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Associations among social engagement, meal-related behaviour, satisfaction with food-related life and wellbeing in Danish older adults living alone

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Abstract

The present study aimed at exploring associations among meal-related behaviour, social engagement factors, satisfaction with food-related life (SWFL) to assess food-related wellbeing and subjective wellbeing in Danish older adults living alone. Three hundred and eighty-eight older adults aged 65–75 years from six Danish municipalities completed an online or article-based survey addressing home cooking, commensality, loneliness, SWFL and subjective wellbeing. Home cooking frequency and self-perceived cooking skills were positively associated with SWFL but not with subjective wellbeing. Commensality was positively associated with SWFL but was not associated with subjective wellbeing. The level of loneliness was negatively associated with SWFL and with subjective wellbeing. Satisfaction with food-related life and subjective health status were positively associated with subjective wellbeing. Male and female respondents did not differ in meal-related behaviour, social engagement factors, SWFL and wellbeing. While the cross-sectional nature of this study does not allow for the direction of causality to be determined, these results suggest that older adults living alone could benefit from a higher frequency of home-cooked meals, a higher level of self-perceived cooking skills and commensality to support SWFL. A higher level of SWFL could, in turn, lead to a higher level of wellbeing.

KEYWORDS

commensality, cooking, food-related life, loneliness, meals, social engagement

INTRODUCTION

Worldwide, more than 703 million people are 65 years or older, which is projected to be 1.5 billion older adults by 2050 (United Nations Department of Economic and Social Affairs Population Division, 2019). Almost one-fifth of the Danish population is aged 65 years or above (Eurostat, 2019). Chronic diseases and disabilities

are increasingly prevalent among older adults (Prince et al., 2015), making successful ageing challenging. Wellbeing has been linked to maintaining health and prolonged survival in older people (Stoptoe et al., 2015). Although wellbeing still lacks a consolidated definition, in research, wellbeing is often measured as being objective and subjective wellbeing (Voukelatou et al., 2020). Objective indicators of wellbeing are those indicators

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that measure a factual condition or give an external view of wellbeing, such as gross domestic product from a societal and economical perspective (Ivković et al., 2014). Subjective indicators of wellbeing focus on people's attitudes or evaluation of their lives, including life satisfaction and emotions (Diener et al., 2009).

As food plays a vital role in people's lives, it is one of the key components contributing to wellbeing (Grunert et al., 2007). Grunert et al. (2007) developed the Satisfaction With Food-related Life scale (SWFL) to assess food-related wellbeing. Previous studies reported higher SWFL when adults eat with company and consume healthy foods (Schnettler et al., 2013; Schnettler, Lobos, et al., 2017). Moreover, living conditions and their associated social engagement factors, such as social isolation and loneliness, can have a substantial impact on food and meal situations (Host et al., 2016; Whitelock & Ensaff, 2018) as well as diet quality (Bloom et al., 2017; Dean et al., 2009; Ramic et al., 2011) for older adults. Older adults living alone are more likely to perceive cooking and eating as obligations to stay alive (Gustafsson & Sidenvall, 2002). This is because when living alone, older adults tend to be less motivated to cook; they simplify their meals and experience lower enjoyment of eating (Gustafsson & Sidenvall, 2002; Whitelock & Ensaff, 2018). Other social aspects, such as commensality, are also argued to affect dietary behaviour (Locher et al., 2005; Vesnaver & Keller, 2011). However, the impact of commensality on food intake and meal experience is complex, as it depends on the type of companionship (Vesnaver & Keller, 2011).

The health and social determinants of meal-related aspects, as well as the outcomes of meal-related aspects, such as home cooking (Mills et al., 2017), are understudied. Only a few studies have investigated the relation among meal-related behaviour, SWFL and wellbeing in older adults (Lee & Mo, 2019). In Denmark, an increasing proportion of older adults are living alone (Eurostat, 2020), and this might have an effect on their food-related wellbeing. To our knowledge, no previous studies have investigated the impacts of meal-related behaviour and social engagement factors on SWFL and wellbeing simultaneously. It is crucial to gain knowledge and an understanding of the food-related factors of wellbeing among single-living older adults. This will help with improving meal experiences and wellbeing in older adults. In addition, recommendations could be made to improve healthcare and meal catering services. Meal catering services are public or private services that offer dietary solutions in form of home-delivered ready-to-eat meals. Previous studies highlighted that meal catering services can improve nutritional and health status (Zhou et al., 2018), loneliness and wellbeing (Wright et al., 2015) among older adults. To improve or adapt meal catering services to the new generation of older

adults, it is important to gain a better understanding of their current behaviour and needs.

The objective of the present study was to investigate whether social engagement and meal-related behaviour are associated with SWFL and wellbeing among Danish older adults (aged 65–75 years) living alone. Associations refer to the relationship among meal-related behaviour, social engagement factors, SWFL and wellbeing. In this study, meal-related behaviour is defined as all aspects related to the preparation and consumption of food, for example home cooking and the consumption frequency of ready-to-eat meals. Social engagement factors were related to commensality, social network and level of loneliness. The young segment of older adults is of interest, as they are likely to use meal catering services in the near future.

The following hypotheses were developed to test the objective of the study:

H1. An association exists among social engagement factors (commensality and level of loneliness), SWFL and subjective wellbeing in Danish older adults.

H2. An association exists among meal-related behaviour (frequency of home cooking, self-perceived cooking skills and the consumption of ready-to-eat meals and convenience foods), subjective wellbeing and SWFL in Danish older adults.

MATERIALS AND METHODS

Study design and data collection

In January 2017, data were collected via a web-based and article-based survey addressing social engagement factors, meal-related behaviour, wellbeing and SWFL among Danish older adults aged 65–75 years. The invitations to the survey were sent via letters to the participants. Initially, the survey could be filled in electronically, but respondents could also ask for a article-based version and a postage-prepaid return envelope. A reminder to complete the survey was sent after approximately one month.

Participants were recruited via six municipalities (Hjørring, Holstebro, Herning, Aabenraa, Frederiksberg and Copenhagen) in Denmark and were included when aged from 65 to 75 years, living alone and residing in one of the six municipalities. For achieving a sample size of approximately 500 participants, it was estimated, based on the response rate reported in a similar study (Bjerge et al., 2017), that the recruitment of 1350 subjects was required. The 1350 subjects were identified through the Danish Civil Register System, which assigns 10-digit civil registration numbers (CPRs) to residents of Denmark (Pedersen et al., 2006). The Danish Health Authority

(Sundhedsdatastyrelsen) randomly selected the 1350 subjects while considering the equal distribution of age classes, gender and residential regions. A secondary recruitment method was established via the municipalities distributing questionnaires in activity centres or senior clubs among solitary-living older adults.

The Danish Data Protection Agency (2015-57-0117) registered and approved the study, which was conducted in accordance with the Danish Act on Processing of Personal Data. Approval from the Danish Health Research Ethics Committee System was not required according to Danish law, as the research project was solely based on non-biological and register-based data. Furthermore, participation in the study was voluntary and the respondents could withdraw from the study by contacting the researchers.

Questionnaire development

The questionnaire was set up in SurveyXact, which allowed for missing responses to be addressed and for responses to be validated. The questionnaire was developed based on previous validated questionnaires (Grunert et al., 2007; Hughes et al., 2004; Ware et al., 1996; World Health Organization, 1998) as well as qualitative research (Bjørner et al., 2018) and similar large surveys (Bjerger et al., 2017; FDB Analyse, 2010; Lau et al., 2018). Some questions were developed for the purpose of this study, and these questions were validated via a pilot study. The questionnaire included the following sections:

1. Socio-demographic characteristics, weight status and self-rated health status.

The questionnaire included socio-demographic questions regarding educational background (highest attained education level), living situation (alone, with spouse, with partner, with children, with other adults and other) and retirement. Other socio-demographic information was collected via the CPR system and included age, gender and postal codes. When this information could not be obtained via the CPR system, the respondents were additionally asked about gender, birthdate and postal code. Furthermore, the participants were asked to indicate their weight status over the past 3 months (maintained, weight loss of more than 2–3 kg and weight gain of more than 2–3 kg). A single-item question regarding general self-rated health adapted from the Sort-Form Health Survey (SF-12) (Ware et al., 1996) was used to assess health status. The SF-12 is a validated self-reported questionnaire including 12 questions to assess health status. Previous studies suggest that this single item question

was sufficient to give an indication of an individual's health risks (DeSalvo et al., 2006).

2. Meal-related behaviour.

The following variables regarding home cooking and meals were phrased, in the questionnaire, in relation to a main meal, which was defined as a hot meal typically consumed during dinner or supper, according to the Danish food culture (Groth et al., 2009; Stamer et al., 2017).

Meal-related behaviour included the following variables:

- a. Frequency of home cooking on a weekly basis was adapted from the FDB Analyse, 2010 and used with the following response options: daily, 3–6 times a week, 1–2 times a week, less than 1–2 times a week, never. In research, the term 'home cooking' does not have a consolidated definition due to its complexity, but could be referred to as preparation of a hot meal from scratch using basic ingredients (Short, 2003). In the Danish food culture, a hot meal is typically prepared at home once a day for dinner or supper (Stamer et al., 2017). Therefore, in the questionnaire, home cooking was defined as cooking a hot meal from scratch.
- b. Level of self-perceived cooking skills was also adapted from the FDB Analyse, 2010 and was assessed using the following response scale: (1) very good, (2) good, (3) neither good nor poor, (4) poor, (5) very poor and (6) I do not know.
- c. Consumption frequency of ready-to-eat meals and consumption frequency of easy meal-box solutions were assessed using seven response options ranging from (1) 5–7 times a week to (7) never. Ready-to-eat meals were defined as fully prepared home delivered meals. Easy meal-box solutions were defined as products or services that could ease cooking or shopping, for example, meal boxes with ingredients and recipes.

Other meal-related factors were included in the survey. However, these factors did not fit the scope of this article and therefore, these results are presented in the supplementary materials.

- a. Eating location with the following response options: kitchen, kitchen-dining room, dining room, living room, conservatory or other (Table S1).
- b. Attitudes towards home-cooked food were assessed using a four-point scale ranging from 1) not important to 4) very important. The questions started with the sentence "How important is it for you that...?" and was followed by 13 statements (e.g. ...your food is homemade) (Table S5).

3. Social engagement factors.

The questionnaire included the following questions regarding social engagement factors and were as follows:

- a. Commensality was assessed by the frequency of eating alone (Bjerge et al., 2017). This question also assessed specific types of companionship (family, friends, colleagues and neighbours).
- b. Finally, a three-item loneliness scale (TILS) (Hughes et al., 2004; Lasgaard, 2007) including three response options (hardly ever, sometimes and often) was used to evaluate the levels of loneliness among the participants.

The following two social-related factors were included in the survey. However, considering the scope of the study's objective, the results are presented in the supplementary materials.

- a. Social networks were assessed by frequency of social contact with friends and family (Lau et al., 2018).
- b. Furthermore, participants were asked to rate the extent to which participation in communal meals (e.g. eating meals with others in a [food] club, church or activity centre) would be attractive to them.

4. Satisfaction with food-related life.

SWFL was measured using the SWFL scale (Grunert et al., 2007) rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) and included five statements related to food; for example, 'My life in relation to food and meals is close to my ideal'.

5. Wellbeing.

Wellbeing was evaluated using the World Health Organization Wellbeing Index (WHO-5) scale, which consists of five items, each rated on a six-point Likert scale (0: at no time and 5: all of the time) (Psychiatric Research Unit, 1999; World Health Organization, 1998). The WHO-5 scale has a good internal and external consistency and is widely used to assess wellbeing and depression among younger and older adults (Topp et al., 2015).

Pilot study

A pilot study was conducted prior to the study ($n = 14$) to test the feasibility of the survey and understanding of the questions. Participants in the pilot study were recruited via snowball sampling within the researchers' network and were participants within the targeted age

group. The participants received information regarding the pilot study and the link to an electronic survey via email. After approximately one-week, short individual interviews were conducted by phone and occasionally in person to discuss feasibility of the survey and to correct any misunderstanding of each of the survey questions. Based on the interviews in the pilot study, only minor changes were introduced in the survey, and this was mainly related to the wording of the questions.

Data management and analysis

In total, 411 surveys (375 electronic and 36 article-based) were obtained (28% response rate). Twenty-one participants were omitted from the analysis, as they did not live alone. Two participants were excluded due to missing data. This resulted in a total of 388 respondents included in the final analysis. For the scope of this article, further analysis included quantitative variables focussing on behaviour and socio-demographic data, namely: subjective wellbeing, SWFL, loneliness, commensality, home cooking frequency, self-perceived cooking skills, socio-demographic characteristics and self-reported health-status.

The internal consistencies of the WHO-5, SWFL and loneliness scale were evaluated by computing Cronbach's alpha values. All three scales showed a good internal consistency (WHO-5: 0.895, SWFL: 0.856 and Loneliness: 0.814). Responses to the 5-item WHO-5 scale resulted in raw score ratings between 0 and 25. The sum of these ratings was multiplied by four and resulted in a total score ranging from 0 to 100. Cut-off values for the total scores were considered based on previous research (Bech et al., 2003) and are as follows: scores ranging from 0 to 25 were considered to be poor wellbeing, scores within 26–50 were considered to be fair wellbeing, scores within 51–75 were considered to be good wellbeing and scores ranging from 76 to 100 were considered to be very good wellbeing. Furthermore, cut-off values for wellbeing were expressed dichotomously and were deemed as follows: 'high wellbeing' (values ≥ 50) and 'low wellbeing' (values < 50) (Topp et al., 2015). Moreover, scores for the SWFL scale were calculated by summing the scores of the five items, leading to a 5–25 score range. In this study, the following cut-off values were used for classification of participants according to their SWFL scores: 5–8 = extremely unsatisfied; 9–12 = unsatisfied; 13–16 = moderately satisfied; 17–20 = satisfied; 21–25 extremely satisfied (adapted from Schnettler, Höger, et al., 2017). The three items of the loneliness scale were summed to total scores ranging from 3 to 9. Cut-off scores of 4, 6 and 7 were determined and represent the following: severely lonely (values > 7), moderately lonely (values between 5 and 6) and not lonely (values < 5) (Lasgaard, 2007).

Five regression models were fitted through multiple linear regression analyses to explore the associations among meal-related behaviour, social engagement factors, SWFL and subjective wellbeing. In two models, meal-related behaviour (home cooking frequency and level of self-perceived cooking skills) were included as independent variables, and the dependent variables were SWFL and subjective wellbeing. As most respondents did not use easy meal-box solutions (90.4%) and did not consume take-aways (75.4%), these meal-related variables were not included in the regression model. In two other models, social engagement factors (commensality and level of loneliness) were included as independent variables, and the dependent variables were SWFL and subjective wellbeing. In the fifth model, SWFL was included as an independent variable, and the dependent variable was subjective wellbeing. In all models, adjustments were made for subjective health status, age, gender and level of education. The residual plots and regression diagnostics for the regression models were examined and it showed that the assumptions of normality and non-multicollinearity were met. Sensitivity analyses were performed to assess whether excluding the sample of respondents who were recruited via the secondary recruitment method (convenience sample, $n = 56$) would affect the main outcome measures. IBM SPSS Statistics version 27 was used for all analyses.

RESULTS

Participant characteristics

Table 1 shows the characteristics of the surveyed participants stratified by gender. A nearly balanced sample of men (45.6%) and women (54.4%) was obtained. The male and female participants were on average 69.9 years old. Most participants were highly educated, lived in non-capital areas, were retired and had good to very good self-reported health status. Subjective wellbeing was rated as good, with a mean score of 71 out of 100. SWFL was rated as 'satisfied', with a mean score of 18.06 out of 25. Male and female respondents did not significantly differ in subjective wellbeing ($p = 0.742$) and SWFL ($p = 0.658$).

Associations between meal-related behaviour, social engagement factors, subjective wellbeing and SWFL

Table 2 reveals the association among meal-related behaviour, subjective wellbeing and SWFL. None of the meal-related behaviours was associated with subjective wellbeing. Nevertheless, home cooking frequency

and self-perceived cooking skills were positively associated with SWFL. A one-unit increment in the frequency of home cooking was associated with a 0.827 (95% CI 0.519–1.134) unit increment in the SWFL score and a one-unit increment in self-perceived cooking skills led to a 0.743 (95% CI 0.382–1.103) increase in the SWFL score.

Table 3 shows the association among social engagement factors, subjective wellbeing and SWFL. Commensality was positively associated with SWFL, but it was not associated with subjective wellbeing. A one-unit increment in commensality led to a 0.46-unit (95% CI 0.186–0.739) increment in the SWFL score. The level of loneliness was negatively associated with both subjective wellbeing and SWFL. A one-unit increment in the level of loneliness led to a decrease of 4.58 (95% CI -5.617 - -3.538) units in the subjective wellbeing score and a decrease of 0.638 (95% CI -0.846 - -0.429) unit in the SWFL score.

Table 4 shows the association among subjective wellbeing, SWFL and subjective health status. SWFL and subjective health status were positively associated with a 1.19-unit (95% CI 0.671–1.709) higher and a 10.50-unit (95% CI 8.689–12.315) higher subjective wellbeing score, respectively.

Sensitivity analyses

Excluding the convenience sample from the total sample, which was obtained via the secondary recruitment method, did not change the overall associations among social engagement, meal-related behaviour, SWFL and wellbeing.

Meal-related behaviour and social engagement factors among male and female respondents

Male and female participants did not significantly differ in terms of frequency of home cooking, frequency of take-away consumption and frequency of ordering easy meal-box solutions. However, a significantly larger proportion of female participants (42.9%) than male participants (29.5%) reported their self-perceived cooking skills as very good ($p = 0.006$) (Table S1). Male and female respondents did not differ significantly in terms of level of loneliness ($p = 0.360$) and commensality ($p = 0.219$) (Table S2). When eating with company, most male and female respondents ($p = 0.083$) eat together with their family or friends (Table S3). Furthermore, both male and female respondents were not interested in participation in various communal meals (e.g. eating with neighbours, eating at municipality's activity centre or nursing home) (Table S6).

TABLE 1 Characteristics of surveyed male and female participants

Characteristic	Total sample (<i>n</i> = 388)	Male (<i>n</i> = 177)	Female (<i>n</i> = 211)	<i>p</i> -value
Age (years), mean ± SD	69.9 ± 3.10	69.9 ± 3.13	69.9 ± 3.07	0.978 ^a
Education				0.468 ^b
Lower education, <i>n</i> (%)	61 (16.4)	25 (14.1)	36 (17.1)	
Intermediate education, <i>n</i> (%)	114 (30.6)	57 (32.2)	57 (27.0)	
Higher education, <i>n</i> (%)	198 (53.1)	88 (49.7)	110 (52.1)	
Other, <i>n</i> (%)	15 (3.9%)	7 (4.0)	8 (3.8)	
Residential region				0.723 ^b
Capital, <i>n</i> (%)	149 (38.4)	69 (39.0)	80 (37.9)	
Non-capital, <i>n</i> (%)	239 (61.6)	180 (61.0)	131 (62.1)	
Retired, <i>n</i> (%)	366 (94.3)	163 (92.1)	203 (96.2)	
Self-rated health				0.494 ^b
Excellent, <i>n</i> (%)	33 (8.5)	13 (7.2)	20 (9.5)	
Very good, <i>n</i> (%)	140 (36.2)	58 (32.8)	82 (39.0)	
Good, <i>n</i> (%)	153 (39.5)	74 (41.8)	79 (37.6)	
Fair, <i>n</i> (%)	51 (13.2)	26 (14.7)	25 (11.9)	
Poor, <i>n</i> (%)	10 (2.6)	6 (3.4)	4 (1.9)	
Weight status over last 3 months				0.651 ^b
Maintained weight, <i>n</i> (%)	335 (86.8)	154 (87.5)	181 (86.2)	
Lost more than 2–3 kg in weight, <i>n</i> (%)	29 (7.5)	14 (8.0)	15 (7.1)	
Gained more than 2–3 kg in weight, <i>n</i> (%)	22 (5.7)	8 (4.5)	14 (6.7)	
Subjective wellbeing (0–100), mean ± SD	71 ± 19	71 ± 19	71 ± 19	0.724 ^a
SWFL (5–30), mean ± SD	18.06 ± 3.25	17.98 ± 3.49	18.12 ± 3.05	0.658 ^a

Abbreviation: SWFL, Satisfaction with food-related life.

^aIndependent samples *t*-test.^bChi-square test for independence.**TABLE 2** Associations among subjective wellbeing, satisfaction with food related life and meal-related behaviour (*n* = 388)^a

Subjective wellbeing				SWFL		
	β	95% confidence interval	<i>p</i> -value	β	95% confidence interval	<i>p</i> -value
Constant	10.290	–31.246 – 51.826	0.626	10.862	3.290–18.434	0.005
Home cooking frequency ^b	0.974	–0.708 – 3.656	0.256	0.827	0.519–1.134	<0.001
Cooking skills ^c	1.326	–0.647 – 3.300	0.187	0.743	0.382–1.103	<0.001

Abbreviation: SWFL, satisfaction with food-related life.

^aMultiple linear regression analysis with adjustments for age, gender, education and self-reported health status. Significant *p*-values are indicated in bold.^bScale 1–5, 5 = daily.^cScale 1–6, 6 = very good.

DISCUSSION

The present study was aimed at exploring associations among subjective wellbeing, SWFL, meal-related behaviour and social engagement factors among 388 Danish older adults living alone. Positive associations were observed among SWFL, home cooking frequency and self-perceived cooking skills. Negative associations were found among loneliness, SWFL and subjective wellbeing. Furthermore, commensality was positively associated with SWFL, but not with subjective wellbeing.

A higher frequency of home cooking and self-perceived cooking skills could either precede or result from higher SWFL scores, but neither were directly related to subjective wellbeing. To our knowledge, only a few studies have explored the associations among home cooking frequency, self-perceived cooking skills and SWFL. Other studies have highlighted the importance of cooking to support wellbeing (Mosko & Delach, 2021), which is not entirely in line with our findings. Nevertheless, home cooking might indirectly affect wellbeing, as the present study shows that SWFL

TABLE 3 Associations among subjective wellbeing, satisfaction with food related life and social factors ($n = 388$)^a

	Subjective wellbeing			SWFL		
	β	95% confidence interval	p -value	β	95% confidence interval	p -value
Constant	44.289	7.090–81.488	0.020	20.879	13.305–28.454	<0.001
Commensality ^b	0.974	–0.404 – 2.351	0.197	0.462	0.186–0.739	0.001
Loneliness ^c	–4.578	–5.617 – –3.538	<0.001	–0.638	–0.846 – –0.429	<0.001

Abbreviation: SWFL, satisfaction with food-related life.

^aMultiple linear regression analysis with adjustments for age, gender, education and self-reported health status. Significant p -values are indicated in bold.

^bAssessed as the frequency of eating alone (1–5, 1 = daily).

^cTotal score 3–9, <5 not lonely, >7 severely lonely.

TABLE 4 Associations among subjective wellbeing, satisfaction with food related life and subjective health status ($n = 388$)^a

	β	95% Confidence Interval	p -value
Constant	–10.509	–50.434 – 29.417	0.571
SWFL	1.190	0.671–1709	<0.001
Subjective health ^b	10.502	8.689–12.315	<0.001

Abbreviation: SWFL, Satisfaction with food-related life.

^aMultiple linear regression analysis with adjustments for age, gender, education and self-reported health status. Significant p -values are indicated in bold.

^bScale 1–5, 5 = excellent.

is positively associated with subjective wellbeing. Furthermore, people's cooking experience could also positively impact SWFL (Bech-Larsen & Tsalis, 2018). Previous studies have found that older adults spend more time on home cooking when transitioning to an old age retirement (Stancaelli & Van Soest, 2012). However, retired older adults might still simplify meals or find easy-meal solutions in order to spend more time on activities outside their homes, such as volunteering or other leisure activities (Andersen, 2020).

In the present work, commensality was found to be a positive social engagement factor related to SWFL, meaning that eating with company might lead to an increase in SWFL. Other studies also found a positive association between SWFL and eating with company (Bjørner et al., 2018; Schnettler, Lobos, et al., 2017). However, in the present work, commensality was not significantly related to subjective wellbeing. This is inconsistent with other studies which indicated that higher levels of social engagement could lead to a better quality of life (Luo et al., 2020). People prefer commensality over eating alone, which contributes to increased meal satisfaction (Bjørner et al., 2018; Haugaard & Lähteenmäki, 2017). When eating with company, the cooking and meal experience becomes more pleasurable (Gustafsson & Sidenvall, 2002). Most respondents in our study stated that when eating with company, they eat together with family or friends. Moreover,

respondents did not find participation in communal meals (e.g. eating with neighbours or at municipality's activity centre) attractive. The type of commensality is of importance for meal satisfaction and experience (Vesnaver & Keller, 2011), as the preferred company would be someone who is sharing the same values and interests (Bjørner et al., 2018).

Loneliness is an important social engagement factor linked to both SWFL and subjective wellbeing, as higher levels of loneliness might lead to a decrease in SWFL and subjective wellbeing. Similar results were observed by Due et al. (2017), which stated that loneliness can negatively affect wellbeing. In previous research, loneliness is often linked to 'living alone'. Living alone (Lasgaard et al., 2016) and social participation (Due et al., 2017) are key factors related to loneliness. Furthermore, individuals who have been living alone for a shorter time might experience a greater feeling of loneliness, as well as loss of the meaning of home cooking, than those who have lived alone for a longer time (Sidenvall et al., 2000). Even though living alone may increase the risk of loneliness (Lasgaard et al., 2016), it does not always mean that someone is actually lonely when living alone. Loneliness refers to the emotions associated with people's social contacts or networks (Due et al., 2017). Therefore, an individual might not feel lonely when living alone, while someone living with others might experience loneliness. Nevertheless, loneliness could be a mediating factor in the association between social support and wellbeing, as a decreased level of loneliness could influence the impact of social support on wellbeing (Due et al., 2017).

The results of this study showed that a higher SWFL is related to higher levels of subjective wellbeing, although the cross-sectional nature of this study means that the direction of the relationship cannot be determined. Other studies found that a higher level of SWFL is associated with a higher life satisfaction (Schnettler et al., 2013; Schnettler, Lobos, et al., 2017), which is one of the primary domains of wellbeing. As food behaviour changes during ageing (Drewnowski & Evans, 2001), it is important to assess, improve and maintain food-related wellbeing among older adults.

Limitations and strengths

One of the limitations of the current study is the representativeness of our sample, as most respondents were highly educated and perceived their health status as good. Therefore, the results should be interpreted with caution and can only be generalised to populations with similar characteristics to those of the participants in this study. Nevertheless, regression modelling allowed adjusting for confounding factors and reducing the effect of bias. In this study, self-reported data were obtained, which might have affected the results due to recall bias or socially desirable responses. Furthermore, the cross-sectional nature of the study is a limitation, as it could provide only a snapshot of the meal experiences and wellbeing of respondents and cannot determine the direction of causality. It is challenging to assess and obtain accurate data on meal practices and wellbeing, as many factors are involved, and ageing affects this. Wellbeing is a dynamic concept, as it changes over time and with age. Wellbeing is not just the absence of disease or illness; it is a complex multidimensional concept which encompasses the combination of positive–negative affect balances (Diener et al., 2009). Therefore, it is difficult to obtain a baseline with exact characteristics on the eating habits associated with older adults' motivation, attitudes, co-presence of others, mental states, emotions, attitudes, knowledge (of alternatives) and expectations related to food. Furthermore, self-perceived cooking skills were assessed via a single item question, which might not have assessed the level of cooking skills as accurately as validated multiple item scales (for example see Hartmann et al., 2013). As priority was given to reducing the length of the survey, the single-item question for self-perceived cooking skills was chosen.

Even though this study has a few limitations, the results of this study can contribute to the understanding of the influence of various meal-related behaviour and social engagement factors on SWFL and wellbeing. A strength of the present study was the use of an exploratory, sequential, mixed methods approach, which allowed us to develop a questionnaire suited to the specific target group and the purpose of the study. Furthermore, a pilot study was conducted prior to data collection to reduce or avoid potential misunderstandings and technical issues in the survey. The use of the CPR address register system enabled us to invite a representative sample of the target group and thus to decrease the risk of recruitment bias. This sampling method enabled us to recruit older adults, which otherwise would have been difficult to reach, for example, older adults not participating in senior clubs or activities.

Implications for healthcare and health promotion

Considering the results of this study, suggestions can be made for the promotion of better meal experiences to support wellbeing and SWFL among solitary-living Danish older adults. When it comes to promoting or improving healthcare in older adults, it is important to consider meal-related behaviour and social engagement factors, such as commensality and home cooking, which could positively affect wellbeing and SWFL among older adults. Supporting the consumption of meals with others is of importance and, in particular, focussing on strengthening bonds between people when eating together. Commensality could, in turn, lead to a reduced risk of loneliness and increased pleasure with meal and cooking experiences. Furthermore, improving the meal's sensory quality and providing information on easy-meal solutions (such as meal boxes with ingredients and recipes) could be an effective strategy to improve older adult's meal experience since sensory appeal and convenience are main motivations for choosing foods or meals among solitary living older adults (Locher et al., 2009).

CONCLUSION

Frequency of home cooking, level of self-perceived cooking skills and social engagement factors (commensality and lower levels of loneliness) are positively associated with satisfaction with food-related life. Meal-related behaviour and commensality were not directly associated with subjective wellbeing. However, meal-related behaviour and commensality might indirectly influence subjective wellbeing, as satisfaction with food-related life is an important factor associated with subjective wellbeing. Reduced loneliness could lead to higher levels of subjective wellbeing. Danish male and female respondents did not differ in terms of meal-related behaviour, social engagement factors, satisfaction with food-related life and subjective wellbeing. This study suggests that it is important to consider meal-related behaviour and social engagement factors when promoting satisfaction with food-related life and wellbeing in solitary-living older adults.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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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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