018).

Rigour

For qualitative analysis, two researchers were involved in interview data analysis to generate codes prior to production of the final themes, guard against researcher bias and enhance validity of the coding method. Rigour, particularly authenticity, was addressed by a process of constantly cross-checking interpretations with the original transcripts, which ensured participant voices be heard (Ajjawi & Higgs, 2007) and enhanced faithfulness to their interpretations (Lincoln & Guba, 2000). Themes and sub-themes were cross-checked and refined within the research team with a consensus achieved for the final headings. Continuing inter-researcher dialogue served to facilitate reflection, consider alternative interpretations, consolidate insights and ensure thorough interrogation of the data (Barbour, 2001). The constant consideration of such criteria throughout the research process promoted the necessary 'methodological awareness' (Seale, 2002) for rigorous engagement with the data (Barusch et al., 2011).

RESULTS

Findings from survey

General characteristics of the survey participants are presented in Table 1. Ninety-seven participants completed the survey. The mean age of participants was 41.5 ± 14.2 years. Of the participants, 36.1% were male, and 59.8% were female with four participants who did not state their gender. In total, 60.8% of carers were between 24 and 54 years old and 42.3% of them were working as an ID carer for >5 years.

Table 2 shows the nutritional knowledge scores of carers who completed the questionnaire. The data from the questionnaire were categorised into three main groups: dietary recommendations; sources of nutrients; and making everyday food choices. According to this, mean scores for dietary recommendations were proportionally higher than for the other two types of knowledge.

TABLE 1 General characteristics of carers who completed the questionnaire

Characteristics	*n*	%
Gender		
Male	35	36.1
Female	58	59.8
Not stated	4	4.1
Total	97	100.0
Age (years)		
18–24	13	13.4
25–34	20	20.6
35–44	18	18.6
45–54	21	21.7
55–64	14	14.4
>65	4	4.1
Not stated	7	7.2
Total	97	100.0
	Mean ± SD	**Mean (min–max)**
Age (years)	41.5 ± 14.2	41.0 (20.0–83.0)
	n	**%**
Education level		
Elementary school	0	0.0
Middle school	3	3.1
Secondary school	3	3.1
NVQ1/CSE	2	2.1
NVQ2/O'LEVEL/GCSE	20	20.6
NVQ3/ALEVEL/BTEC	24	24.7
NVQ4/DIPHE	21	21.6
PGCE	1	1.1
Not stated	23	23.7
Total	97	100.0
Working experience		
<1 month	2	2.1
1 month to 1 year	19	19.5
1–5 years	28	28.9
5–10 years	15	15.5
>10 years	26	26.8
Not stated	7	7.2
Total	97	100.0

Note: Data are given as value (*n*) and percentage (%) for gender, age groups, education levels, working experience and mean ± SD and median (minimum-maximum) for age.

Abbreviations: ALEVEL, Advanced Level; BTEC, British and Technology Education Council; CSE, Certificate of Secondary Education; DIPHE, Diploma of Higher Education; GCSE, General Certificate of Secondary Education; NVQ, National Vocational Qualifications; O'LEVEL, Ordinary Level; PGCE, Postgraduate Certificate in Education.

Nutritional knowledge scores according to age, gender and working experience (number of years) are summarised in Table 3. According to this, the knowledge scores for 'making everyday food choices' were higher among carers who had work experience of more than 5 years ($p = 0.034$). In addition to this, carers whose ages were between 36 and 55 years had higher scores for knowledge of dietary recommendations. There were no statistically significant differences in knowledge scores between males and females.

Figure 2 presents the data from the completed food frequency questionnaire. According to this,

TABLE 2 Nutritional knowledge scores of carers ($n = 97$)

	Mean ± SD	Median (min–max)
Dietary recommendations (11 points total)	8.4 ± 1.55	9.0 (3.0–11.0)
Sources of nutrients (45 points total)	27.8 ± 5.49	28.0 (14.0–38.0)
Making everyday food choices (10 points total)	5.4 ± 1.57	6.0 (0.0–8.0)
Total score (66 points total)	41.6 ± 6.76	43.0 (26.0–55.0)

32.9% of carers reported that they never consume white bread. Fruit and vegetable consumption was asked as two separate questions. Findings show that 39.2% of carers consume at least one portion of fruits and 44.3% of participants consume at least one portion of vegetables per day with 45% of carers were consuming at least two portions of fruit and vegetables a day when fruit and vegetable data are combined. Between 28.8 and 34.0 of participants consumed a combined total of five portions of fruit and vegetables per day (data not shown). The data also identified that 38.6% of carers consume beef, 56.7% consume pork, and 66.3% consume lamb less than once a week. We also asked carers about their dietary habits about salt, fried foods and vitamin-mineral supplementations. According to the answers, 14.7% of carers reported always adding salt to their food, 57.3% of them reported using any vitamin, minerals or other food supplements, and 8.3% reported never eating fried foods. Of participants, 75.4% of female and 24.6% of male carers reported eating fried foods less than once per week. Women reported consuming fried foods less frequently than male carers ($p = 0.000$). There was no statistically significant difference between age, gender, education or work experience in these dietary habits ($p > 0.05$).

Findings from one-to-one interviews

All participants for the one-to-one interviews were carers employed by the third sector organisation. Seventeen participants were interviewed including five male staff and 12 female staff. All worked in one of three small community houses located in different geographical areas and all participants were over the age of 18 years. Years employed by the third sector organisation varied, ranging from less than a year to 8 years or more. The interviews explored stages involved in obtaining foods for clients to eat, including food access, to provide an understanding of the relationship between client and carers when food choices are made. The data focussed on four general emergent themes, some of which were linked to the aspects explored through the interview questions (i and ii) and others which came from the participants (iii, iv): (i) concept of a healthy diet, (ii) typical dietary habits of clients, (iii) food acquisition, (iv) training in nutrition. Selection of text which largely expressed the majority viewpoint or consensus were used to illustrate these themes. Where possible, and data permitted, differences between views are reported, as are any deviations. Quotes used are anonymised, using only a pseudonym as identifier. Client X used in the text refers to clients the interviewees referred to.

Concept of a healthy diet

Participants were asked about their understanding of the concept of a healthy diet. Participants overall were knowledgeable about this concept, being able to describe a diet which includes all the food groups in a balanced way and emphasised fruit and vegetable consumption in particular:

> …fruit and vegetables and obviously you have also got to have your meat and your fish and everything else – a nice rounded diet so you are not having too much of something and not enough of another which is what we always try and do, or encourage at least. So to make sure you are not eating too many fatty foods and too many sugary sweets and that – get your fruit and vegetables in and sort of balance meals so you are having your meat and vegetables, as they used to say, for your balanced meals in the evening and making sure you are eating properly throughout the day, so you are getting three meals a day and not skipping breakfast, which is a good one.
>
> (Olivia, female)

In support of a balanced diet, many carers emphasised portion control as a crucial factor for ensuring a healthy diet. They attached importance to portion sizes both for themselves and their clients. Adjusting portion control of clients as a means of having a healthy diet for those who have physical disabilities was stressed. The following quotes illustrate this:

TABLE 3 Nutritional knowledge scores according to age, gender and work experience

		Dietary recommendations			Sources of nutrients			Making everyday food choices			Total score		
	n	Mean ± SD	Median (min-max)	*p*	Mean ± SD	Median (min-max)	*p*	Mean ± SD	Median (min-max)	*p*	Mean ± SD	Median (min-max)	*p*
Gender													
Male	35	8.3 ± 1.38	9.0 (5.0–10.0)	0.681	28.4 ± 6.00	29.0 (14.0–38.0)	0.334	5.5 ± 1.60	6.0 (0.0–8.0)	0.677	42.3 ± 7.26	44.0 (26.0–55.0)	0.416
Female	58	8.4 ± 1.53	8.5 (5.0–11.0)		27.6 ± 5.18	27.0 (16.0–38.0)		5.4 ± 1.61	6.0 (2.0–8.0)		41.4 ± 6.33	42.0 (28.0–54.0)	
Age (years)													
18–35	36	7.9 ± 1.56	8.0 (5.0–11.0)[a]	**0.035***	27.4 ± 5.53	27.0 (16.0–38.0)	0.894	5.4 ± 1.66	5.0 (2.0–8.0)	0.992	40.9 ± 7.10	40.0 (28.0–55.0)	0.726
36–55	37	9.0 ± 0.80*	9.0 (7.0–10.0)[a]		28.1 ± 5.41	29.0 (14.0–37.0)		5.5 ± 1.32	6.0 (3.0–8.0)		42.5 ± 6.39	44.0 (26.0–54.0)	
>55	17	8.1 ± 2.02	8.0 (5.0–11.0)		28.1 ± 6.17	29.0 (19.0–38.0)		5.3 ± 1.86	6.0 (0.0–7.0)		41.5 ± 6.74	44.0 (30.0–49.0)	
Working experiment													
1 month–5 years	49	8.1 ± 1.46	8.0 (5.0–11.0)	0.058	28.2 ± 5.15	29.0 (16.0–38.0)	0.961	5.1 ± 1.57	5.0 (0.0–8.0)	**0.034***	41.4 ± 6.36	42.0 (28.0–53.0)	0.417
>5 years	41	8.6 ± 1.50	9.0 (5.0–11.0)		27.9 ± 5.84	27.0 (14.0–38.0)		5.8 ± 1.57	6.0 (3.0–8.0)		42.4 ± 6.98	44.0 (26.0–55.0)	

Note: Data are given as mean ± SD and median (min–max). Mann–Whitney *U*-test was used to compare scores between gender and working experience groups. Kruskal–Wallis one-way ANOVA test was used to compare scores between age groups. *$p < 0.05$ a: statistical significance between subgroups.

> I don't believe in cutting anything out of a diet, I believe small portions…
>
> (Nicola, female)

> …you just tailor the portion size. So again, where you would give a normal walking person x amount, you give them, maybe the gentleman in the wheelchair, not as much and maybe they don't have … say if they have a sweet portion in the meal, maybe they don't get a sweet portion, I mean client X doesn't really like anyway, but again we don't give them too many sugars and stuff.
>
> (Jack, male)

Together with their influence on both their own and clients' diets, carers are also aware of clients' autonomy and ability to make choices regarding daily dietary habits. In many situations, the clients can choose for themselves and have more autonomy and whenever possible, independent decision-making and choice is fundamental to the approach used by carers to support clients. The following quotes reflect some opinions shared by carers on clients and their independency on dietary habits.

> That's their choice and there is nothing we can do other than say ‘you have been out this week, you have bought your snacks for the week and when they are gone they are gone’. If it is gone in a day well that is up to them. Yes, we do have issues with a lot of overeating at the other place. There is nothing really that we can do because in their best interests you can go to a dietitian who will advise try this, this and this and we can go ‘yes OK’ but we can't force them.
>
> (Jenny)

> …we have to leave him a choice and we also discuss with him and ask if he is willing to bargain with us if you like. So, we don't take the things away from him, we just try and encourage him in a smaller proportion, or maybe don't leave him to his own devices. Offer him an opportunity to store – he likes to buy chocolate bars for example when he walks off to the shop independently. That is just something he does, we can't stop, we wouldn't want to stop.
>
> (Gary)

Besides a balanced diet which includes all food groups in regulated portion sizes, it emerged that most of the participants also consider the cooking method when it comes to eating healthily. Some participants even suggested that using healthy cooking methods is more important than the food consumed. In

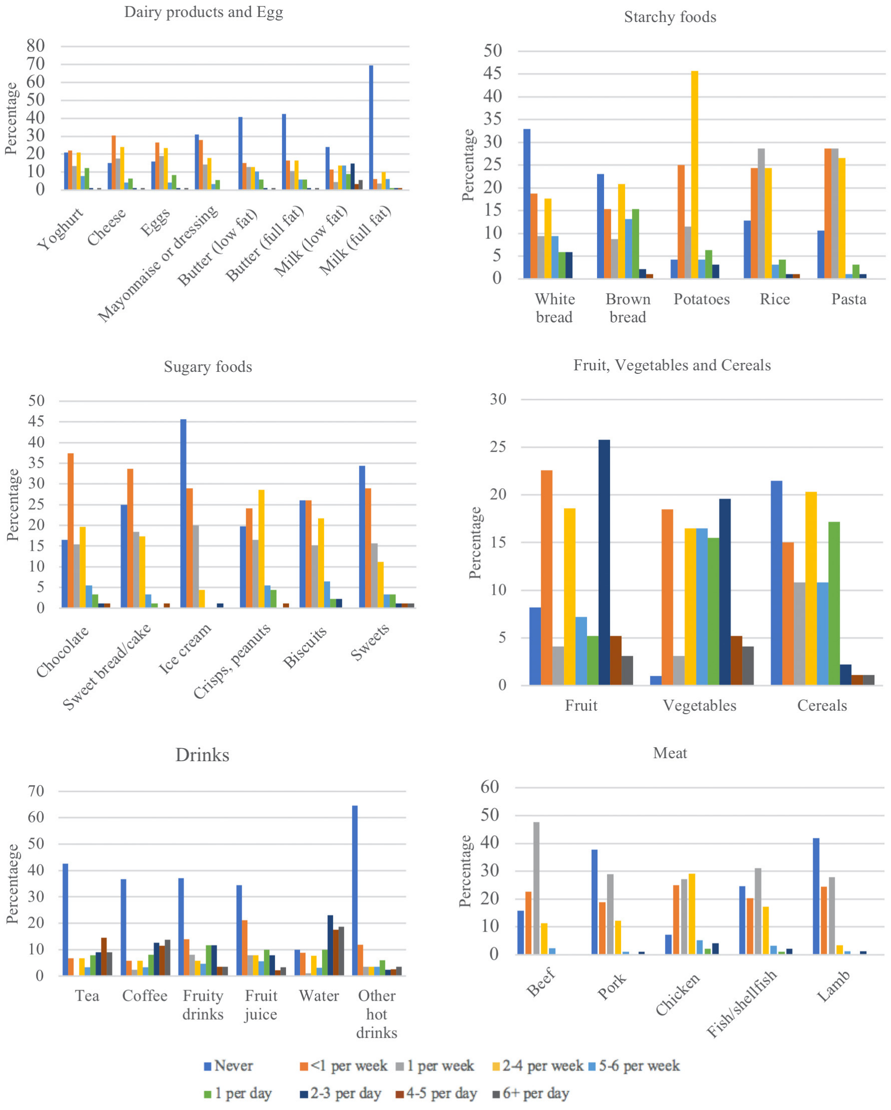

FIGURE 2 Food consumption frequencies of carers in a typical month

particular, fried food consumption was avoided if following a healthy diet:

> If I was going to do a healthy diet, I wouldn't fry anything. It would be boiled or poached or grilled. Salads, pasta. I wouldn't say meat is healthy unless you have different ways of cooking it. Yes, it depends how you cook it really. Like a roast potato is not healthy.
>
> (Terry, male)

After explaining their opinions about nutrition and health, carers could describe the positive effects of diet on health through their own personal experiences. They also pointed out the link between healthy diet, health and the prevention of chronic diseases such as obesity and diabetes:

> …I have struggled with my own weight. I have seen how I feel when I have eaten poorly, and I feel rubbish and then I know that makes me feel bad about the way I look and then it also changes how tired I am and that. So, if I eat really poorly, I am knackered you know when I have to be up the next day for work. When I eat healthy, I struggle to sleep at night and then I am getting up before my alarm in the morning. I can already see that is based entirely on my diet.
>
> (Alison, female)

> It is important anyway to give you energy; a sense of wellbeing; stops you going overweight and if you get overweight you could suffer with things like breathing problems, diabetes, obesity and then obviously you have to balance it. If you eat too little you could suffer with things like anorexia and that can obviously lead to feeling weak all the time and yes, things like that.
>
> (Malcolm, male)

Typical dietary habits of clients

Focussing on the diets of the ID client, carers were asked to describe typical dietary habits they observed. Most of the clients have regular meals and carers prefer to provide home-cooked (cooked in the residence) foods for lunch and dinner. One carer described a typical day's diet:

> So, they get up in the morning. It's typical. It's a breakfast… Weetabix, cereal, fruit and a cup of tea. Depending on who it is we have someone else on the Nutrilift drinks and the yogurts, the stage two yogurts [thickened drinks for dysphagia]. A normal dinner would be… I think I suppose we provide for five people and they will all have different meals and what they can eat because with dysphagia they can't have beans, peas… We give them what they can have rather than blended beans we give them spaghetti. So, for like a lunch they would have a sandwich or soup, depending on the weather. It all depends on… It is kind of like a light lunch, what they would have – soup and bread. They would have the carbohydrates. Fruit again, bananas, which seems to be the main food they will have as fruit. Then you go onto tea and that is the main meal. So that will be anything from… Normally it is home-cooked – normally, depending on what staffing levels are. Then for suppers depending… they go to bed quite early because of medications and stuff. It will be just a yogurt, cup of tea, that's the supper around about then.
>
> (Colin, male)

However, when discussing snacks, a greater difference in views and practices emerged. Most participants indicated that they prefer to include snacks and give yogurt, fruit and biscuits as snacks.

> We offer them yogurts and fruit, sometimes a little cake and then we give them milk shakes and stuff as well…
>
> (Nicola, female)

Yet, some specified that they were trying to limit snack consumption of clients, especially for those who have physical disabilities and are overweight:

> I don't tend to give her [client] any snacks but it is all dependent on you as a support worker. Some people might give her more or give her snacks and stuff but I don't tend to do it because I see that she is overweight and in a wheelchair.
>
> (Alison, female)

Fluid intake was another essential point that carers pay attention to for their clients' diets. They also pointed out that they were trying to be creative to offer alternatives if clients cannot meet liquid needs with water to keep them hydrated:

> Everybody goes 'it is warm' and we start to check fluid intake – how can we get fluids down them because the guys stop drinking when it gets warm. So, you have to use your imagination – let's make jellies; let's crush ice-pops, because they will still eat. So long as it is still solid on a spoon, we can still get it down
>
> (Helen, female)

Whilst paying attention to home-cooked and healthy foods, clients depending on their disability level and dietary restrictions were also going to a pub to eat out once a week and to socialise. They also consume takeaway foods occasionally for a change to their routine:

> …the guys go to the pub and that and they get what they want really as long as it is in proportion but you are not going to take them to the pub and make them have something healthy because they already eat healthy in the house. Then they have a take-away once a week so that would be Chinese or Indian and stuff like that. It is quite free really and it is in every house unless they are on a restricted diet plan.
>
> (Alison, female)

> They will go and have fish and chips – so they all do that once a week (the ones who are able to do it). We have got one on a peg in here so we wouldn't be able to do that with her.
>
> (Colin, male)

Some of the clients depending on their disability level can make their own dietary choices. Although carers respected their individual choices, this was an aspect they struggle with in relation to finding the balance in terms of supporting consumption of a healthy diet:

> Well they make choices the ones who can. Like fruit and cake… one of them loves melon loads so he will choose the melon

> rather than the cake but the ones… There are two who are on a bit of a more higher fat diet because they are quite thin but that is not a fault of anyone's, it is just the way they are, so they really have the small stodgy stuff like cake and custard and stuff like that.
>
> (Karen, female)

> He [client] has got lack of capacity in a lot of areas of his life but that doesn't mean he has got lack of capacity in what he wants to eat. We have got to balance what we think is best with the least restrictive route as well because we don't want to be going through multidisciplinary team meetings just because we want to say, 'well he doesn't like eating that'. If he is choosing to eat what he is eating and sometimes, in particular with the people we support here, that might be the only food that they will eat. You have got to weigh up then well is it healthier for him to not eat or is it healthier for him to eat just that? So that's the difficulty we do have here.
>
> (Colin, male)

Food acquisition

Food acquisition in this case refers to menu planning, shopping and cooking that carers encourage or undertake with or for clients and which shape their dietary habits. Most carers indicated that they prefer fresh cooking rather than pre-prepared food:

> I have tried to get it through to everyone [co-workers] – 'please would you stop buying these prepared sauces'? You know, you can give people… They all like Spaghetti Bolognese but you can make it can't you with passata and things like that - stop buying them because of all the salt and all the sugar and all the fat and try and steer them away from ready meals and try and steer them more towards the healthier option. Why buy frozen jacket potatoes when you can stick a fresh one in the microwave and it is far nicer – you know things like that.
>
> (Barbara, female)

Carers undertake menu planning and shopping whilst keeping in mind clients' dietary needs and their preferences. There are several factors that influence menu planning including carers' own nutritional knowledge, clients' dietary choices and any dietary restrictions. Carers describe this process as follows:

> We do a chart for the week; we have Monday to Friday breakfast, dinner, tea. I normally do it on the weekend and we normally sit down with the girls and see what they would like and what days we can put it on, or we find out what the boys like, because I know the boys like curry and stuff. So, one day we have a nice curry, next day I don't know we will have some fish or something like that. We will spice it up every day, so they don't have the same… same food every day.
>
> (Penny, female)

> We do a weekly shop. We try to get as much fresh food and veg as we can, it is not always possible, but we do our best and we try and buy all the meats so we can plan meals for the week you know to make like I say a shepherd's pie or something like that, or say we will buy mince and we will buy like fresh chicken and lamb, so we can throw a stew together or something like that and then as I say all the veg and potatoes and everything else, onions and all that. We do try and you know get whatever we can to make the meals.
>
> (Nicola, female)

Training in nutrition

Carers described mandatory food hygiene training which they had to undertake as they were food handlers (and training is a requirement). They spoke about an absence of specific training in nutrition to improve their knowledge and assist the role they play in supporting the eating habits of their clients. All participants expressed that they were not given enough information in any training to better understand nutrition and diet in practice. They believe that extended and more frequent training would be beneficial:

> Food hygiene that's it … that's what we did and it involved a bit of nutrition as well …
>
> (Nicola, female)

> Perhaps the people that we do support they seem to have a lot more access to nutritional information than we do as support staff. They do courses at college on nutrition and they bring things home, telling the staff – "do you know this is good for you and you should be doing this"
>
> (Helen, female)

> I think we could train the staff on nutrition awareness. I know a fair few years ago we

> did do (I am going back quite a few years) nutritional awareness training and it was really quite eye-opening because you saw the reaction in the staff when they came back.
>
> (Clare, female)

DISCUSSION

This mixed-method study assessed the nutritional knowledge of carers and their related care practices when working with clients who have an ID and contributes new knowledge to this topic. Nutritional knowledge of carers has been reported previously (Hamzaid et al., 2018; Melville et al., 2009). Hamzaid et al. (2018) found that carers have limited nutritional knowledge scores when compared to the general population in Australia. Similarly, Melville et al. (2009) reported carers have low knowledge levels in relation to the public health recommendations for diets. However, in our study, we found carers have, comparative to Hamzaid 2018, higher levels of knowledge in relation to 'dietary recommendations' which scored higher (76.4%) than other areas (61.7% and 54.0%) of questioning using our adapted questionnaire (Parmenter & Wardle, 1999). We also evaluated the relationship between knowledge scores and gender, age and work experience. Accordingly, 'making everyday food choices' scored more highly in those participants who had more experience. Our findings show a relationship between work experience and daily nutritional practices. Furthermore, dietary recommendations score and thus knowledge also increased with age. These results can be explained by older participants having more independent living experiences or having families of their own and thus a responsibility for shopping and cooking. This finding is supported by other research which explored the longitudinal changes in food habits with age (Lake et al., 2006).

Unique to our study, we used a food frequency questionnaire and evaluated the dietary intakes of the carers as to how they put their nutritional knowledge into practice for themselves. Due to the nature of their role as support workers for clients with an ID, high levels of personal knowledge and practice can be used as a proxy for determining how the carers may influence the food eaten by their clients. However, less than half of male and female carers were consuming fruit and vegetables at least once a day. Similarly, Ocean et al. used a food frequency questionnaire to determine fruits and vegetables consumption in the UK and they found that in a usual week, 50% of people consume at least one portion of vegetables daily, and 46% of people consume at least one portion of fruit daily (Ocean et al., 2019). According to the Eatwell Guide (Public Health England, 2018) and WHO (2018) recommendations, at least five portions of a variety of fruit and vegetables a day are recommended. In the most recent *National Diet and Nutrition Survey*, it is reported that adults in the UK are consuming on average 4.3 portions of fruit and vegetable which is just below recommendations (Beverly et al., 2020) and that 33% of adults consume five portions of fruit and vegetables a day. Carers in our study seem to be similar to the general population in terms of fruit and vegetable consumption. This shows a gap between knowledge and practice for most of the carers (as for the majority of the population). Conversely, according to a study on fruit and vegetable consumption in the United States, only 12.2% and 9.3% of adults were meeting the fruit and vegetable consumption recommendations respectively (Lee-Kwan et al., 2017). A limited number of our study group showed positive behaviour in relation to fruit and vegetable consumption in line with Public Health England recommendations (Public Health England, 2018). This finding may translate to a positive impact of the use of nutritional knowledge by carers to the benefit of their clients, a possibility which is supported with evidence from the qualitative interviews.

'High fat, salt and sugar foods, which include fatty and sugary foods and beverages, are linked to the development of chronic diseases such as obesity, diabetes and hypertension (Pomeranz et al., 2018). Rauber et al. (2020) reported that adults in the United Kingdom consume 54.3% of their daily energy consumption as ultra-processed foods [foods which are formulations of a large number of ingredients specific to industrial use as a result of a series of industrial processes such as sugary drinks, packaged snacks, chocolates and sweets (Monteiro et al., 2018)]. About a third of carers in our study indicated that they never consume sugary foods, drinks and saturated fats in their daily diets. Most of the carers stated in the questionnaire that they were not eating/rarely eating foods like biscuits, ice cream, sweets and fruit juices. Most of them also stressed, in the interviews, that cooking fresh and choosing healthy cooking methods are important in the concept of healthy diet. Moreover, they were conscious of cooking fresh food for clients and discouraging them away from packaged foods with high saturated fat and sugar content. Furthermore, they were usually choosing to eat low-fat dairy products alternatives as recommended. Recommendations also suggest adults should eat a protein source such as beans, meat, eggs or fish every day (Public Health England, 2018). In this study, carers were consuming at least one animal food source every day. Fish consumption is also emphasised in the Eatwell Guide which recommends consumption of fish at least twice a week (one of which should be oily; Public Health England, 2018). However, only 23.7% of carers reported that they were eating fish/shellfish at least twice a week. Overall, from this, we conclude that although carers are generally knowledgeable about healthy diets and some put this into practice, there remains a gap in their practice on several the details of recommendations particularly in relation to the number of portions of fruit and vegetables recommended.

Our survey participants demonstrated high knowledge scores for the questions on dietary recommendations, especially in relation to fruit, vegetables and fried foods consumption, an outcome which was triangulated and reinforced through the interview findings. Armed with this understanding of carers' nutrition knowledge and practices for making food choices, our interview analysis enabled us to explore further this knowledge in practice and in particular its impact on the diets of people with intellectual disabilities. A healthy diet can be described as having variety and appropriate amounts of foods that have positive effects on health (De Ridder et al., 2017; Stevenson, 2017). Viewed from this aspect, most of the carers interviewed were knowledgeable about the concept of a healthy diet and define it using the term 'balanced diet'. This finding was cited as a crucial factor by carers in another qualitative study (Spanos et al., 2013). Participants in our study also stressed the importance of consuming fruit and vegetables and this was demonstrated by some in daily practice by the food frequency questionnaire findings. In England, obesity is more prevalent in adults with intellectual disabilities (NHS England, 2016). Portion control is also a substantial factor in healthy eating and weight management (Rolls, 2014). Large portion sizes increase consumption and eating smaller portions is a recommended weight control strategy. In this study, carers were likely to limit the food portions of people with ID who also have physical disabilities to manage their weight. However, Spanos et al. (2013) reported that the level of ID is very important for understanding the concept of portion control and implementing it into daily living tasks. Participants also stressed the importance of cooking methods in obtaining a healthy diet. Most of the carers in our study avoided fried foods for their clients but they were also consuming less in their own diets, as reinforced in the qualitative data. The connection between frequency of fried food consumption, obesity and chronic disease risk is well documented (Gadiraju et al., 2015; Qi et al., 2014), and so this was a positive practice undertaken by carers themselves and for their work with clients.

Healthy dietary habits are crucial factors for health for people with IDs who have varying nutritional needs regarding to their disability levels and are also identified as an at-risk group for nutrition-related diseases (Rodgers, 1998; Van Riper, 2010). Previous studies show that people with IDs generally do not have healthy dietary habits (Gephart & Loman, 2013; Phillips & Holland, 2011). However, our data show that clients were encouraged and supported to regularly sit at the dining table together (where possible), to consume meals freshly cooked by the carers. Carers also encourage clients to assist them with the weekly shopping trips to help sustain these regular positive dietary habits. Clients were supported to use a shopping list and discuss types of food, the nutritional content, healthier alternatives and its location within the shop. Carers also ensure fruit and yogurt are provided as snacks. This suggests that carers' own nutrition and food choice knowledge (reinforced by the survey) is put into practice for the health and wellbeing of their clients and with the aim to increase health literacy. Health literacy can be defined as 'the degree to which individuals have the capacity to obtain, process, and understand basic health information….to make appropriate health decisions' (Kindig et al., 2004). Health literacy is well known to be a predictor of health behaviours (Náfrádi et al., 2018) largely through a health empowerment approach.

Foods prepared outside the home are only consumed around once a week in this group. In the United Kingdom, eating out habits expanded between 1975 and 2000, related to socialisation (Cheng et al., 2007). Carers explained that eating out activity was an opportunity for clients who can leave the residence to come together and socialise and that this was empowering. According to research, having an active social life can help people with an ID to feel happier, more connected with the community, included and valued (Chadwick et al., 2013; Mason et al., 2013; Wilson et al., 2017). It is worth noting that in addition to health literacy, empowerment is also broadly researched as a determinant of health behaviours. Empowerment, in simple terms, can be understood as relating to the use of one's will when referring to the client's capacity to participate in decision-making (Schulz & Nakamoto, 2011) and health literacy is seen as instrumental to increasing client empowerment (Porr et al., 2006).

One of the most important outcomes of this study was carers' need and requests for more training. Carers were undertaking food hygiene training regularly, but this training was not detailed enough for them to support clients' diets, especially in relation to any special dietary requirements. They were eager to undertake further training about healthy eating both for themselves and clients they were taking care of, yet this had not been identified by the organisation and is not generally provided in this sector. Similarly, in a recent study conducted with people with intellectual disabilities, the authors suggested that carers should get some more training in cooking and healthy eating (Doherty et al., 2020b). The survey data in relation to scores for sources of nutrients and making everyday food choices coupled with themes from the interviews provide insights, which can be used as a focal point for further training. Basic information about nutrients, making healthy food choices (including looking at food labels and portion size and control), cooking skills (since not all the carers can cook) and nutrition awareness warrants further attention through training. The carers' role is an important and fundamental position embedded in the structure of health and social care. The impact of nutrition knowledge and practice through empowerment strategies could easily be harnessed to assist clients' health.

The mixed-method approach used in this study has meant we are able to add context through qualitative research to the study's quantitative findings, which serves to strengthen this paper. However, as participation was voluntary, there is a possibility that those who participated in the survey or the interviews already had an interest in nutrition (something found in other surveys and may explain the high knowledge scores and behavioural aspects), although the randomly selected sites for interviews helps to partially address this. Secondly, the scope of the food frequency questionnaire used limited analysis. For example, our tool asked for fruit and vegetable consumption separately, whereas a combined question would provide a better understanding of carers' dietary habits in relation to the at least 5-a-day recommendation and allow comparison to the wider population. Also, our questionnaire asked about frequency of food groups on both a weekly and a daily basis which may have been confusing for participants. They also might have incentive to give the right answers to the questions because it was being directly linked to their job. Third, the degree of independence of the clients would affect the relationship between carers and clients regarding carers influence on a client's dietary choices and influence the qualitative findings. It was not our aim to assess clients' diets due to the heterogeneous nature of the clients and that dietary recall methods could be limited by any ID. However, we looked at knowledge of carers and checked how this impacted on reported consumption behaviours for carers. If a carer was interested in good nutrition and tried to eat a healthy diet themselves, we would argue that they had the knowledge to assist their clients to make healthier choices. Nonetheless the contextual data from the interviews do provide depth of understanding which is helpful for informing recommendations for training of carers moving forward.

CONCLUSION

Our study revealed that the level of nutritional knowledge of carers according to the public health messages and awareness of dietary guidelines was moderate in aspects such as consumption of fruits and vegetables and low consumption of fried foods. However, their practices were not so good. The findings suggest the relationship between carer, client and food consumption, in particular, helping the clients choose and eat a healthy diet, is influenced by the knowledge and understanding of the carer. This is enacted through carers' understanding of clients' dietary habits and supporting shopping for food as part of daily living activities. According to our interviews, carers were keen to put into practice their nutritional knowledge and help encourage a healthy diet for their clients with intellectual disabilities, and this was identified through related shopping and preparation activities as part of a client-centred approach. However, to assist this role, carers were keen to participate in training about nutrition and health, the content of which can be informed by the survey findings herein and includes a focus on food exchanges (alternatives of high/low fibre, saturated fat and sugar) linked to shopping for food and portion sizes and increasing understanding of using the Eatwell Guide in daily living. The findings suggest this is a timely opportunity to support patient (or client) centred care and health improvement through equipping carers, particularly in residential care settings, with the requisite nutritional knowledge and skills which they can use to support and empower their clients through formal and informal everyday encounters and daily living tasks and to assist in weight management and the prevention of obesity and other related non-communicable diseases in this group.

AUTHOR CONTRIBUTIONS

AO and RH contributed to literature searching. BE, AO and AL contributed to the study design and further data analysis. RH, BE and AL contributed to ethical approval, funding acquisition and qualitative data collection. AO and BE contributed to the quantitative data analysis quantitative, qualitative data analysis and paper drafting. All authors critically reviewed the final draft for submission.

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CONFLICT OF INTEREST

The authors declare that there is no conflicting interest.

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DATA AVAILABILITY STATEMENT

Research data are available upon request to the corresponding author.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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