BMC Nursing

RESEARCH Open Access

Nurse-related behavioural determinants associated with healthy eating support provided by Dutch community nurses: a cross-sectional study

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Abstract

Background Community nurses (CNs) play an important role in supporting healthy lifestyles, including healthy eating behaviour of patients. However, many CNs do not incorporate healthy eating support in their daily routines to the fullest extent possible. This study aimed to explore (1) the associations between nurse-related behavioural determinants and self-reported healthy eating support practices of Dutch CNs and (2) CNs' need for additional knowledge.

Methods In this cross-sectional survey design, 244 Dutch CNs completed an online, self-administered questionnaire in October-November 2021. The 60 questionnaire items were related to CNs' characteristics, nurse-related determinants, healthy eating support practices (observing problems, having a conversation about patients' dietary behaviour, motivating patients to eat and drink healthier and supporting patients in goal setting) and the need for additional knowledge. The items on determinants and practices used a 5-point Likert scale. Adjusted prevalence ratios ($PR_{adjusted}$) with 95% confidence intervals (95%CIs) were obtained for the associations between determinants and practices, using adjusted Poisson regression with robust variance estimations.

Results More CNs practiced observing problems (75%) and having a conversation (70%) than did motivating patients (45%) and supporting goal setting (28%) at least often. A more positive attitude ($PR_{adjusted}$ 1.8; 95%CI 1.5–2.2), greater self-efficacy ($PR_{adjusted}$ 1.3; 95%CI 1.1–1.5), greater motivation ($PR_{adjusted}$ 1.5; 95%CI 1.3–1.7) and better abilities ($PR_{adjusted}$ 1.4; 95%CI 1.2–1.6) were associated with a greater prevalence of supporting healthy eating at least often (vs. never to sometimes). Barriers were not associated with healthy eating support ($PR_{adjusted}$ 1.1; 95%CI 1.0-1.2). CNs especially desired more knowledge on diet in relation to cancer, gastrointestinal diseases, severe psychiatric diseases and dementia; methods for motivating patients to start and for supporting patients to sustain healthy eating; and dealing with patient autonomy.

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Conclusions This study suggests that nurse-related behavioural determinants such as attitude, self-efficacy, motivation and ability should be addressed to improve CNs' competences in healthy eating support. In addition, based on self-reported need for additional knowledge, it is recommended to pay attention to evidence-based behaviour change techniques, dealing with patient autonomy, and diet in relation to cancer, gastrointestinal diseases, severe psychiatric diseases and dementia.

Reporting method The STROBE Statement was followed for reporting.

Keywords Nurses, Home care, Dietary counselling, Health promotion, Questionnaire, Educational needs assessment

Introduction

Nurses play an important role in promoting healthy lifestyles, as a health promoter role is included in competency profiles for nurses in various countries, including Canada, the UK and the Netherlands [1–3]. Moreover, diet is included in the systems of Gordon and Kitson, where Gordon described which aspects should be assessed to ensure a comprehensive nursing assessment of the patient [4, 5] and Kitson defined the fundamental elements that (nursing) care should address [6]. As such, healthy eating support is a role for all nurses. Food-based dietary guidelines that are universal across countries describe what entails healthy eating: to consume fruits and vegetables, legumes and animal-source foods, and to limit sugar, fat and salt [7]. Healthy eating has been shown to reduce the risk of all-cause mortality and the incidence of noncommunicable diseases [8]. This issue is urgent, especially for the growing population of home-dwelling older adults, who are at high risk of developing nutritional problems such as malnutrition [9]. The healthy eating habits of patients can be supported throughout the nursing process. The nursing process involves five sequential steps: (i) assessment of the patient's health risks and problems [10], in which the nurse can observe problems regarding the patient's dietary behaviour, including malnutrition but also other unhealthy dietary behaviours. In step i, the nurse could have a conversation about the patient's dietary behaviour. The next steps include (ii) making one or more diagnoses and (iii) formulating behavioural and health outcomes [10]. In step iii, the nurse could motivate the patient to eat and drink healthier and support the patient in goal setting regarding healthy eating. The next steps include (iv) intervention planning in dialogue with the patient and intervention implementation and (v) monitoring and evaluating behavioural and health outcomes [10]. In steps i, iii and iv, the nurse can make use of evidence-based behaviour change techniques (BCTs) such as motivational interviewing and providing information [11], which community nurses used for healthy eating support [12]. A systematic review found that primary care nurses' use of these techniques had predominantly positive effects on patients' lifestyle behaviour, which was also true for the BCTs self-monitoring, feedback and goal setting [13].

Because of the global shift from inpatient to outpatient care [14], community nurses (CNs), also called home care nurses, have become a group of nurses whose role in healthy eating support has become particularly significant. In the Netherlands, CNs provide care in the patient's own home and are generalist healthcare professionals with a crucial role in primary healthcare, together with the general practitioner [15]. Since CNs provide long-term care, they are in a key position to support healthy eating [15, 16], but many CNs do not incorporate healthy eating support in their daily routines to the fullest potential [12, 17–19]. For example, only 52.5% of 101 Dutch CNs routinely screened patients for malnutrition, 42.6% did this during home care assessment [19], and Danish CNs (n=45) on average only sometimes assessed patients' nutritional status within the first 14 days of the first visit [17]. Healthy eating support could be either hindered or facilitated by nurse-related behavioural determinants (CNs' knowledge, skills and role perception) and determinants related to cooperation and organizational context, as indicated by a previous qualitative study among 18 CNs [12].

Moreover, most previous studies on dietary care provided by CNs concentrated on steps i, iv and v in the process of healthy eating support, with a focus on either undernutrition or malnutrition [17–19], but not on step iii (formulating behavioural and health outcomes), including motivating the patient and supporting the patient in goal setting. Step iii is important in behaviour change, supported by Bartholomew and colleagues' Intervention Mapping [20] and Michie and colleagues' BCT taxonomy [11], which both include setting (behavioural and health) goals. Insight is needed in whether CNs actually motivate patients and support them in goal setting. Additionally, to our knowledge, no study has yet quantitatively investigated the association between nurse-related behavioural determinants and healthy eating support in a larger population of CNs. Insights in this association and in CNs' self-assessed need for additional knowledge should be taken into account when improving healthy eating support. Accordingly, this study aimed to explore (1) the association between nurse-related

behavioural determinants and self-reported healthy eating support practices of Dutch CNs and (2) CNs' need for additional knowledge.

Methods

Study design and setting

This study used a cross-sectional design. An online, self-administered questionnaire (Additional file 1) was sent to Dutch CNs from 25 October to 26 November 2021.

Participants and procedure

Voluntary response sampling, which is a non-random selection method in which each individual chooses whether to respond, was conducted [21]. For recruitment, a digital flyer was created that included a web link and QR code for the online questionnaire. The researchers placed LinkedIn posts, contacted the professional network of the researchers by email, and contacted 30 managers of home care organizations or teams within the region around the city of Ede (the Netherlands) by phone and email. Managers of home care organizations and teams were asked to spread the flyer across their organization or team via email or the online portal of the organization. Recruitment strategies were executed when the questionnaire was launched and repeated 10 and 20 days later to recruit as many CNs as possible. Informed consent was provided by 357 CNs. CNs who did not meet the inclusion criteria were excluded (not working in home care, $n=18$; employed for less than 8 h/week, $n=7$; not having completed a nursing degree at the European Qualifications Framework (EQF) level 3 or higher, $n=10$ [22]). CNs who did not meet the inclusion criteria received a pop-up notification that they were not eligible for participation in the study and thus could not complete the questionnaire. CNs who did not complete questionnaire items on inclusion criteria ($n=11$), participant characteristics ($n=26$), nurse-related determinants ($n=28$) or professional practices ($n=13$) were also excluded. Dropout was defined as CNs who completed questionnaire items on inclusion criteria and participant characteristics, but not on determinants and/or professional practices ($n_{dropout}=41$). CNs in the population for analysis ($n=244$) were on average slightly older than CNs who dropped out (47.2 vs. 44.2 years). A slightly smaller proportion of CNs in the population for analysis completed a nursing degree at EQF 6 or 7 compared to CNs who dropped out (40% vs. 46%), while a larger proportion of CNs in the population for analysis were employed for 17–24 h/week compared to CNs who dropped out (45% vs. 32%). The distributions of gender and years of nursing experience were comparable between the two populations. The results on the need for additional knowledge were based on 234 CNs, because 10 participants did not complete the relevant questionnaire items.

Questionnaire

The questionnaire was developed and pretested for readability and comprehensibility among four nurses in the researchers' professional network. Pretest feedback informed adjustments to the wording of the questions prior to the questionnaire's launch. The questionnaire included a short description of the study aim and the estimated completion time (15 min). It consisted of items on (i) participant characteristics (10 items), (ii) nurse-related determinants (24 items), (iii) professional practices (5 items) and (iv) the need for additional knowledge (21 items). Items could not be skipped, although participants could close the questionnaire at any time. The questionnaire was developed using the Qualtrics online survey tool (Copyright 2021, Qualtrics).

Participant characteristics

The following characteristics were assessed: employment in hours/week, education level, gender, age and years of nursing experience. Education level was classified as EQF level 3 or 4 (both levels are secondary vocational education), 6 (Bachelor) or 7 (Master). In addition, participants were asked whether they were thematic specialists for the themes 'lifestyle' or '(under)nutrition', i.e. employees with a particular responsibility for a specific area of interest within their team or organization. Participants were also asked whether they had followed additional training on nutrition or behaviour change (techniques) during the past two years.

Nurse-related determinants

The questionnaire items concerning nurse-related behavioural determinants were derived from the Determinants of Implementation Behavior Questionnaire (DIBQ) [23, 24], which is a validated Dutch questionnaire based on the Theoretical Domains Framework (TDF) [25]. The TDF and the Integrated Change (I-Change) Model [26] describe behavioural determinants and the pathway from determinants to behaviour. We included DIBQ constructs on the following health professional-related determinants of healthy eating support: attitude, professional role perception, positive emotions, negative emotions, outcome expectancies (3 items), self-efficacy (2 items), knowledge, skills, motivation and priority (Table 2). To focus our study scope, building on our qualitative study [12], and to limit the length of the questionnaire, DIBQ constructs on the following health professional-related domains were not included: behavioural regulation and nature of the behaviours. Agreement with the statements was rated on a 5-point Likert scale: strongly disagree (1), disagree (2), neutral (3), agree (4) and strongly agree (5) [24]. All statements were formulated positively for healthy eating support, except for the statements for 'negative emotions' and 'priority'. Professional role

perception (or role identity) and self-efficacy (or self-confidence and experience) were important constructs as shown by previous qualitative research [12], and therefore were investigated not only for healthy eating support in general, but also for the specific professional practices described below. In addition, based on previous qualitative research [12], self-efficacy was explored for specific skills related to healthy eating support: a) dealing with patient autonomy appropriately, b) dealing with patient resistance appropriately and c) informing patients about a healthy diet.

Professional practices

The questionnaire items addressed healthy eating support in general and the following specific practices, aligning with the steps in the nursing process: (a) observing problems regarding patients' dietary behaviour, (b) having a conversation about patients' dietary behaviour, (c) motivating patients to eat and drink healthier and (d) supporting patients in goal setting regarding healthy eating. Healthy eating support practices were scored on a 5-point Likert scale: never (1), seldom (2), sometimes (3), often (4) and always (5).

Need for additional knowledge

The questionnaire items on the need for additional knowledge related to healthy eating support were based on a previous interview study of the researchers among Dutch CNs [12] and a survey on identifying the need for knowledge among Dutch coassistants and general practitioners [27]. Our questionnaire inquired about the need for additional knowledge on (a) diet in relation to a variety of physical and psychiatric problems: undernutrition, overweight and obesity, dementia, diabetes, cardiovascular diseases, cancer, gastrointestinal diseases, wounds and severe psychiatric diseases; (b) motivating and communicating with patients; and (c) other topics related to healthy eating support: involving patients' social network, interprofessional cooperation, media and hypes, and financing of healthy eating support. Answering categories for all items were (i) 'I would like to have additional knowledge', (ii) 'I already have sufficient knowledge', (iii) 'I am not interested in additional knowledge' and (iv) 'I don't know'. In addition, participants were asked two open-ended questions: 'On which other topics related to healthy eating support would you like to have additional knowledge?' and 'Which behaviour change techniques are you familiar with?'.

Data analysis

The data were analysed by using IBM SPSS Statistics version 28 (IBM Corp, Armonk, NY, USA). Descriptive statistics (frequencies and percentages for categorical variables, means and standard deviations [SDs] for continuous variables) were applied to describe participant characteristics, nurse-related behavioural determinants, professional practices and the need for knowledge. In addition, mean scores were calculated for the determinants. Items worded negatively, presenting the constructs negative emotions and priority, were reverse-coded [24]. Accordingly, a high score for all items was in favour of healthy eating support. To yield more robust and overarching constructs for data analysis, questionnaire constructs were categorized into the determinants attitude, self-efficacy, motivation, ability and barriers, inspired by the I-Change Model, which integrates different psychological theories [26] (Table 2). To assess the internal consistency of the determinants attitude, self-efficacy and ability, Cronbach's α was calculated. The Cronbach's α values were 0.68 and 0.74 (Table 2), implying that the internal consistency was 'reasonable' or 'adequate' [28]. Descriptive statistics for determinants and professional practices were shown in total and by EQF level (3 and 4 vs. 6 and 7), as healthy eating support competences and practices may differ among education levels with more basic competences being taught at EQF levels 3–4 and more in-depth competences at EQF levels 6–7 [29]. Mann-Whitney U tests were applied to test whether the EQF level-groups differed significantly.

Since the prevalence rates were above 10%, logistic regressions could overestimate the prevalence ratios (PRs); therefore, Poisson regressions with robust variance estimations were used to calculate PRs [30]. In these analyses, the determinants (mean determinant scores) were included as independent variables in five separate models and professional practice (never to sometimes vs. often to always) was included as dependent variable. Poisson regressions yielded PRs and 95% confidence intervals (CIs) for each determinant. A PR of 1.5 would imply that a 1-point increase in a determinant on the 5-point Likert scale was associated with a 1.5 times greater prevalence of providing healthy eating support in general at least often. To adjust for potential confounding factors, Poisson regressions were also performed with age (continuous; years), education level (dichotomous; EQF levels 3 and 4 vs. 6 and 7) and employment (categorical; 8–16, 17–24, 25–32, >32 h/week) as covariates. Since age was significantly correlated with years of nursing experience (Spearman's rho = 0.6, $P < 0.001$), years of nursing experience was not included as a covariate in the models. To ensure the robustness of the results of the adjusted Poisson regressions, sensitivity analyses were performed including women only ($n = 230$).

Results

Participant characteristics

Most participants were female (94%), completed a nursing degree at EQF level 3 or 4 (60%) and were employed

17–32 h/week (74%) (Table 1). Half of the participants were 50 years or older (52%) and had more than 20 years of nursing experience (48%). Some participants followed additional training on nutrition (7%), behaviour change (techniques) (21%) or both (14%), during the past two years.

Nurse-related determinants and professional practices

Participants in general had a positive attitude, a high motivation and good abilities to support healthy eating, as indicated by above-average scores for attitude (3.7), motivation (4.0) and ability (3.7) (Table 2). The mean scores for self-efficacy and barriers were lower (3.1 and 3.3, respectively). No differences in mean scores were observed between CNs who completed either a lower or higher degree ($P>0.05$ for all determinants).

Most participants supported healthy eating in general at least often (64%), where the most frequently implemented practices were observing problems regarding patients' dietary behaviour (75%) and having a conversation about dietary behaviour (70%) (Table 3). Motivating patients to eat and drink healthier (45%) and supporting patients in goal setting regarding healthy eating (28%) were less common. No differences in reported professional practices were observed between CNs who completed either a lower or higher degree ($P>0.05$ for all professional practices).

Professional role perception and self-efficacy were investigated for healthy eating support in general as well as for specific practices. Most participants considered observing problems regarding patients' dietary behaviour as part of their professional role (84%) (professional role perception) and believed that they were capable of observing problems (85%) (self-efficacy) (data not shown in table). Regarding having a conversation about patients' dietary behaviour, half of the participants considered this part of their professional role (51%); nevertheless, 90% felt capable of having a conversation. The results for motivating patients to eat and drink healthier differed: most perceived this as part of their professional role (90%), while 55% believed that they were capable of motivating patients. Most participants considered supporting goal setting regarding healthy eating as part of their professional role (80%) and 62% felt capable of supporting goal setting.

Concerning self-efficacy for specific skills, most CNs believed to be capable of dealing with patient autonomy appropriately related to healthy eating support (82%) and informing patients about a healthy diet (86%) (data not shown in table). In contrast, 33% felt capable of dealing with patient resistance appropriately concerning healthy eating support.

Table 1 Characteristics of Dutch community nurses, $n=244$

Characteristics	*n*	%
Gender		
Male	13	5
Female	230	94
Other	1	< 1
Age (years)		
18–34	51	21
35–49	64	26
50–64	123	50
65 or older	6	2
Highest level of education		
EQF level 3	65	27
EQF level 4	81	33
EQF level 6	94	39
EQF level 7	4	2
Working experience (years)		
< 5	27	11
5–10	42	17
11–20	58	24
> 20	117	48
Employment (hrs/wk)		
8–16	47	19
17–24	109	45
25–32	70	29
> 32	18	7
Thematic specialist		
(under)nutrition and/or lifestyle	12	5
Neither	232	95
Additional training followed during the past 2 years		
Nutrition	17	7
Behaviour change (techniques)	51	21
Nutrition and behaviour change (techniques)	35	14
None	141	58

Abbreviations EQF, European Qualifications Framework

Associations between determinants and professional practice

Attitude ($PR_{adjusted}$ 1.8; 95%CI 1.5–2.2), self-efficacy ($PR_{adjusted}$ 1.3; 95%CI 1.1–1.5), motivation ($PR_{adjusted}$ 1.5; 95%CI 1.3–1.7) and ability ($PR_{adjusted}$ 1.4; 95%CI 1.2–1.6) were associated with a greater prevalence of providing healthy eating support in general at least often, relative to providing healthy eating support never to sometimes (Table 4). This implies that a 1-point increase in attitude on the 5-point Likert scale was associated with a 1.8 times greater prevalence of providing healthy eating support in general at least often, adjusted for CNs' age, education level and employment. Barriers were not associated with healthy eating support ($PR_{adjusted}$ 1.1; 95%CI 1.0-1.2). When performing sensitivity analyses including women only, no results changed significantly, indicating the robustness of our results.

Table 2 Community nurses' self-reported nurse-related determinants regarding healthy eating support in general

Determinants	Constructs	Number of items	Cronbach's α	Total (*n* = 244)		EQF levels 3–4 (*n* = 146)		EQF levels 6–7 (*n* = 98)		*P*-value[2]
				mean[1]	SD	mean	SD	mean	SD	
Attitude	*Total*	*7*	*0.74*	*3.7*	*0.4*	*3.7*	*0.4*	*3.7*	*0.5*	*0.52*
	Attitude	1		3.4	0.8	3.5	0.7	3.4	0.8	
	Professional role perception	1		3.9	0.6	3.9	0.6	4.0	0.7	
	Positive emotions	1		3.8	0.7	3.7	0.7	3.8	0.7	
	Negative emotions (reverse-coded)[3]	1		3.9	0.8	3.8	0.8	4.0	0.8	
	Outcome expectancies[4]	3		3.6	0.7	3.6	0.6	3.6	0.7	
	Awareness			3.8	0.6	3.8	0.6	3.8	0.6	
	Motivation			3.5	0.7	3.5	0.7	3.5	0.7	
	Work toward goals			3.4	0.6	3.4	0.6	3.4	0.7	
Self-efficacy	*Total*[5]	*2*	*0.74*	*3.1*	*0.6*	*3.1*	*0.6*	*3.0*	*0.7*	*0.64*
	Self-efficacy			3.3	0.7	3.3	0.7	3.2	0.7	
	Self-efficacy when there are barriers			2.9	0.7	2.9	0.7	2.9	0.8	
Motivation	Motivation	1	n.a.	4.0	0.6	4.0	0.6	4.0	0.7	0.83
Ability	*Total*	*2*	*0.68*	*3.7*	*0.6*	*3.8*	*0.6*	*3.7*	*0.7*	*0.90*
	Knowledge	1		3.8	0.7	3.8	0.7	3.8	0.8	
	Skills	1		3.7	0.7	3.7	0.7	3.7	0.8	
Barriers (reverse-coded)	Priority (reverse-coded)[3]	1	n.a.	3.3	0.9	3.3	0.9	3.3	1.0	0.57

Abbreviations n.a., not applicable; SD, standard deviation; EQF, European Qualifications Framework; [1] Mean on 5-pt Likert scale: strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5); [2] P-value for the difference between participants who completed EQF levels 3–4 vs. 6–7, Mann-Whitney U test; [3] Constructs 'negative emotions' and 'priority' were reverse-coded prior to the analysis, because they were formulated negatively (respectively 'I feel bad when I support healthy eating (e.g. nervous, pessimistic, depressed, agitated, sad, uncomfortable)' and 'Working on something else on my agenda is a higher priority than supporting healthy eating'); [4] Questionnaire items for the construct 'outcome expectancies' were: 'If I support healthy eating of patients, they will (1) become aware of their own dietary behaviour, (2) become motivated to eat and drink healthier and (3) start working toward the healthy eating and drinking goals they set'; [5] Questionnaire items for the construct 'self-efficacy' were: 'I am confident that I can support healthy dietary behaviour of patients' and 'I am confident that I can support healthy dietary behaviour of patients, even when there are barriers (e.g. lack of time, unmotivated patients)'

Table 3 Community nurses' self-reported professional practices regarding healthy eating support

Professional practices	Total (*n* = 244)		EQF levels 3–4 (*n* = 146)		EQF levels 6–7 (*n* = 98)		*P*-value[1]
	n	%	*n*	%	*n*	%	
General practice							
Supporting healthy eating							
Never to sometimes	89	36	54	37	35	36	0.84
Often to always	155	64	92	63	63	64	
Specific practices							
Observing problems regarding dietary behaviour							
Never to sometimes	60	25	38	26	22	22	0.53
Often to always	184	75	108	74	76	78	
Having conversation about dietary behaviour							
Never to sometimes	72	30	46	32	26	27	0.40
Often to always	172	70	100	69	72	74	
Motivating to eat and drink healthier							
Never to sometimes	134	55	81	56	53	54	0.83
Often to always	110	45	65	45	45	46	
Supporting goal setting regarding healthy eating							
Never to sometimes	176	72	105	72	71	72	0.93
Often to always	68	28	41	28	27	28	

Abbreviation EQF, European Qualifications Framework; [1] P-value for the difference between participants who completed EQF levels 3–4 vs. 6–7, Mann-Whitney U test

Table 4 Associations between each determinant and professional practice regarding healthy eating support in general, *n* = 244

Determinants	Crude models		Adjusted models[1]	
	PR	95%CI	PR	95%CI
Attitude	1.8	1.5;2.2	1.8	1.5;2.2
Self-efficacy	1.3	1.2;1.5	1.3	1.1;1.5
Motivation	1.5	1.3;1.7	1.5	1.3;1.7
Ability	1.4	1.2;1.6	1.4	1.2;1.6
Barriers (reverse-coded)[2]	1.1	1.0;1.2	1.1	1.0;1.2

Abbreviations PR, prevalence ratio (never to sometimes vs. often to always); CI, confidence interval; [1] Adjusted models include age (continuous; years), education level (dichotomous; EQF levels 3 and 4 vs. 6 and 7) and employment (categorical; 8–16, 17–24, 25–32, >32 h/week) as covariates; [2] 'Priority', the construct underlying the determinant 'barriers', was reverse-coded prior to the analysis, because it was formulated negatively regarding healthy eating support ('Working on something else on my agenda is a higher priority than supporting healthy eating')

Need for additional knowledge

Overall, many participants wanted to have additional knowledge of various topics included in the questionnaire. CNs especially desired more knowledge on diet in relation to cancer (*n* = 181), gastrointestinal diseases (*n* = 177), severe psychiatric diseases (*n* = 175) and dementia (*n* = 174); methods for motivating patients to eat and drink healthier (*n* = 169) and supporting patients to sustain healthy eating (*n* = 174); and dealing with patient autonomy (*n* = 179) (data not shown in table). No additional topics emerged from the open-ended question on need for knowledge. Participants either had sufficient knowledge or were not interested in additional knowledge about the involvement of patients' social network (*n* = 129) or interprofessional cooperation (*n* = 132). Familiarity with BCTs was expressed in an open-ended question; participants were familiar with motivational interviewing [31] (*n* = 47), goal setting (*n* = 1) and social support (*n* = 1).

Discussion

This quantitative study explored (1) the associations between nurse-related behavioural determinants and self-reported healthy eating support practices and (2) CNs' need for additional knowledge. Encouraging results are that CNs reported a positive attitude (including role perception), a high motivation and good abilities towards healthy eating support in general. In addition, more than half of the CNs supported healthy eating in general at least often, as reflected by the finding that most CNs observed problems and had a conversation about patients' dietary behaviour at least often. Fewer CNs motivated patients to eat and drink healthier and supported goal setting at least often.

The prevalence of supporting healthy eating at least often was greater when CNs reported a more positive attitude, greater self-efficacy, greater motivation and better abilities. These findings are consistent with previous cross-sectional studies among practice nurses and registered nurses on weight management of patients [32, 33] and among primary care nurses [34] and Dutch general practitioners on lifestyle counselling [35]. The findings of these studies show that attitude [35], professional role perception (component of the determinant 'attitude') [33], self-efficacy [32, 33, 35] and perceived skills (component of the determinant 'ability') [32–34] are associated with professional practice. Consistent with our study findings, perceived barriers were not significantly correlated with weight management practices in a previous study [33]. However, questionnaire item wording differed between studies and between the Dutch and English versions of the DIBQ. This complicates the comparison with findings of other studies. Barriers may still play a role, as CNs address barriers such as a lack of time and work pressure, in qualitative studies [12, 36]. Nevertheless, the inhibitory effect of barriers on professional practice might be very limited for CNs with a positive attitude, as in our study.

Professional role perception (component of determinant 'attitude') of most CNs was positive for observing problems, motivating patients and supporting goal setting. Similarly, in previous studies, CNs and primary care nurses had a positive professional role perception on the assessment of patients' nutritional status at the first visit and on lifestyle counselling, respectively [17, 34]. Interestingly, a large proportion of CNs in the present study reported having a conversation about patients' dietary behaviour at least often, while fewer CNs considered this to be part of their professional role. This discrepancy might have been caused by a difference in the interpretation of questionnaire items: CNs may have interpreted 'conversation' in the item on professional role perception as purposeful healthy eating support, while they might have interpreted 'conversation' in the item on professional practice as an everyday talk on patients' wellbeing, including diet. A potential reason for the relatively neutral professional role perception on having a conversation is that CNs perceived diet as patients' own responsibility, which is seen as part of patients' autonomy [12].

CNs' self-efficacy for healthy eating support in general was, on average, less positive than their attitude, motivation and ability. One reason might be that only one-third of the CNs in our study felt capable of dealing with patient resistance. Indeed, dealing with patient resistance, which is related to shared decision-making and patient autonomy, is complicated [37]. Regarding self-efficacy for specific practices, most CNs believed that they were capable of observing problems and having a conversation with patients, but fewer CNs believed this for motivating patients and supporting goal setting. This might also contribute to CNs' low involvement in motivating patients

and supporting goal setting. In addition, performing prior steps in the nursing process (observing problems and having a conversation) is a prerequisite for performing the steps of motivating patients and supporting goal setting. Improving self-efficacy for in particular motivating patients and supporting goal setting may enhance healthy eating support practices.

To better support healthy eating, CNs wished to have additional knowledge on: diet in relation to cancer, gastrointestinal diseases, severe psychiatric diseases and dementia; methods for motivating patients to start and for supporting patients to sustain healthy eating; and dealing with patient autonomy. These findings reflect the variability of the patients CNs meet in their daily practice. CNs' approach should be tailored to the individual patient [12], which is challenging, as disease-specific dietary guidelines exist for e.g. cancer [38] and dementia [39], in addition to generic dietary guidelines.

Our results provide insights into nurse-related behavioural determinants of healthy eating support practices and related knowledge needs to be addressed in strategies. Strategies such as well-fitted training programs for CNs might be developed, paying particular attention to (self-efficacy for) motivating patients to eat and drink healthier and supporting goal setting, as well as specific skills such as dealing with patient autonomy and patient resistance. To motivate patients and deal with patient resistance, motivational interviewing can be used, in which patients are "prompted to engage in change talk in order to minimize resistance and resolve ambivalence to change" [31]. Another BCT that can be used for motivating patients is providing information on the consequences of a behaviour in general or to the individual [31]. Since we found no differences between the determinants and professional practices of CNs who completed either a lower or higher degree, strategies targeting improving healthy eating support practices can use the same starting points for different nursing degrees. Strategies should include context- or case-based learning [40] because everyday nursing practice is affected by numerous contextual and situational factors.

Future research could investigate CNs' personal and professional values regarding healthy eating support, thereby deepening insights from the present study, since values affect decisions CNs make and actions they take in caring for patients [41]. Personal and professional values could be investigated for specific practices to shed light on which particular values play a role in each of the separate steps in healthy eating support, and which strategies can address those. In addition, nurse-related behavioural determinants could be examined for the entire nursing process in healthy eating support, including intervention implementation and subsequent monitoring and evaluation of behavioural and health outcomes. When CNs incorporate healthy eating support in their daily routines to the fullest potential, dietary behaviour of home-dwelling (older) patients might improve, eventually leading to enhanced wellbeing.

Strengths and limitations

This study adds to the international literature on healthy eating support, as our study provides valuable (quantitative) insights into the home care setting. Existing literature mainly focuses on other settings, such as the general practice setting. Moreover, the present study examined specific healthy eating support practices, building upon a previous qualitative study of the researchers [12].

Limitations of the present study should also be noted. First, the use of a self-administered questionnaire could result in social desirability or self-report bias [42], which could lead to an overestimation of actual healthy eating support. To obtain more objective information and deeper insight into CNs' professional practice other data collection methods such as videotaping CNs' real-life visits and conversations with patients could be used as was done in a previous study on weight-loss counselling by practice nurses [43]. Second, since our study had a cross-sectional design, the causality of associations could not be evaluated. It would be useful to investigate whether an improvement in determinants such as attitude is followed by an improvement in professional practice. Future intervention studies could contribute to this, e.g. an educational intervention for CNs, addressing the topics discussed above, with pretest and posttest measurements of CNs' determinants and professional practice. Third, although good representation of the total population of CNs in the Netherlands by our study population is suggested by similarities in gender and age distributions [44], voluntary participation may have resulted in selection bias. Our study might overrepresent CNs who sympathize with their role in healthy eating support, reflected in almost half of the participants having followed additional training on nutrition, behaviour change (techniques) or both, during the past two years. This could have caused the high self-reported involvement in healthy eating support, implying that our findings may overestimate actual healthy eating support practices in the total population of CNs in the Netherlands. In addition, age, education level and employment in hours/week differed between CNs in the population of analysis and CNs who dropped out. It is unclear whether and how these differences might have affected the study findings. Nevertheless, selection bias was not expected to affect the associations between determinants and professional practice.

Conclusion

This study suggested that it is important to address nurse-related behavioural determinants such as attitude, self-efficacy, motivation and ability to improve CNs' competences in healthy eating support. Specifically, self-efficacy to motivate patients to eat and drink healthier and to support them in goal setting should be addressed. In addition, based on CNs' self-reported need for additional knowledge, it is recommended to pay attention to evidence-based behaviour change techniques, dealing with patient autonomy, and diet in relation to cancer, gastrointestinal diseases, severe psychiatric diseases and dementia.

Abbreviations

CN	Community nurse
DBIQ	Determinants of Implementation Behavior Questionnaire
TDF	Theoretical Domains Framework
I-Change Model	Integrated Change Model

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12912-024-02403-z.

Supplementary Material 1: Additional file 1: Questionnaire

Acknowledgements

The authors express their gratitude to the community nurses who participated in this questionnaire study and to everyone who contributed by spreading the questionnaire within their (professional) networks and healthcare organizations. We would also like to thank Marijke Bos-Minnen for practical assistance in the study.

Author contributions

The design of the study (GdHJ, GGvW, AHN, WK), data collection (GdHJ, GGvW, WK), data analysis and interpretation (GdHJ, GGvW, AHN, ET, WK), drafting of the paper (GdHJ), critical revision of the paper and reading and approval of the final paper (all authors).

Funding

The research described in this paper was financially supported by a grant from the Regio Deal Foodvalley (162135).

Data availability

The data that support the findings of this study are not publicly available due to privacy restrictions. The data are available from the Department of Nursing, Christian University of Applied Sciences (CHE), upon reasonable request; email address: leefstijlengezondheidsbevordering@che.nl; website: https://www.che.nl/lectoraten/leefstijl-en-gezondheidsbevordering.

Declarations

Ethics approval and consent to participate

This study was approved by the Social Sciences Ethics Committee of Wageningen University & Research (Wageningen, the Netherlands). All methods were conducted in accordance with the ethical guidelines of the Declaration of Helsinki. Informed consent was obtained from all study participants. Confidentiality was assured by using a self-administered, anonymous questionnaire. Additionally, participants were aware that their participation was voluntary and that they had the right to withdraw from completing the questionnaire at any time. The data were stored on a protected server of the CHE and were accessible only to the researchers. The study followed the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) Statement [45].

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Received: 16 July 2024 / Accepted: 3 October 2024
Published online: 21 October 2024

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