

A longitudinal study of changes in noticing and treating patients' overweight by Dutch GPs between 1997 and 2007

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Background. One of the stakeholders in tackling the rise and health consequences of overweight and obesity is the general practice physician (GP). GPs are in a good position to inform and give nutrition guidance to overweight patients.

Objective. Assessment of working mechanism of determinants of the nutrition guidance practice: noticing patients' overweight and guidance of treatment by GPs [linear analysis of structural relations (LISREL) path model] in a longitudinal study.

Methods. This longitudinal study measured data in 1992, 1997 and 2007. The 1992 LISREL path model (Hiddink GJ, Hautvast J, vanWoerkum CMJ, Fieren CJ, vantHof MA. Nutrition guidance by primary-care physicians: LISREL analysis improves understanding. *Prev Med* 1997; 26: 29–36.) demonstrated that 'noticing patients' overweight and guidance of treatment' was directly and indirectly influenced by predisposing factors, driving forces and perceived barriers. This article defines and discusses the path analysis of the 2007 data (compared with 1997).

Results. This analysis shows both similarity and differences in working mechanism of determinants of noticing patients' overweight and guidance of treatment between 1997 and 2007. The backbone of the mechanism with four predisposing factors is the similarity. The number of driving forces and of paths through intermediary factors to the dependent variable constitutes the difference.

Conclusions. The backbone of the working mechanism of determinants of the nutrition guidance practice: noticing patients' overweight and guidance of treatment by GPs was similar in 2007 and 1997. The influence of GPs task perception on noticing patients' overweight and guidance of treatment considerably increased in 2007 compared to 1997. The longitudinal character of this article gives a strong practice-based evidence for weight management by GPs.

Keywords. Behaviour change, general practice, GPs and overweight and obesity, longitudinal study, obesity advice.

Introduction

Obesity is a multifactorial complex chronic disease and a growing problem worldwide. It develops from an interaction of genotype and environment. The disease has reached epidemic proportions globally^{1–3} and is accompanied by a range of serious health consequences, predisposing patients to hypertension and cardiovascular disease, diabetes mellitus type 2, hormone-related cancers, gallbladder disease, musculoskeletal (joint) disorders and sleep apnoea. It has a negative effect on social well-being, decreases longevity and imposes

a financial and time burden on health care systems. Worldwide, 1.1 billion adults and 10% of children are classified as overweight or obese.² In the Netherlands, overweight (obesity) prevalence in adult males was recently estimated 51% (10%) and in females 42% (12%).⁴ This is a great concern for public health and demands solutions by close cooperation between various parties in health care. In the Netherlands, several initiatives took place to enter the obesity agenda of health as well as non-health professionals.⁵

In the multi-sectoral approach to intervene in the rise of overweight and obesity, GPs are important

stakeholders.^{6,7} GPs are in the best position to give nutrition advice because of their high referral score, their high perceived expertise and their reach to nearly all segments of the population.⁶ Pan-European research confirmed the use of trusted nutrition information source by adults for GP and dietician.⁸ Van Weel⁹ described the central position of the GP in the health care system as ‘opportunity through regular contacts with patients (continuity of care)’ and trust with ‘their’ patients. Moreover, GPs are often consulted for problems with a (potential) nutrition component.^{5,6,10–12} Ideally, GPs should be able to notice overweight or obesity in an early stage and give lifestyle and nutrition guidance to prevent the development of obesity and obesity-related morbidity.¹³ GPs have an interest in nutrition.^{12,14} Nutrition guidance involves the GP, the patient, their perceptions, the GP–patient interaction and contextual factors and these will be influenced by culture.¹⁵ The Dutch setting of this research means Dutch culture, and this exerts a profound influence on the position of the GP, the position of the patient, the perceptions of both the GP and the patient, the GP–patient interaction, the food pattern and the nutrition guidance by the GP.

The Guideline Obesity, Dutch College of General Practitioners¹⁶ gives insight into the possibilities for how GPs handle this problem in daily practice. Keystone is the intervention in the high-risk population.

Main barriers often mentioned in the literature are lack of time, lack of patient motivation and having not enough skills.^{17–23} Hiddink *et al.*^{12,14} described as most important barriers GPs not being trained in nutrition, lack of time to address nutrition issues and GPs perception that patients lack motivation to change lifestyle and/or dietary patterns. In case of overweight, the most important barriers were lack of treatment skills, lack of time and lack of patient motivation.¹²

Based on the Precede–Proceed model¹⁵ and on previous qualitative research,¹¹ Hiddink *et al.* postulated a working model of determinants of nutrition guidance practices of GPs and confirmed it by a path model after exploratory analysis¹¹ using linear analysis of structural relations (LISREL).²⁴ The resulting path model demonstrated that nutrition guidance practices (e.g. noticing patients’ overweight and guidance of treatment^{25–27}) by GPs were directly or indirectly influenced by predisposing factors (nutrition interest: interest in the effect of nutrition on health and disease; self-efficacy coronary heart disease (CHD); perception of own ability to give dietary advice in the treatment and prevention of coronary heart disease and role of behaviour in health: perception of role of behaviour and heredity in health), driving forces and perceived barriers.²⁵ The LISREL model of determinants of nutrition guidance practices has been confirmed in cross-sectional and longitudinal analyses of nutrition guidance by GPs^{11,25} and in nutrition guidance practices of GP-trainees NECTAR (Nutritional Education by Computerised Training and Research) Study.²⁶

The most important nutrition guidance practice studied in these cross-sectional and longitudinal analyses of nutrition guidance by GPs^{25–27} was ‘noticing patients’ overweight and guidance of treatment’, which significantly decreased over the period 1992–97.²⁵ Nutritional attitudes and practices of GPs are well studied in the Netherlands.^{10,28–31}

In this article, the working mechanism of noticing patients’ overweight and guidance of treatment 2007 will be defined and compared with the reference LISREL model.²⁵

Materials and methods

Study population

In 1992, a random sample of 1000 GPs—stratified by gender and type of practice—was drawn from GPs in the Netherlands who had been practicing for 5 and 15 years. Addresses and information on sex, type of practice, year of starting practice and grade of urbanization of the practice were obtained from the database of the Netherlands Institute of Primary Health Care. They received a specially developed mail questionnaire (The Wageningen PCPs Nutritional Practices Questionnaire = WPNPQ). The 633 respondents (net response rate of 64%) were well representative of the population of GPs, in practice for between 5 and 15 years.¹²

For the longitudinal study, a shortened version of the WPNPQ was mailed in 1997 to a nationwide random sample of 675 GPs, who had been in practice for 5 up to 20 years. Three hundred and seventy-one GPs responded to the questionnaire. At the same time, a new cohort of 88 GPs in practice for 5 up to 10 years was approached.²⁵

In 2007, in total, 289 GPs participated in the longitudinal study again. In addition, 183 GPs were approached to participate in the 2007 study. This means our data consisted of five subsamples (including four panels) with different numbers of GPs (Table 1).

Panel 929707 consisted of 136 GPs who participated in 1992, 1997 and 2007. Panel 9297 consisted of 147 GPs who participated in 1992 and 1997. Panel 9207 consisted of 119 GPs, 34 GPs in Panel 9707 and 183

TABLE 1 Size of the sample by year

	1992	1997	2007
Panel 929707	136	136	136
Panel 9297	147	147	–
Panel 9207	119	–	119
Panel 9707	–	34	34
Drop out 92	231	–	–
Drop out 97	–	54	–
Panel 07	–	–	183
Total	633	371	472

GPs in the Cohort 07 subsample. Cohort 07 refers to 'new' GPs who participated in 2007 for the first time.

Questionnaires

The questionnaire was based on the methodology of Dillman³² and specially developed for this research by Hiddink *et al.*¹² It was based on qualitative research (focus-group discussions and in-depth interviews) and consisting of 318 questions on issues, such as personal characteristics, description of the practice, task perception of GP, sources of information on nutrition, nutrition guidance practices and the barriers to be coped with (e.g. lack of time). Special attention was given to two typical examples of nutritional problems: treatment and prevention of overweight and of coronary heart disease. The items suggested as possible barriers were taken from the literature and from previous qualitative research. Attitudinal and behavioural questions were scored on a five-point Likert scale, unless stated otherwise.^{11,25}

In 1997, the WPNPQ was shortened from 318 questions to 92 questions. The content of the remaining questions stayed the same and consisted of the same topics. The resulting questionnaire was sent to 675 GPs of which 371 responded.

In the 2007 questionnaire, questions about physical activity and questions about the nurse practitioner were added. The questionnaire was sent to 1096 GPs of which 472 responded.²⁷

Construction of dependent variable

The dependent variable 'noticing patients' overweight and guidance of treatment' reflects the self-reported behaviour of GPs regarding treatment of overweight of their patients. This variable was operationalized in five items about guidance of treatment, of which three items concerned the discussion of overweight and two items concerned the extent of the advice. The factors were constructed with factor analysis by varimax rotation, and after normalization of the SDs, the score was determined by adding up the items scores. For further details, see Hiddink *et al.*¹¹ This variable is central to the analyses below. The reliability of the resulting factor was assessed by evaluating Cronbach's alpha.

Construction of predisposing factors, driving forces and perceived barriers

According to Green *et al.*¹⁵, nutrition guidance by GPs is determined by their predisposing, enabling and reinforcing factors. The original 1997 path model, which was analysed in this study¹¹ consisted of the predisposing factors:^{11,25}

1. Self-efficacy general: perception of GPs own ability to influence the lifestyle and eating habits of patients with health problems.

2. Nutritional interest: GPs interest in the effect of nutrition in health and disease.
3. Self-efficacy CHD: perception of GPs own ability to give dietary advice in the treatment and prevention of coronary heart disease.
4. Role of behaviour on health: perception of role of behaviour and heredity on health.

The intermediary factors consisted of three driving forces:

1. Task perception: perception about general tasks concerning health and nutrition education
2. Attitude regarding the treatment of overweight
3. Attitude towards weight–health relationship.

The two barriers were lack of skills to treat overweight and lack of time to treat overweight.^{11,25} Table 2 shows the number of items for each of these factors. The factors were constructed with factor analysis by varimax rotation, and after normalization of the SDs, the score was determined by adding up the items scores. For further details, see Hiddink *et al.*^{11,14} The exact computer scripts used to compute the predisposing factors, driving forces and perceived barriers in 1997 were used on the 2007 data. In other words, these variables are perfectly comparable for the 2 years (1997 and 2007). The reliability of the factors was evaluated by Cronbach's alpha.

Reliability of constructed factors

Cronbach's alpha (α) was used as a measure of reliability of the scales. The results for the factors used in 1997 and the reproduced factors in 2007 are shown in Table 2. The reliability coefficients indicating moderate to good reliability are comparable in magnitude in both years.

Statistical analysis

The mechanism of action of the determinants on the dependent variable was tested by assessing fit of the 1997 path model²⁵ within the empirical data of 2007. Tests were considered statistically significant with $P < 0.05$. Possible differences may apply to the assumed causal structure, to the sample composition or both. In all analyses, only cases with observed values for all 10 factors were used (as a result, subsample size may deviate slightly from the numbers in Table 1). All subsamples are taken into account. The mechanism of action resulting in the LISREL path model²⁵ demonstrated that noticing patients' overweight and guidance of treatment by GPs was directly or indirectly influenced by four predisposing factors (self-efficacy general, nutritional interest, self-efficacy CHD and role of behaviour in health). The indirect influence took place through intermediary factors, being driving forces (task perception, attitude regarding the treatment of overweight, and attitude towards weight–health relationship) and barriers (lack of skills to treat overweight and lack of time to treat overweight).^{11,25}

TABLE 2 Factors used in LISREL path analysis for analysing the dependent variable 'noticing patients' overweight and guidance of treatment' in 1997 and 2007

	Cronbach's alpha 1997 ²⁷	Cronbach's alpha 2007
Predisposing factors		
Nutritional interest: interest in effect of nutrition on health (one item)	–	–
Self-efficacy general: perception of own ability to influence lifestyle and eating habits of patients with health problems (two items)	0.82	0.82
Self-efficacy CHD: perception of own ability to give dietary advice in treatment and prevention of coronary heart disease (two items)	0.83	0.82
Perception of role of behaviour and heredity in health (seven items)	0.73	0.73
Driving forces		
Task perception (24 items)	0.62	0.79
Attitude regarding treatment of overweight (five items)	0.64	0.64
Attitude towards weight–health relationship (one item)	–	–
Perceived barriers		
Lack of skills to treat overweight (five items)	0.72	0.74
Lack of time to treat overweight (two items)	0.75	0.75
Dependent variable		
Noticing patients overweight and guidance of treatment five items)	0.62	0.60

Path coefficients indicate the extent and the direction of the influence (see Figure 1).

Results

Assessing fit of the 1997 model in the 2007 data

The original 1997 LISREL model of Hiddink *et al.*²⁵ (figure 4, p.40) with Goodness of Fit Chi Square 25.17 with d.f. = 25 served as the starting point of this study. (Unfortunately, in the original 1997 paper, figure 4 contains an error: the path between Nutritional interest and Attitude regarding treatment of overweight should be between Nutritional interest and Attitude toward weight–health relationship.) Tests were considered statistically significant with $P < 0.05$. We estimated the same model in the data of 2007 (total panel, $n = 472$) resulting in $GFX = 77.10$ at d.f. = 25 with $P < 0.05$. This means that the 1997 model does not fit the empirical data of 2007. Therefore, the hypothesis that the mechanism of action of determinants of the dependent variable noticing patients' overweight and guidance of treatment by GPs is the same in 2007 as in 1997 had to be rejected. For the different subsamples, it was found that the 1997 model fitted only in the 9707 panel and none of the other subsamples (Table 3). It was therefore concluded that the working mechanism had changed between 1997 and 2007.

Assessing fit of the new model in the 2007 data

By systematically evaluating (i) the estimated standard errors of path coefficients and (ii) the discrepancies

between the observed and the reproduced correlation matrices, a better fitting model was estimated in the total 2007 sample. The resulting new 2007 LISREL model was run on all subsamples and on the 1997 data.

The new model fitted in all these subsamples; see Figure 1 for a display of path coefficients in the original 1997 model and the adjusted 2007 model. Table 3 shows a diagram of the new model in the 2007 data set ($GFX = 29.72$, d.f. = 23, $P = 0.16$).

Compared to the original 1997 LISREL model, in the new 2007 model, most (11 of 13) paths were identical, three existing paths disappeared and five paths emerged (see Figure 1). The backbone of the working mechanism [four predisposing factors (self-efficacy general, nutritional interest, self-efficacy CHD and role of behaviour in health)] together with intermediary factors (task perception, attitude regarding the treatment of overweight, lack of skills to treat overweight, lack of time to treat overweight) formed the similarity between the 2 years. The difference lies in the fact that three existing paths disappeared and five paths emerged and that the intermediary factor attitude towards weight–health relationship disappeared from the model. The discussion will cover an in-depth interpretation of these results.

Discussion

In this longitudinal study, the objective was to define the working mechanism of the nutrition guidance

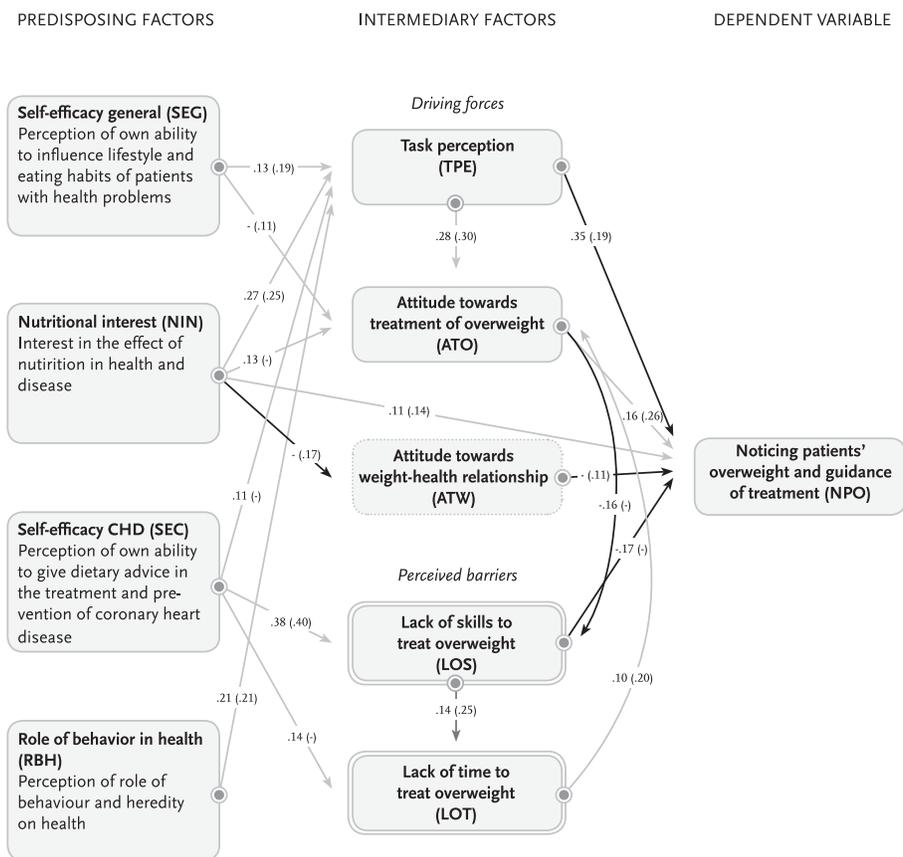


FIGURE 1 Factors coefficients of the path model in 2007 and 1997 (between brackets) of total sample

TABLE 3 1997 LISREL model and new 2007 LISREL model run in five different subsamples

Sample	1997 LISREL model (d.f. = 25) in different years/ panels tested	2007 LISREL model (d.f. = 23) in different years/ panels tested	N (missing listwise)
1997	25.17 ($P = 0.45$)	35.24 ($P = 0.05$)	279
2007	77.10 ($P < 0.05$)	29.72 ($P = 0.16$)	441
Panel 9707	29.96 ($P = 0.23$)	24.29 ($P = 0.39$)	32
Panel 929707	46.67 ($P < 0.05$)	27.47 ($P = 0.24$)	125
Panel 9207	39.91 ($P < 0.05$)	31.91 ($P = 0.10$)	122
Cohort 07	45.21 ($P < 0.05$)	28.52 ($P = 0.20$)	170

practice noticing patients' overweight and guidance of treatment 2007 and to compare this with the LISREL model of 1997.²⁵ This under the hypothesis that the 1997 original path model would fit the empirical data of 2007 in the total panel ($n = 472$). However, this was not the case. Accordingly, a better fitting model was developed.

Our findings show that during 10 years, the mechanism of action of nutrition guidance practices by GPs has changed. In this decade, the general practice became even more a dynamic environment, the seriousness of the obesity problem increased in the Netherlands¹⁶ and the average GP practice came under a much bigger pressure. GPs had to make choices and the question is what the place of nutrition guidance behaviour is in this new

context. The most remarkable similarities and changes will be discussed below.

First of all, the most remarkable similarity in the 2 years is the backbone of the working mechanism (with four predisposing factors) together with intermediary factors. The four predisposing factors (self-efficacy general, nutritional interest, self-efficacy coronary heart disease and role of behaviour on health) still played an important role. They all positively influenced the intermediary factor task perception in 1997 as well as in 2007. This is in agreement with earlier research^{11,25-27} with regard to LISREL models and also in agreement with other earlier studies.^{12,14}

The differences between the positive influence in 1997 and 2007 were small for all these four factors.

Nutritional interest has a direct effect on the dependent variable (as in 1997). The four predisposing factors have also indirect influences through other intermediary factors (three paths in 2007 and four paths in 1997). Compared to the original 1997 LISREL model in the new 2007 model, most (11 of 13) paths were identical. The difference lies in the fact that three existing paths disappeared and five paths emerged and that the intermediary factor attitude towards weight–health relationship disappeared from the model (see Figure 1). Two of these new paths were influences of self-efficacy CHD on attitude regarding the treatment of overweight and on lack of skills to treat overweight.

Secondly, the intermediary factor attitude towards weight–health relationship disappeared from the model of 2007. The paths of nutritional interest as well as of self-efficacy CHD on the intermediary factor attitude towards weight–health relationship disappeared in 2007, as well as the influence of attitude towards weight–health relationship on noticing patients' overweight and guidance of treatment. This may be (partly) explained by the implemented guidelines on treatment and prevention the last decade combined with the increased attention to overweight and obesity in lay and scientific press.

Thirdly, the influence of GPs task perception on noticing patients' overweight and guidance of treatment is in agreement with earlier research^{11,25–27} with regard to LISREL models and also in agreement with other earlier studies^{12,14} and considerably increased in 2007 compared to 1997. The more GPs perceive treatment of overweight as part of their task the more likely it is that they will guide and treat their overweight patients. Therefore, it is advisable to make the care-related prevention of overweight and obesity one of the central tasks of GPs as part of the treatment plan of obesity related morbidity.

Fourthly, attitude regarding the treatment of overweight had a lower direct influence on noticing patients' overweight and guidance of treatment, and in addition, it influenced lack of skills to treat overweight negatively (new path). It may mean that a more positive attitude towards treatment of overweight may lead to the experience of better skills or to be motivated to acquire these skills to cope with the practical challenges in the treatment of overweight in 2007. Having skills is important for GPs to be able to efficiently treat and guide obesity, considering the given time pressure.

A new (negative) influence of lack of skills to treat overweight emerged on the dependent variable in 2007. Focusing on a more positive attitude may be one way of reducing the perception of lacking of skills. Another way is educating GPs more extensively about nutrition and obesity and providing them with skills and materials like the minimal intervention strategy (MIS). The MIS is a Dutch initiative, which provides GPs with practical

tools to signal and treat overweight and proved to be useful in daily practice in a pilot study.³⁰

Finally, our society needs developments and strategies with a positive influence on GPs noticing patients' overweight and guidance of treatment to help combat overweight/obesity.

The development of multidisciplinary and monodisciplinary guidelines is probably the most motivating factor for the attitude towards the diagnosis and treatment of overweight/obesity. The same applies for questions around skills and practice facilities like a primary care network with dieticians, psychotherapists and psychologists as well as special interest into childhood obesity.¹⁶ Truswell *et al.*³³ concluded that effective nutrition interaction between family doctors and patients is possible, be it under a number of circumstances. GPs need strategies to overcome their barriers, need evidence-based medicine and access to the best (most up-to-date) dietary guidelines. In addition, GPs should consider their nowadays more egalitarian and better informed patients as partners.³⁴ Both GPs and patients need to be empowered in nutrition communication.³⁵ GPs should assess the patients' motivation to change in order to be successful in nutrition guidance.³⁶ Other possible strategies are creating supportive environments for nutrition guidance, by striving towards a synergy between Primary Care and Public Health,³⁷ creating an alliance between Primary Care and Public Health to be really effective in weight management, including community interventions,³⁸ the GP acting as a spider in the web with allied forces,³³ the establishment of a policy on obesity and the development of a minimal intervention strategy.³⁰

Conclusions

The hypothesis that the mechanism of action of determinants of noticing patients' overweight and guidance of treatment by GPs was the same as in 1997 had to be rejected. The working mechanism had changed between 1997 and 2007.

This analysis shows both similarities and differences in working mechanism of determinants of noticing patients' overweight and guidance of treatment between 1997 and 2007. The similarity is in the backbone of the mechanism with four predisposing factors, in agreement with earlier research.^{11,25–27} The difference lies in the number of driving forces and of paths through intermediary factors. This deserves special attention in the strategies to make GPs more effective and provides an important lead for future research (in particular regarding the task perception of GPs). The longitudinal character of this article gives a strong practice-based evidence for weight management by GPs. Therefore, the planning of interventions to improve this nutritional guidance practice of GPs can be based on these results with confidence.

Declaration

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Ethical approval: Approval of the research protocol by the Scientific Assessment Committee of Mانشolt Graduate School of Social Sciences, Wageningen University (6-06-2009), which at that time also acted as Ethics Committee.

Conflict of interest: none.

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