

# Introducing a nutritional app in supervised residences for independent living: Experiences of individuals with intellectual disabilities and their caregivers

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## Abstract

**Background:** Dietary challenges are common among individuals with intellectual disability residing in supervised living in Norway, and this is a major risk factor for health problems. The aim of this study was to explore feasibility of the nutrition tablet app APPetitus, among persons with intellectual disability and their formal caregivers.

**Method:** Joint dyad interviews with residents and caregivers were conducted after five individuals with intellectual disability used APPetitus for eight weeks. Seven formal caregivers and managers participated in subsequent focus group interviews. Thematic analysis informed the data analysis. The study complies with the Consolidated Criteria for Reporting Qualitative Research (COREQ).

**Results:** The findings were mapped into three themes: APPetitus mediating nutritional conversations, residents' strategies to control the conversation and caregiver support as a required prerequisite for overall user comprehension.

**Conclusions:** The study demonstrates that a nutritional app can contribute to and normalize nutritional conversations, and empower residents to participate.

## KEYWORDS

APPetitus, behavioural changes, intellectual disability, mHealth, nutrition, tablet

## 1 | INTRODUCTION

Individuals with intellectual disability living in the community have a high prevalence of obesity, due to unhealthy food choices and passive lifestyles (Hsieh, Rimmer, & Heller, 2014; Humphries, Traci, & Seekins, 2009). They are generally in higher risk than the general population for developing secondary conditions at younger ages, such as fatigue and chronic pain, due to biological factors, lack of access to adequate health care and lifestyle and environmental issues (Heller, McCubbin, Drum & Peterson, 2011; Rimmer, Chen, & Hsieh, 2011). 15% of men and 25% of women

with mild intellectual disability in Norway were obese in 2004, where compared to the general population obesity was respectively 6% and 7% (Hove, 2004). No newer research is reported domestically, however, international research shows this trend continuing (Ranjan, Nasser, & Fisher, 2018).

A radical reorganization of care was implemented in Norway for individuals with intellectual disability in the early 1990s, from institutionalizing to ensuring adults with intellectual disability the right to community services. Individuals with intellectual disability over the age of 18 moving from their family home are usually accommodated in supervised, independent residences. Most

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residences are staffed 24 hr a day, where the service provision is intended to be customized to the person's abilities and needs, not linked to the residential unit (St. Meld. 67, 1986–1987). Indeed, 84% of adults with intellectual disability live apart from their parents or family, with most of them living in co-located or shared supervised, independent residences with other individuals (NOU, 2016:17, 2016 [Official Norwegian Report]). The extent of care provided in supervised, independent residences varies from one-to-one care, to staff being less present, yet facilitating self-care. Most of the residents residing in supervised, independent residences retain their decision-making competence (NOU, 2016:17, 2016), where by law, health care can only be provided to anyone following their own consent. The articulated goals for the living facilities are independence, normalization, equalization, self-determination and inclusion (NOU, 2016:17, 2016). However, despite good intentions, the service provided is influenced by factors related to the municipal economy and willingness to invest (Eide & Breimo, 2013). Consequently, the staff have different backgrounds and competences, often with little specialized knowledge about health and nutrition (Ruud, Raanaas, & Bjelland, 2016).

The move from family home to a supervised, independent residence is generally associated with residents gaining higher levels of autonomy. They are more actively participating in decisions on what groceries to buy, and what they eat, consequently also increasing dietary challenges (Humphries et al., 2009; Nordstrøm, Paus, Andersen, & Kolset, 2015). Challenges associated with the freedom to make dietary decisions need to be accompanied by support to make healthy food choices and appropriate training for individuals with intellectual disability in food-preparation skills (Humphries et al., 2009; Nordstrøm et al., 2015). The literature suggests that the caregivers employed in supervised, independent residences need nutritional education to contribute to good choices being made by the residents (Humphries et al., 2009).

Assistive technology can contribute to maintaining or improving functioning and independence, thereby promoting well-being and empowerment (World Health Organization, 2018). From the perspective of individuals with intellectual disability, assistive technology gives increased control and health benefits (Wennberg & Kjellberg, 2010). Tablet and mobile touch screen technology lack the stigma traditionally associated with assistive technology, as mobile phones and tablets now are indispensable for everyone. In addition, touch screen devices are viable aids for individuals with intellectual disability, as many have a high degree of digital literacy (Jenaro et al., 2018; Kagohara et al., 2013). There exists a range of apps especially developed to meet the needs of individuals with intellectual disability. Examples of challenges they attempt to encounter are time management skills (Green, Hughes, & Ryan, 2011) and employment-related tasks (Collins, Ryan, Katsiyannis, Yell, & Barrett, 2014). Related to health and nutrition, studies have shown positive results in using apps as interventions for weight loss among children and adolescences, with opportunities to provide them with tailored information to understand healthy eating habits (Isasi, Basterretxea, Zorrilla, &

Zapirain, 2013; Ptomey et al., 2015). Understanding strengths and weaknesses of nutritional apps among adults with intellectual disability is needed to understand if and how technological tools can contribute to healthy eating habits.

The aim of this study was to explore the feasibility of a tablet-based app about nutrition called APPetitus, among individuals with intellectual disability and their formal caregivers in supervised, independent residences.

## 2 | METHOD

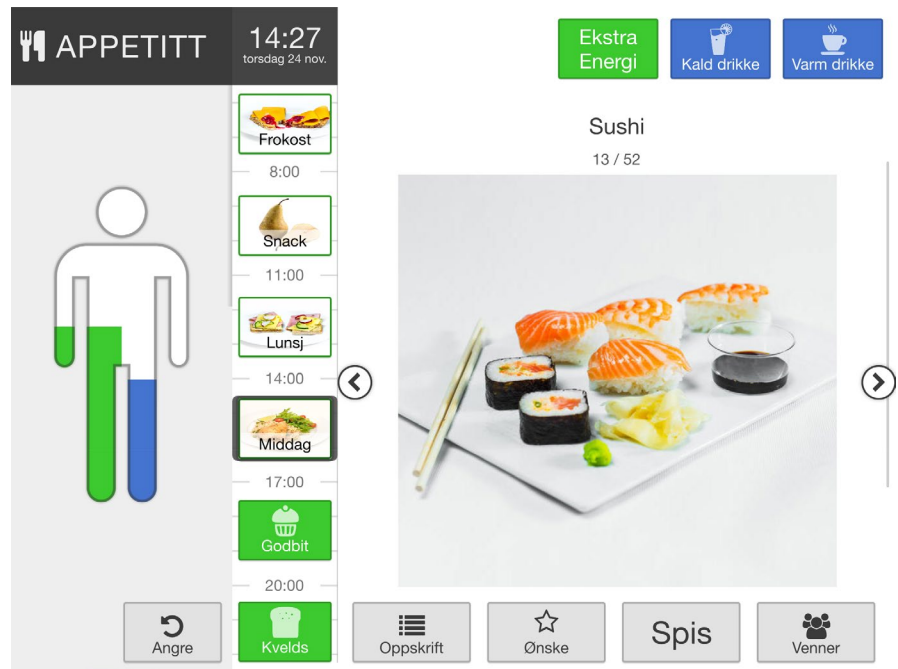
This study has an explorative design using qualitative methods. Approval for the study was granted from the Norwegian Centre for Research Data (Project Number 44004).

### 2.1 | APPetitus

The tablet app APPetitus is an outcome of the publicly funded, regional innovation project "APPETITT—APplikasjon for Ernæring—TilTak for helse og Trivsel" (APPETITT: Application About Nutrition—Intervention to Foster Health and Thrive) (Farsjø, Kluge, & Moen, 2018). The app is founded on ideas of active ageing, aimed to prevent malnutrition in older adults, as malnutrition is a major concern associated with health problems in old age (Agarwal, Miller, Yaxley, & Isenring, 2013). Humphries et al. (2009) emphasize that unique differences for nutritional needs among healthy adults with intellectual disability compared to the general population needs to be examined. The Norwegian government's white paper on people with intellectual disability underscore that there is a need for particular attention on nutrition for individuals with intellectual disability; however, it is advised to use the recommendations for healthy diet in the general population (Meld. St.45, 2012–2013). The focus of dietary advice for the general population is having a varied diet, with whole grain products, fish and fruits and vegetables, and recommendations for a moderate intake of full fat milk products, red meat, sugar and salt (Norwegian Directorate of Health, 2016).

The APPetitus app focuses on eating regularly and varied and stimulate to sufficient energy, fluid and protein consumption, grounded in above-mentioned recommendations. To support those at risk of weight loss, the app presents advice on how to modify meals from ordinary products (e.g. oil or eggs). The app visualizes how food and beverages the user records as consumed, reflects the users need for energy, protein and fluid. The algorithm for the calculation of daily nutritional needs follows the national recommendation for persons with low levels of activity of 30 kcal\*body weight for energy, 30 ml\*body weight for fluids, and 1.2 grams\*body weight for protein intake each day (Norwegian Directorate of Health, 2016). The APPetitus application contains two panels, a main surface and a back panel. The main surface includes a visualization of a meal plan, 147 meal suggestions with recipes in three levels of complexity, possibilities to record food

**FIGURE 1** Main surface of the APPetitus app, with visualization figure on the left, meal plan visualization middle-left and picture presenting meal suggestions for each meal on the right [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



and drinks, and a gradually filling figure visualizing energy and fluids (Figure 1). The back panel shows a list of recorded meals, daily and weekly graphs of registered calories, proteins and fluids, and functionality for meal planning through generating a shopping list.

## 2.2 | Recruitment procedure

The professional development advisor of one of Norway's largest municipalities initiated the study. Recruitment occurred in a two-step convenience sampling process (Polit & Beck, 2017). First, the professional development advisor recruited six supervised, independent residences to be study sites. Managers of these six residences recruited participants to the study. The inclusion criterion for the participants with intellectual disability was that they had decision-making competence, as assessed by the managers, and that they were obese or in perceived risk of obesity. In total, seven persons with intellectual disability were identified as potential participants. Two declined to participate, one due to parents' disapproval, and one dropped out after introduction to the app. He/she did not give a reason for withdrawal. Details about the five persons with intellectual disability that participated in the study are presented in Table 1.

The managers also recruited full-time care staff to participate. They selected care staff based on perception of interest in nutrition or the project. Six was recruited, and two withdrew consent, following the two residents that withdrew from the study. Four care staff completed the study. None of the care staff had specific education related to nutrition, one had attended a day-long course on nutrition 10 years ago, and one had recently been given the responsibility for nutrition in multiple residences, without any further training. The care staff are henceforth referred

**TABLE 1** Characteristics of participants with intellectual disability (n = 5)

Gender (n)	
Male	3
Female	2
Age (mean, range)	48 (29–62)
BMI, kg/m <sup>2</sup> (mean, range, 1 missing)	33.3 (24.7–41.5)
Technology experience (n)	
Experience with touch screen technology	2
Regular use of internet (daily/weekly)	4
Organization of dinner preparations during a regular week <sup>a</sup>	
Home delivery meal programme	50%
Communal dinner in the residence, made by staff	25%
Pre-cooked dinner heated by resident	25%

<sup>a</sup>Dinner preparations followed a fixed schedule in each residence regarding preparation, but differed between the residences. Thirty-five dinners are included, seven for each participant, to represent one week across all residents.

to as caregivers and the participating individuals with intellectual disability as residents.

## 2.3 | Procedure

The study was initiated in June 2017. Caregivers were introduced to the app and its functionality by the researchers and were given a hand-out for future reference containing the same information. Caregivers were responsible for introducing the APPetitus app to the residents and give follow-up support. Caregivers independently assessed the

need of follow-up activities from resident to resident, ranging from daily cooperation of recording meals, to being available for questions. Residents were encouraged to use the app to record their food and beverage consumption daily for eight weeks. They wanted to record their food and beverage consumption in APPetitus by memory each evening, in fear of losing iPads at work/day facilities. At residents' request, the study was put on hold for their summer holiday weeks (2–4 weeks). One resident wanted to use his/her own tablet computer and the remaining four borrowed iPads® from the project. As four of five recruited participants were obese, the municipality's professional development advisor was consulted on how to proceed to not justify overeating, as she has extensive experience working with nutritional challenges for people with intellectual disability. She advised to enter a reduced weight of 10% for calculation of nutritional needs. Approximately four weeks into the trial period, the first author (ALJ) contacted all residences by phone and asked if residents or caregivers had any questions about using the APPetitus app. One of the borrowed tablets had technical issues due to software updates, and the first author (ALJ) visited the residence solving the issue. One caregiver wanted to discuss the visualization figure, since the resident's recordings had not filled the figure over the course of a day.

## 2.4 | Data collection

Data was collected in dyad interviews with care staff and residents before and after the trial period, and in focus group interviews with care staff and managers. Residents and caregivers gave their written consent to participate at the first meeting before the trial period, and managers gave their consent before the focus group interview. All data points were recorded using a recording device and transcribed verbatim using HyperTRANSCRIBE version 1.6. First author (ALJ) took field notes at all data collection points, with initial impressions and contextual information.

### 2.4.1 | Dyad interviews

Participating residents and caregivers was interviewed in their home. "Dyad interview" is used in this article as interviews where both the residents and caregivers participated, hence acknowledging their established relationship. Dyads give the interviews a "we" component, where one person will indirectly be part of the other's experience (Eisikovits & Koren, 2010). It is suggested that joint dyad interviews can promote choice and self-determination in qualitative research participation among individuals with intellectual disability (Caldwell, 2014). This approach therefore offered opportunity to get a broader understanding of how APPetitus was used in nutritional care in the residences, in particular in the views of the residents. Semi-structured interview guides was used in these dyad interviews. Before the trial, residents and caregivers were asked to talk about nutritional habits from both parties' perspectives and describe the daily life in supervised, independent residences. In addition, age, BMI and experience

with technology was collected. One resident only agreed to participate if he/she did not need to provide his/her weight, which was then omitted from this resident's data collection. After the trial, the interview guide was developed to investigate experiences regarding how the app was used, with an emphasis on the recordings of daily meals, the learning outcomes for both caregivers and residents, the use of the output data and changes APPetitus introduced (Appendix 1). The interviews were held at the residents' apartments or in the residences' common areas, depending on what the residents preferred. In one dyad interview, both residents from the residence were present, at their request. The four dyad interviews were 18, 32, 43 and 48 min in length.

### 2.4.2 | Focus group interviews

To elicit caregivers' and managers' experiences of APPetitus in this setting, and their broader view of nutritional work and the project, they were invited to two focus group interviews. Three caregivers, three managers and the professional development advisor participated, presented in Table 2.

Composition of participants in each interview was mixed between caregivers and managers and lasted 54 and 57 min. One of the participating caregivers was not able to attend. A semi-structured interview guide was used. This interview guide solicited experiences on implementation of APPetitus, daily use of APPetitus and exchange of experiences and information between caregivers and managers (Appendix 2). Both focus groups were held in one of the residence's common areas during working hours. The first author (ALJ) led the focus groups and the last author (CFA) was the assistant moderator.

## 2.5 | Data analysis

The six steps of thematic analysis outlined by Braun and Clarke (2006) informed the analysis via an inductive approach. The analytic method is characterized by identification, analyses and reporting patterns in qualitative data (Braun & Clarke, 2006).

**TABLE 2** Description of participants in focus group interviews

Occupation	Education level	Employment experience
1. Caregiver	Healthcare assistant <sup>a</sup>	9 months
2. Caregiver	Healthcare assistant <sup>a</sup>	5.5 years
3. Caregiver	Bachelor degree	1 year
4. Caregiver	Bachelor degree	7 months
5. Manager	Bachelor degree	2 years
6. Manager	Bachelor degree	2 years
7. Professional development advisor	Master's degree	10 years

<sup>a</sup>Healthcare assistants are authorized health professionals, which have undergone further education within health care, focusing on practical help and care, of all ages and different life situations: children, adults and older people with disabilities, illnesses, or in need of rehabilitation.

**TABLE 3** Example of data analysis, following the steps of thematic analysis

	Data set A	Data set B
Quote (step 1)	<p>Interviewer: Did you ever look at the graphs in the back there?</p> <p>Resident: Yes, a little bit...</p> <p>Interviewer: What did you do with that information?</p> <p>Resident: I don't really remember...</p> <p>Caregiver: Well, we did not really use it for anything; we just looked at it, observed it, and did not really think any more about it...</p> <p>Interviewer: Yes, and it's the same with the figure as well? You observed it being half-filled and did not think any more about it?</p> <p>Resident: Yes.</p> <p>Caregiver: I know you have asked multiple times what it really means if you don't eat enough, or what it means, but I have not had a clear answer to it.</p>	<p>In my experience, they fixated on the figure and that it did not fill up. The more they tapped, the more it filled up. However, in time, we agreed on—do not bother with the figure!</p>
Initial code (step 2)	Output data not utilized	Caregivers advised residents to ignore the figure
Initial theme (step 3)	Use of output data	Nutrition work with the app
Collated theme (step 4)	Resident and caregiver frustration over figure	
Final theme (Step 5)	Caregiver support is a required prerequisite for overall user comprehension	

The data corpus consisted of transcripts from all interviews and associated field notes. The data corpus was read three times to familiarize with the data (step 1). Field notes showed to be particularly important to understand the context of statements, as well as the context in each residence and with each resident. In the subsequent analysis, the data set consisted of the transcriptions of all interviews performed after the trial period. This data set was divided in two, data set A and B. Data set A consisted of the dyad interview transcripts. Data set B consisted of focus group interview transcripts. Separating the data corpus was important to fully appreciate the context the statements and findings emerged from.

In the second analytic step, the entire data corpus of interview transcripts was coded. The present authors took a broad approach towards understanding feasibility. In total, 221 codes were identified using HyperRESEARCH version 3.7.1. Thirty-five themes were collated (step 3), where behavioural change as an underlying theme of the whole data corpus was discovered and guided further analysis. This process resulted in 12 initial collated themes (step 4). Through step 5, defining and naming the themes, three themes were identified. An example of the data-analysis procedure is presented in Table 3. The first author (ALJ) led the analysis, in close cooperation with the last author (CFA). CFA read the data corpus and was involved in discussions throughout the analysis from identifying initial themes throughout naming of the final themes. The second author (AM) participated in data interpretation.

### 3 | RESULTS

The results present a cross case analysis where both the residents, caregivers and managers perspectives are presented. Three themes were identified: (a) APPetitus mediating nutritional conversations, (b) residents' strategies to control the conversation and (c) caregiver support being a required prerequisite for overall user

comprehension. Quotations from the dyad interviews are marked as (DI) and as a focus group (FG) in the description of findings.

#### 3.1 | APPetitus mediating nutritional conversations

The use of APPetitus prompted a novel nutritional conversation between caregivers and residents. The novelty was attributed to balance the individual's right to withhold information, and consent to health care including nutritional guidance, and caregivers' fear of crosscutting this right by discussing food choices without the resident asking for it. By having conversations when assisting residents to record in the app, adding some joint deliberations over their food choices occurred, stimulating the resident's self-awareness.

All participating residents had meal rules visualized in their apartments or oral agreements with the caregivers on what meals to eat, and the approximate contents of each meal throughout the day. Cake, candy, soda and other unhealthy foods were limited to the weekends only. An example of caregivers given the opportunity to converse on nutrition was how one of the residents had the habit of eating in secrecy, outside these agreements with the caregivers. Introducing the app gave the caregivers an opportunity to talk about the secret eating with the resident, without challenging the resident's freedom to choose:

In time, this [secret eating] was more natural to address with the individual. "Did you eat during the night?," "Have you eaten while I was out?" ... Umm – and in time [the resident] opened up about it more and more.

(Caregiver, FG)

For caregivers, the nutritional conversations raised awareness of their own assumptions about the residents' level of knowledge. As the nutritional conversations did not occur before use of the app, they had no way of knowing what the residents knew:

What I feel is what we mostly got out of it is a better understanding of what they [the residents] know about food. That we maybe believe they know more than what they do.

(Caregiver, FG)

The residents expressed recording and discussing food choices as giving them the opportunity to evaluate and gaining awareness of their own food choices. One of the residents expressed concern before the study as to whether what she chose to eat was "good enough." Through recording and discussing food choices, the app increased the resident's confidence:

I can see what—that I consumed what I was supposed to, and not supposed to.

(Resident, DI)

Gaining access to this conversation and both caregivers and residents being active participants, resulted in an increased quantity and quality of nutritional dialogue. One resident got "using APPetitus" as an activity in their evening care plan, after expressing in the first dyad interview that he/she wanted a regular conversation about nutrition. By including using APPetitus in the care plan, the nutritional conversation was easy to keep up from caregiver to caregiver and gave the resident a daily reason to talk about food choices.

### 3.2 | Residents' strategies to control the conversation

The residents used different strategies to control the nutritional conversation, as caregivers ascribed to ensuring no breach of trust based on the dietary agreements as outlined above. One resident periodically hid the tablet in different locations in the residence, without giving a reason to the caregivers. The caregivers saw it as the resident's strategy if he/she had made eaten something outside the agreements and feared consequences.

Secondly, the caregivers questioned the accuracy of the recordings of the residents' daily intake:

If they had eaten a piece of cake at work, they did not mention it. There has never been a piece of cake recorded ever, you know!

(Caregiver, FG)

Finally, one resident restricted the caregivers' access to the recordings and postponed the conversation by what caregivers called excuses, not being in the mood or being done with recording today's meals. This resident was vocal about wanting to master the technology independently, and thereby did not want anyone else to look at the tablet. However, this resident lost over 10 kilos during the trial period and expressed increased inspiration:

In my lunch pack, when I eat my lunch at work, I have started bringing a tomato. Either a small one or those bigger ones. And I notice, if my tomato storage, as I named it, is empty, I think ... Oh no, like, now... I have to stock up on my tomato supply!

(Resident, DI)

Caregivers interpret these strategies of residents controlling the situation as excuses of not having to disclose what they eat, and fear of sanctions from caregivers. Few residents were willing to discuss these strategies in the dyad interviews, but one agreed that not disclosing the all food, especially food outside the agreement, had happened. Caregivers expressed that challenges of the nutritional dialogue were minimized as the resident strategies to control the conversation overshadowed the value of information they gained through the dialogue. Their statements were, however, twofold, on the one hand, the conversation was talked about as important, but on the other, they wanted retained or increased control as to whether the recordings actually reflect dietary consumption among residents.

### 3.3 | Caregiver support is a required prerequisite for overall user comprehension

The findings indicate that caregivers had a crucial role to foster the residents' understanding of the potentials and functionality in using the app. One resident attempted to use the conversation with caregivers to gain a better understanding of functionality of APPetitus, in an attempt to learn more about his/her nutritional consumption:

Interviewer: Did you ever look at the graphs in the back there?

Resident: Yes, a little bit...

Interviewer: What did you do with that information?

Resident: I don't really remember...

Caregiver: Well, we did not really use it for anything; we just looked at it, observed it, and did not really think any more about it...

Interviewer: Yes, and it's the same with the figure as well? You observed it being half-filled and did not think any more about it?

Resident: Yes

Caregiver: I know you have asked multiple times what it really means if you don't eat enough, or what it means, but I have not had a clear answer to it.

(DI)

The figure in the app was grounds for curiosity, followed by confusion and frustration among all residents. The caregivers described it as a dilemma, as it could be understood as justifying overeating:

In my experience, they payed tremendous attention on the figure and that it did not fill up. The more they tapped, the more it filled up. However, in time, we agreed on—do not bother with the figure!

(Caregiver, FG)

The caregivers' encouragement kept the residents recording and talking about food, even when considering their frustration over the figure.

Organization of use of the app varied, as the primary caregiver for each resident had freedom to organize the use as they saw fit within their activities and with each resident. As described earlier, one resident used the app daily as part of his/her care plan. In one of the other residences, the follow-up of recordings depended on the presence of the primary caregiver to discuss APPetitus:

Interviewer: How did you experience recording your daily intake?

And the possibility of others seeing what you had eaten...

Resident: No, I did not think about it, and here, at least, no one cared! We sat by ourselves, here in the living room. The others did not say anything. They did not care at all.

(DI)

One resident's goal for the use of the app was to increase variety of food choices, as the current diet was unbalanced and lacked variety. In the dyad interview, the resident and caregiver talked about how they actively used the app for this purpose the first week. However, the attempt was unsuccessful, as the caregiver recalled, it "dropped out" of their routine shortly after, making the resident fall back in previous patterns.

## 4 | DISCUSSION

This is the first study to examine the potential of APPetitus as a nutritional tool in supervised, independent residences for individuals with intellectual disability. The finding in this study can be summed up in "behavioural change and making good food choices" as guiding most nutritional work in the residences. Behavioural change was more or less outspoken for the nutritional work through the caregivers nurturing and endorsing "good choices" in attempting to reduce unwanted behaviour through agreements over dietary intakes.

### 4.1 | A normalization tool for caregivers

The Convention on the Rights for Persons with Disabilities (The United Nations, 2006) states that individuals with disabilities, as a matter of principle, have the freedom to make their own choices. Previous studies have highlighted tensions for caregivers, as they struggle to fulfil their duty of care and stimulate the autonomy of residents (Bergström & Wilman, 2011; Hawkins, Redley, & Holland, 2011). According to the caregivers, APPetitus created a bypass of the conflictual or tension-laden interactions, normalizing conversations about food and dietary behaviour. Our results underscore that there had been a lack of distinction between a general conversation around the residents' food choices, and caregivers deciding what the residents should eat. With use of Appetitus the residents were given the opportunity to take greater control of the

conversation. Basing the conversation on what the resident chose to share increased confidence that their autonomy would not be challenged, and caregivers were given an opportunity to address dietary behaviour they deemed inappropriate without challenging the residents' autonomy. Thereby, the app helped to normalize the conversation and neutralized the internal ethical conflict for caregivers.

### 4.2 | An empowering tool for individuals with intellectual disability

Through the app's mediation of nutritional conversations, the residents were given the opportunity to inform caregivers of their views. The caregivers demonstrated in this study that they assumed they knew why the residents acted in certain ways when the residents were hesitant about talking about a topic. Through using the app, the residents could provide the caregivers with affirmative or disproving statements, and possibly insights into the factors influencing the difficulty behind nutritional behavioural change. For changes aiming to increase physical activity, Temple and Walkley (2007) showed that views of caregivers and parents can differ substantially from those of individuals with intellectual disability. They found for example that caregivers and parents ascribed low amounts of physical activity to a lack of personal motivation, while individuals with intellectual disability were more concerned with barriers such as a lack of support and funding, and changes in schedules for physical activity. Given these views also differ in terms of behavioural change for dietary aspects for individuals with intellectual disability, a shared vocabulary and opportunity to discuss nutrition is vital to understand and encourage good food choices.

Furthermore, the present authors observed and were told about examples of residents advocating for themselves and their own health by asking for additional information when they did not understand what was said. One resident repeatedly asked for an explanation as to why the visualization feedback did not match the caregiver feedback, and another stated his/her wish to use the app for inspiration for healthier meals. Mastebroek, Naaldenberg, Largo-Janssen, and de Valk (2014) reported that possessing health information enables individuals with intellectual disability to self-advocate or improve their health literacy skills, conversely facilitating the retrieval or supply of additional information. The present authors see the statements and actions of the residents, when they are provided with health information through the normalized nutritional conversation, resulting in self-advocacy to understand and change their food choices. Consequently, our findings suggest that using APPetitus further empowered residents to utilize what they had learned in making everyday food choices.

### 4.3 | Nutritional support through tablet apps

APPetitus is a nutritional tablet app with an easy-to-use, interactive interface, designed to meet needs of home-dwelling older adults

with little or no experience of touch screen technology. The initial purpose of APPetitus was that the goal for the elderly user is to maintain their weight or gain weight. This is a challenge in the intellectual disability population, since their nutritional challenges often relate to weight gain and overeating. Our results underscore a difficulty for the residents to interoperate feedback and visualization in APPetitus, where the gamification effects implicitly underscored weight gain. However, their persistence in wanting to understand, described as "paying tremendous attention to the figure," suggests that proper visualization can empower individuals with intellectual disability to be more active participants in their food choices. Our results should encourage development of health-related apps for tablets or other technological devices to support and empower individuals with intellectual disability, and to enable caregivers of supervised, independent residences to normalize nutritional conversations with residents.

#### 4.4 | Strengths and Limitations

Data from multiple sources in the data-collection phase provide a rich foundation to understand APPetitus as a nutritional tool for this group, with views from individuals with intellectual disability, caregivers and managers. However, this study has few participants and includes only individuals with decision-making competence. They are thereby in the most independent range of the whole group of people with intellectual disability, naturally influencing the results of the study.

Power relations could influence the data-collection method in this study. The caregivers contributed with valuable contextual knowledge and communication skills to facilitate opportunities for individuals with intellectual disability to state their opinions, but the presence of both the researcher and the caregiver might have driven the residents to report answers they deemed to be most situationally and socially acceptable. Similar arguments can be put forward regarding the focus group interviews where the caregivers were compelled to share their experiences in the presence of their manager. Using the tablet as a mediating tool and concrete reference (Hollomotz, 2017) helped facilitate a productive dialogue though with the residents and between caregivers and managers.

No one in the research team had extensive experience of working with individuals with intellectual disability, and all researchers have nursing background, a professional group that is less represented in supervised, independent residences for individuals with intellectual disability in Norway. Therefore, the present authors depended on residents and caregivers to explain certain aspects of daily life to us. There is always the possibility that some key aspects were missed. On the other hand, this gave us an open mind, a questioning demeanour, and an excuse to ask about anything. To ensure integrity in the study, the first author (ALJ) had regular discussions with the research team throughout the data-collection and analysis phases of the study. In this article quotes from the interviews are presented to enhance the transparency of how data is

interoperated. They are translated from Norwegian to English, with a possible layer of interoperation from the researchers. However, all three authors have approved the translations.

## 5 | CONCLUSION

By exploring APPetitus in supervised, independent residences for individuals with intellectual disability, this study demonstrates how a nutritional tablet app can contribute to normalizing and facilitating novel nutritional conversations between residents and caregivers. These conversations are often tension laden. In this study, the residents showed more initiative in wanting to understand and participate in their nutritional care, while the caregivers were given an opportunity to engage in food-related conversations without challenging the residents' autonomy. In conversation about dietary behavioural changes, both parties can be active participants, thereby increasing the residents' opportunity to make choices, explain or reflect on choices, and participate in relevant conversations.

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### CONFLICT OF INTEREST

Mrs. Janson: None. Dr. Moen reports that on the completion of the APPETITT project (at the end of 2017), the main project result—the app APPetitus—was transferred to the startup company Appetitus as. The startup was founded in early 2018, with the responsibility of maintaining and developing the APPetitus app. Dr. Moen is one of the founders and CEO of Appetitus as and she owns stocks in Appetitus as. The study reported in this paper took place as part of the R&D project APPETITT—before creating the company. The analysis of the material leading to the findings and conclusions in the paper has been the main responsibility of the first and last authors and has not been influenced by Dr. Moen's role in the startup Appetitus as. Mrs. Aure: None.

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## APPENDIX 1

### DYAD INTERVIEW GUIDE

- How have you experienced using APPetitus?
- Can you show me how you use the app?
- Have you used the app to record what you eat?
  - a. How have you experienced that?
  - b. Has it happened you have been reluctant to record anything?
- How has it been to use the tablet?
- Is it anything you find difficult?
- What is normally going on when you are using the app?/ Can you tell be about a situation where you have looked at the app together?
- What have you done when you cannot find what you have eaten?
- How have you understood the figure and the graphs?

- a. How have you used this information? Does it differ between you?
  - b. Have you seen anything surprising?
- Did you use the app to plan meals? How?
  - Has anyone of the other caregivers here used the app with you?

## APPENDIX 2

### FOCUS GROUP INTERVIEW GUIDE

- How have you experienced participating in this project?
- How did you decide which residents you invited to participate?
- How did you decide the role of the caregivers within the project and the other caregivers in the residence would be?
- Did you pay attention to the daily and weekly graphs?
  - a. What were your experiences?
  - b. Has it affected routines and nutritional work?
  - c. Has it influenced how you are documenting?
  - d. We have heard suggestions of using APPetitus for distance monitoring. Do you have any thoughts about that in this setting?
- How does the app fit with how you normally work with nutrition?
- How have you (caregivers) talked about the app with the other caregivers? Did you (managers) hear anything about the experiences?
- Has the understanding of what APPetitus offer changed during the period?
- As APPetitus is developed for elderly with a risk of malnutrition, and now used within a group of different challenges, have you made any reflections regarding this aspect?
- Imagine being contacted by a manager or a caregiver in another residence somewhere else that is implementing APPetitus. The person asks you about your experiences. What would you say?