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Patient Satisfaction with the General Practitioner: A Two-Level Analysis

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ABSTRACT

Objectives. The authors examine how patient satisfaction with health care providers relates to either the individual characteristics of respondents or the characteristics of health care providers and the structural setting in which they work.

Methods. Measures of three dimensions of patient satisfaction with the general practitioner (GP)-accessibility, interpersonal relationship, information given-were derived from an existing data set. Patients were nested with GPs. Multilevel analysis was used as the analyzing technique.

Results. Between 90% and 95% of the variance in patient satisfaction scores is at the patient level, whereas the remaining 5% to 10% is at the GP or practice level. At the patient level, in addition to the usual predictor variables such as age and morbidity, which explain approximately 5% of the variance at this level, previous experiences with the general practitioner in the form of misunderstandings or incidents may play an important role in the emergence of dissatisfaction among patients.

Conclusions. This study demonstrated the usefulness of multilevel analysis in studying patient satisfaction scores. Findings indicate that the effectiveness of strategies directed at health care providers or services and aiming to improve the quality of care through the patient's eyes can be questioned when these strategies are based on general satisfaction scores only. More attention should be paid to the interaction process between patient and GP.

Patient satisfaction plays an important role in a continued use of medical services,¹ in maintaining relationships with specific providers,² and in compliance with medical regimes and treatments.³⁻⁵ Apart from that, patient or consumer satisfaction with health care services is considered to be of paramount importance with respect to quality improvement programs

from the patients' perspective, total quality management, and the expected outcome of care.⁶⁻¹² In this respect, patient satisfaction studies can be used to supplement medical audit programs.¹³ However, the relevance of patient satisfaction studies is also questioned on the basis of conceptual and operational problems.¹⁴

Conceptually, most researchers regard patient satisfaction as a function of expectations and experiences of the users of health care facilities.¹⁵⁻²¹ For instance, the Patient Satisfaction Questionnaire developed by Ware et al ^{22,23} is based on the idea that different characteristics of providers and medical services influence patient satisfaction scores, and that patients develop distinct attitudes toward each of these characteristics. Differences in patient satisfaction are due in part to individual preferences and attitudes toward health care and the health care delivery process, and in part to external circumstances, such as practice setting or the way health care services are organized. However, the role of previous expectations and general values of patients with respect to health care services also has been questioned.^{4,24} Despite this more or less uniform conceptual model, very few studies elaborate on the distinction between expectations and experiences. Most studies are empirical and "data driven,"²⁵ focusing on patient satisfaction scores as the predictor variable for subsequent behavior or as the outcome variable for evaluating health care services and the behavior of health care providers.

Compared with the enormous amount of patient satisfaction studies that link predictor variables at the patient level to differences in patient satisfaction, the number of studies relating quality of care scores to more objective measures of service delivery or to perceived differences between care providers is relatively small. Hall et al ²⁶ carried out a meta-analysis on 41 observation studies in which the working style of health care providers was related to three outcome variables including patient satisfaction. Patient satisfaction was related to (a) objective measures of information giving, (b) technical and interpersonal competence, (c) provider's partnership building (which refers to a provider's efforts to elevate the patient's status within the relationship and to increase the likelihood of patient participation) and (d) social emotional behavior, such as a provider's nonverbal behavior, social conversation, and positive talk. Starting at the other end of the line, De Bakker found that general practitioners (GPs) with relatively high percentages of satisfied patients see more patients a day, have more doctor-patient contacts that last longer than 10 minutes, carry out more physical and blood examinations, give more information on complaints and health in general, refer more often to other primary care professionals, and prescribe less medicines.²⁷ In studying the relationship between patient evaluation of care and status-characteristics of the provider in the United States, Ross et al ²⁸ found patients being more satisfied with a middle-aged, male physician, of high socioeconomic Protestant or Jewish background. With respect to providers' experience, Hall and Dornan ²⁹ carried out a meta-analysis that revealed a negative relationship between patient satisfaction and physician experience. Finally, Steven and Douglas ³⁰ found that patient dissatisfaction was relatively high in large practices and low in duo practices, whereas solo-practices occupied an intermediate position, suggesting that the relatively poor performance of group practices may be related to the length of waiting times at the surgery and the accessibility of the health care setting.

Until the 1970s, patient satisfaction studies focused mainly on satisfaction playing a mediating role in the way people experience their own health. Since then, satisfaction scores are being considered as a useful instrument to evaluate the functioning of health care facilities and to improve the perceived quality of care (B Williams, unpublished data, 1992).³¹ Implicit in this argument is that patients have a common idea about how health care facilities should operate, and that key variables to improve the quality of such facilities can be found in the structure of these facilities or in the characteristics of the health care professionals who run these services. Whether differences in patient satisfaction scores have to do with individual differences between respondents or with differences on the supply side of the health care system, remained unclear. From a methodological point of view, a

conclusion in this respect can only be valid when based on a data set that resembles the actual hierarchical structure within society, with patients or clients being grouped within different health care settings or health care providers. The absence of a direct link between two or more levels in most data sets makes it difficult to distinguish the relative contribution of each level to the variability in satisfaction scores. Our first research question refers to this subject.

1. To what extent are differences in patient satisfaction scores related to

- Individual characteristics of the respondents (patient-level);
- Characteristics of health care providers and the setting in which they work (GP-level); or
- A combination of both types of characteristics (cross-level interactions)?

The second objective of this article is to examine which role previous experiences and fulfillment of expectations play in the assessment of patient satisfaction scores. In their study on the relationship between the fulfillment of patient requests in clinical encounters and patient satisfaction, Like and Zyzanski [32](#) conclude that meeting patients' requests increased patient satisfaction with the encounter. At least 20% of the variance in patient satisfaction scores could be attributed to request fulfillment. Combining the results from research of literature on consumer equity and literature on patient satisfaction, Swan et al [33](#) found overall satisfaction with hospital services being directly related to the fulfillment of expectations concerning performance and equity, which are, in turn, influenced by attribute level performance. Finally, Gauthier [34](#) analyzed the level of satisfaction of clients, who participated in a government residential rehabilitation program, in accordance with the Multiple Discrepancies Theory framework published by Michalos.[35](#) The main conclusions from this study are that the relationship between satisfaction and objective indicators is weak, that there is an erosion of subjective satisfaction over time, and that expectation indicators are three times as powerful in explaining satisfaction than are objective conditions. Although expectations are difficult to measure in a valid and reliable way because they tend to shift over time owing to previous experiences and memory effects (for which reason their relationship with client satisfaction scores is often questioned [4](#)) we believe that looking at previous experiences, in this case incidents or unmet expectations, helps us to gain a valuable insight into possible explanations for dissatisfaction. Our second research question is, therefore:

2. Given the hierarchical structure of data sets in which patients satisfaction scores are the dependent variables, what factors are related to differences in patient satisfaction scores and what role do previous experiences play?

To answer our two research questions we will use secondary analysis of a data set that focuses on the work of the Dutch general practitioner. We will restrict ourselves to three dimensions of patient satisfaction: accessibility, humaneness, and informativeness.[29,36,37](#) We will look at the three dimensions separately, using a multilevel analysis (MLA) approach [38](#) instead of the traditional disaggregated- and aggregated-regression approach. Our choice for MLA was based on three arguments. First, MLA offers more precise estimates of the regression coefficients and their standard errors and subsequently reduces the risk of atomistic or ecological fallacies.[39](#) Second, MLA allows for interactions of variables on different levels (so called cross-level interactions) being modeled in an elegant way. Third, MLA allows for meaningful division of the total variance of patient satisfaction scores into a component at the patient level and a component at the GP level.[40](#)

THE DATA SET

In 1987-1988 a nonproportional, stratified sample of General Practitioners, randomly chosen from all 5,826 GPs practicing in the Netherlands in 1987, recorded all patient contacts during a 3-month period and answered a written questionnaire. These data were

collected as part of the Dutch National Survey of General Practice.⁴¹ In the same cross-sectional study, a random sample of patients of each participating GP was asked to fill in a health interview form. Sample size was set at 100 patients per GP. In total, 161 GPs participated in this study and with 13,014 health interviews completed the response rate for the interviews was 81%. With patients being nested with GPs, this two-level data set provides us with the necessary link between the GP level and the patient level.

The dependent variables are three different aspects of patient satisfaction with the GP. These are: (1) accessibility and availability of care, (2) patients' perception of the humaneness of the GP, and (3) patients' perception of the amount of information given by the GP. The three dependent variables were measured using Likert-type items that were combined into three scales, as suggested by Cassee⁴² and Foets & van der Velden.⁴³ Reliability coefficients, as presented in [Table 1](#), are weak to moderately high. Scores on the original scale items are presented in [Appendix A](#).

The selection of independent variables, in addition to them being available in the original database, took place on the basis the existing literature about patient satisfaction. Predictor variables on the patient level include respondent's age, morbidity status, gender and the dummy variable whether or not there are children in the family. Age(in years) and morbidity status meet both criteria. Morbidity measures include the subjective health status as perceived by the respondents themselves, as well as measures for the number of chronic diseases and psychosocial complaints a patient reported. Younger and less healthy people are believed to be less satisfied with the GP.^{36,44} The variable of whether or not there are children in the family is included because of its supposed relevance for the use of health care facilities in general and the accessibility of health care facilities in particular. Gender is included because of possible cross-level effects with respect to the same GP characteristic.

Predictor variables on the GP or practice level include personal characteristics of the GP (gender, age, number of years working as a GP, degree of urbanization of the practice location), scale scores measuring the GP's attitude toward prescribing medicines and toward democratic rights for patients, number of technical interventions, contacts with information given, and referrals to medical specialists per 1,000 patients, and variables characterizing the practice organization (listsize, the availability of a open consultation hour, length of time between the moment an appointment is made and the actual visit takes place, completeness of the set of instruments at the GP's disposal, and the type of practice).

Finally, information about previous experiences in GP-patient contacts was included in our data set by studying incidents, or possible doctor-patient conflicts. With reference to the accessibility of the general practice, approximately 10% of all patients report that they usually experience an average waiting time of more than 30 minutes when they visit their general practitioner, waiting time that was often considered of being too long. Also, between 15% and 20% of all patients report that there have been situations in which the general practitioner refused to take their problems seriously, refused to prescribe or prescribed medicines unnecessarily, or referred the patient unnecessarily to a medical specialist. Dummy variables represent whether or not patients (1) experienced prolonged waiting times, (2) felt not taken seriously by the GP, and (3) experienced the refusal/unnecessary prescription of medicines or referrals. The three dummy variables on incidents are based on self-reported incidents, as seen through the eyes of the patient. Prolonged waiting time (P INCID1) refers to the average doctor-patient contact, and also the two other variables (P INCID3 and P INCID2) do not refer to a specific time frame ("has it ever occurred that the general practitioner....?").

From the original data set, comprising the results of the 13,014 interviews, three separate data sets were compiled, each including scores on one of the three dimensions of patient satisfaction selected. The three data sets include patient satisfaction scores with respect to the accessibility of general practice (ACCESS), the amount of information given by the general practitioner (INFORM), and the humaneness of the general practitioner (HUMANE). The number of level 1 (patient) units and level 2 (GP) units is different for the three data sets.

The ACCESS-data set consists of 4,111 level 1 (patient) units and 151 level 2 (GP) units. The INFORM data set consists of 4,329 level 1 (patient) units and 152 level 2 (GP) units. The HUMANE data set has 6,275 level 1 (patient) units and 152 level 2 (GP) units. Compared with the original data set with the results of 13,014 interviews with patients from 161 general practitioners, this means a large reduction in sample size. First of all proxy interviews, mainly conducted with patients not yet having reached the age of 15, were omitted from the data set because these answers reflect the ideas of the parents rather than those of the responding child. Secondly, all patients with missing values on one of the statements used to calculate the relevant patient satisfaction scores were removed from the data set. Because the number of scale-items varied between each of the three scales, the number of patients removed from our analysis because of missing values on one or more of the scale-items also varies between the three data sets. Finally, only included data were included of which it was absolutely sure that the level 1 (patient) units were linked to the level 2 (GP) units. Patients enlisted with GPs working together in duo practices, group practices, and health centers, cannot always be linked to one specific GP. When there was uncertainty about the linkage between individual GPs and patients, these data were removed from the analyses. Applying the three selection criteria to our original sample, resulted in a data set with data referring to 151 or 152 GPs (instead of 161), whereas the number of patients varies between 4,111 and 6,275 (instead of 13,016). We believe this reduction in sample size, based on methodological reasons, does not hamper the generalizability to all Dutch GPs and allows us to answer our research questions in a way that is sound from a methodological point of view. Dependent and predictor variables, when relevant with the mean values and standard deviations, are summarized in [Table 1](#).

[TABLE 1]

MULTILEVEL MODELS

Multilevel analysis can be regarded as an extension of generalized linear models, and offers the opportunity to explain differences in the dependent variable by introducing independent variables from different levels in a statistically sound way.⁴⁰ Multilevel analysis has been developed in educational research ³⁸ and also has been successfully applied in health care research.⁴⁵ For our study, parameters to explain differences with respect to the three dimensions of patient satisfaction were estimated on the basis of a series of two-level models, using ML3,⁴⁶ as our standard package. Although only the final outcomes of the analyses will be presented in tables, some basic information about this analyzing technique is necessary for a better understanding of these results.

The simplest two-level model [1] often is referred to as the "null model" as no predictors are specified. The model is equivalent to a one-way analysis of variance with random effects. [Equation\(1\)](#)

The random part is put between parentheses. The subscript "i" refers to the ith level 1 (patient) unit, the subscript "j" refers to the jth level 2 (GP) unit, and Y refers to the dependent variables: the satisfaction scores. In our case the fixed part of the model- $[\tau]_{00}$ -represents the grand mean of patient satisfaction scores. The terms $[\epsilon]_{ij}$ and μ_{oj} represent the random components for the patient level effect and the GP level effect. Where $[\epsilon]_{ij}$ is the variance around the grand mean, intercept, due to between-patient differences, and μ_{oj} is the variance around the grand mean, intercept, due to between-GP differences. These two random components are assumed to be normally distributed and uncorrelated, with a mean of 0 and variances $[\sigma]_{\mu}^2$ and $[\sigma]_{[\eta]}^2$ respectively.

In our analyses, we included predictor variables from both levels. The extended model [2] is now, in general, as follows: [Equation \(2\)](#)

In the [2] model the variability in satisfaction scores (Y_{ij}) is seen as a function of both patient predictor variables X_q ($q = 1 \rightarrow Q$), and GP predictor variables W_r ($r = 1 \rightarrow R$). To enhance the interpretability of the regression coefficients, we centered the level 1 (patient) variables around the group (GP) mean before estimating the model. The intercept now represents the average patient satisfaction score, and the group means are included in the model as a level 2 (GP) variable to control for differences in the patient population of GPs.⁴⁷ To identify predictor variables with a significant fixed effect on differences in patient satisfaction scores, we divided the estimated coefficients by their standard errors that resulted in estimated t values. Estimated t values of 1.96 or more are significant on a $P < 0.05$ level. The random parameters should not be tested in this way.⁴⁰

A sequence of multilevel models can be compared on the basis of the proportion of explained variances, compared with the so called "null" model, or any other model preceding the one that is being tested. Differences in the modeled variance indicate how much better a model can account for the variance in the data at a specific level.⁴⁸ The proportion of variance explained is calculated by the formula $(R^2_n - R^2_f)/R^2_n$, with R^2_n being the modeled variance for the "null" model [A] and R^2_f being the modeled variance for the fitted model as represented in [B]. At the second level, $R^2 = [\text{varepsilon}]_{ij}/n + \mu_{oj}$, with $[\text{varepsilon}]_{ij}$ being the variance at level 1, μ_{oj} being the level 2 (GP) variance, and n being a representative estimate for the number of patients per GP. In our analysis we used the harmonic mean as an estimate. Likewise, the modeled variance at the patient level can be assessed by comparing the level 1 (patient) variance estimates of the "null" and final models, for level 1 $R^2 = [\text{varepsilon}]_{ij} + \mu_{oj}$.⁴⁸

The proportion of level 2 (GP) variance compared with the total variance is calculated by the formula: $[\rho] = \mu_{oj}/([\text{varepsilon}]_{ij} + \mu_{oj})$, and is called "intraclass correlation coefficient." This intraclass correlation is the percentage of the total variance, in the patient satisfaction scores, which is due to between GP differences. One minus the "intraclass correlation" gives the proportion of variance at level 1 (patient).

[Appendix A](#) shows that the dependent variables are highly skewed, and therefore one should inspect the residuals for deviation from normality. In our analysis residuals were compared with normal scores, with residuals being distributed more or less normally.

[EQUATION 1] AND [EQUATION 2]

RESULTS

In [Table 2](#) parameter estimates and t values are presented for each of the predictor variables included in the analyses of differences in patient satisfaction with the accessibility of general practice, the humaneness of the general practitioner, and the amount of information received by the patient during a doctor-patient contact. Also included in the table are parameter estimates and estimated t values for a series of variables representing the mean scores at the GP-level for patient variables. By including these variables we can establish whether there are differences in the practice population of the GPs with respect to the relevant patient characteristics, which possibly influence the satisfaction scores for each GP. In the remainder of this article we will refer to these variables as "aggregated patient variables."

Three out of seven patient characteristics included in the model used to explain differences in patient satisfaction with the accessibility of general practice have an independent effect that exceeds the 0.05 significance level. Older patients, patients with relatively few psychosocial problems and patients having no or relatively few chronic problems are more satisfied with the accessibility of general practice than are younger patients and patients with high morbidity scores on the psychosocial complaints and chronic diseases. Of the 16 GP or practice characteristics included in the analysis, only one has a significant effect on patient satisfaction. If the practice organization is such that patients can make an appointment to see

the doctor the very same day, this fact is associated with a higher percentage of satisfied patients. There is also one aggregated patient variable effect, which indicates that some of the differences in patient satisfaction scores are related to a different practice population as regards the number of patients with (self-reported) psychosocial complaints. All other variables included in this two-level model do not reach the $P < 0.05$ significance level.

With respect to differences in patient satisfaction scores regarding the "humaneness" of the general practitioner, we find four significant effects on the patient level, four significant effects on the GP-level and two significant aggregated patient-level effects. Higher patient satisfaction scores for the affective behavior or "humaneness" of the GP are associated with less (self-reported) psycho-social complaints, less (self-reported) chronic diseases, the presence of children in the family, older patients, a more positive attitude of the GP toward the democratic rights of patients, and a relatively high rate of (self-reported) information, prescriptions, and referrals per 1,000 doctor-patient contacts. The aggregated patient level effect indicates that a higher average number of female patients per GP and a greater number of psychosocial complaints have a small but significant effect on the level of patient satisfaction with the humaneness of the general practitioner.

The third multilevel model, focusing on patient satisfaction with the information received during a visit to the general practitioner, indicates that again there are four significant effects on the patient level, five significant effects on level 2 (GP), and two significant effects on the aggregated patient level. At level 1 (patient), higher scores on the "informativeness" dimension of patient satisfaction are associated with older patients, better (self-reported) overall health condition, less (self-reported) psychosocial complaints, and less (self-reported) chronic diseases. At level 2 (GP or practice), such higher patient satisfaction scores are associated with a more democratic attitude of the GP, a more positive attitude of the GP toward technical skills, a higher prescription rate per 1,000 patients, and a higher (self-reported) information and referral rate per 1,000 patients. Finally, the two effects at the aggregated patient-level indicate that between GPs there are differences in the patient mix of their practice population regarding gender and the number of psychosocial complaints, which differences are related to patient satisfaction with the amount of information received from the GP.

For each of the three dimensions of patient satisfaction, no statistical evidence was found indicating that there are cross-level effects for gender and age. Satisfaction scores of female patients for female GPs do not differ significantly from the satisfaction scores of female patients for male GPs. Also, controlling for other factors included in the analysis, male patients are not more satisfied with male GPs than with female GPs. The hypothesis that there is a cross-level interaction between the GPs' and patients' ages has to be rejected too. For this additional analysis, GPs and patients were divided over two categories: patients who differ more than 20 years in age with their GP and patients who differ less than 20 years in age with their GP. Satisfaction scores of patients who belong to the group differing more than 20 years in age with their GP do not differ significantly from satisfaction scores given to GPs who belong to the patient's age group. Parameters for these (and other) cross-level interactions were, therefore, not included in the models tested in [Table 2](#).

[Table 3](#) presents an overview of the estimated variances for the "null" (no predictor variables) models and the applied (with all the predictor variables) models. If the variances given in [Table 3](#) are entered in the formula for calculating the intraclass-correlation (see the previous paragraph on multilevel modelling), the percentage of unexplained variance at level 2 (GP) for the applied model on patient satisfaction with the accessibility of the GP is $(0.282) \times 100 / (0.282 + 4.070) = 6.5\%$ of the total variance. So 93.5% can be labelled as variance on level 1 (patient), while the remaining 6.5% is due to differences on level 2 (GP).

On the level 1 (patient), the applied MLA model, for accessibility scale, explained $([4.198 + 0.462] - [4.070 + 0.282]) \times 100 / (4.198 + 0.462) = 6.6\%$ of the total variance due to between patient differences (level 1 variance). At level 2 (GP) the amount of variance explained by the variables included in our analysis is $([4.198 / 18.597 + 0.462] - [4.070 / 18.597 + 0.282]) \times$

$100/(4.198/18.597 + 0.462) = 27.2\%$. Estimated variances for the two other dimensions of patient satisfaction show similar results. For "humaneness," 96.7% of all variance can be found at level 1 (patient) and 3.3% at level 2 (GP). For patient satisfaction scores regarding the amount of information received from the GP, the corresponding percentages are 95% at level 1 (patient) and 5% at level 2 (GP). The estimated variances on which these percentages are based can be found in [Table 3](#), together with the amount of variance in patient satisfaction scores explained by the variables included in the two-level models. For all three models, the percentages of variance explained by the variables included in the model are low.

The variables included in the two-level models applied to our data sets so far were selected on the basis of their relevance in the literature about patient satisfaction and the quality of care from the patients' perspective. Although we were able to establish some significant relationships between independent variables on the patient and GP levels and patient satisfaction scores, the fit of these models is insufficient. Especially on the patient level, where 90% or more of all variance in our satisfaction scores can be found, the two-level models fit badly. Generally speaking, less than 10% of the variance at the patient level is explained by the independent (predictor) variables included in the model. At the GP-level the models performed, in all the three cases, better and were able to bind around 25% off the total variance at this level.

We may safely conclude that other variables are needed to gain a better insight into the way patients judge their general practitioners. Such variables, derived from the interaction process between general practitioner and patient, are doctor-patient misunderstandings or conflicts. Incidents like these are seldom, but when they occur they leave a clear mark on the overall satisfaction scores of patients, as is illustrated by the results presented in [Table 4](#). In addition to information about whether or not patients had experienced such incidents, a selection of predictor variables as presented in [Table 2](#) was included in our analyses, with significance or theoretical relevance serving as selection criteria.

When we look at the differences in patient satisfaction with the accessibility of general practice, we find that level 2 (GP) variables included in the model explain 35.6% of the variance on this level. On level 1 (patient), 13.2% of all variance due to differences between patients is explained, as can be seen in [Table 5](#). All three variables with information about incidents that took place in the past have an independent effect on almost all three patient satisfaction scores. Information about the length of the time spent in the waiting room before a consultation has the strongest effect, but also information about the occurrence of the two other types of incidents affects patient satisfaction scores for the accessibility of the general practice. According to the patients' reports, satisfaction scores are significantly lower when such incidents have occurred.

Prolonged waiting times before consultation are hardly related to the scores for the other dimensions of patient satisfaction. Here, the fact whether or not incidents have occurred that gave patients the impression that their problems were not taken seriously, has the strongest effect on the satisfaction level. Where such incidents are reported, and also where incidents about prescriptions or referrals have occurred, patient satisfaction scores for both the humaneness of the GP and the information received during consultations are significantly lower.

At level 2 (GP), 42.2% and 43.7% of the variance due to between GP differences in satisfaction scores for informativeness and humaneness is explained by the variables included in the analyses of which the results are presented in [Table 4](#). At level 1 (patient), corresponding percentages of the variance explained are approximately 21.9% for the variances in humaneness-scores and approximately 26.6% for the variance in scores for the amount of information received by patients.

[TABLE 2], [TABLE 3], [TABLE 4] AND [TABLE 5]

CONCLUSIONS AND DISCUSSION

We started this article about patient satisfaction with the Dutch general practitioner by formulating two research questions. Our first, methodological, question referred to whether it would be possible to use the hierarchical structure of an existing data set by dividing the variance component in patient satisfaction scores into two parts: one component that refers to all variance in satisfaction scores on the level of individual patients, whereas the other component refers to the level of the general practitioner or general practice. The general idea behind this methodological exercise is that information about the relative importance of each component is essential for the effectiveness of a policy toward quality improvement and Total Quality Management from the patients' perspective. Our second research question refers to the predictor variables that would make such a policy work. For answering the two questions a two-level analysis approach was used to account for the hierarchical structure of our data set.

With respect to the variance in patient satisfaction scores concerning the Dutch GP, between 90% and 95% of the total variance in patient satisfaction scores is at the patient level, and the remaining 5% to 10% is at the GP or practice level. This result casts serious doubts on the effectiveness of strategies directed at the GP or practice level with the aim to improve the quality of care in general practice as seen from the patient's perspective. Dissatisfaction is, as our analyses show, most of all "between the ears" of the patients and can only for a very small part be related to practice characteristics or GP characteristics. Maybe improvements in the way the practice is organized or the particular working style of the GP will result in somewhat less dissatisfaction among certain groups of patients, but on the other hand other patients satisfied with the way everything is functioning right now might become dissatisfied after these "improvements." However, one should keep in mind that the percentage of dissatisfied patients is relatively low for various reasons. On a national level the quality of care in the Netherlands is, as in most other industrialized societies, relatively high. General practitioners are highly trained and well equipped professionals and therefore "being satisfied with your GP" can be considered as being the standard. When dissatisfaction occurs, there is always the possibility to change to another GP, although the number of patients that move from one GP to another is quite low. If a dissatisfied person decides not to change from one GP to another, one of the options to resolve cognitive dissonance is to reformulate one's opinions about that particular GP. Finally, one should be aware of the fact that this "modest" variance at the GP level could be the result of the general way in which patient satisfaction was measured. If patient satisfaction or quality of care from the patients' perspective is measured in a more specific way, for instance by asking patients from specific morbidity categories about the treatment received with respect to this morbidity, this could result in much larger differences between GPs, and hence greater variance might be found on the GP-level.

Given the results of numerous satisfaction studies, it is hardly surprising that differences in satisfaction scores on the patient level are difficult to explain when the common independent variables are added to the multilevel model. As usual, patient age and morbidity indicators have significant effects, but these variables explain only approximately 5% of the variance on the patient level. At the GP or practice level, the percentage of variance that can be explained varies between 25% and 30% for each of the three dimensions of patient satisfaction. Working style and attitudes of the GP are related to satisfaction scores concerning the amount of information received by the patient and the patient's perception of the GP's humaneness. Practice characteristics have a limited effect on patient satisfaction, with only the possibility to make an appointment for the very same day being positively related to the level of satisfaction with the accessibility of general practice. Other indicators,

such as type of practice, list size, and free consultation hour, but also sociodemographic variables such as age and sex of the doctor, do not have an independent effect on each of the three dimensions of patient satisfaction. Our findings can be regarded as an illustration of the Law of Preservation of Discontent, formulated by Verkruijsen ⁴⁹(p225) who stated that [...] The medical care people desire adjusts in such a way, that in a given population there are always 15% to 30% who are dissatisfied with their contacts with medical practitioners[...].

Also, we have not been able to identify any interaction effects between sociodemographic characteristics of patients and those of GPs on patient satisfaction scores. Satisfaction scores of female patients for female doctors do not differ from the scores of female patients for male doctors. The same holds for the age factor.

After we had concluded that even on the basis of multilevel analyzing techniques, differences in patient satisfaction with the general practitioner cannot be linked to social demographic and other patient characteristics, nor to GP or practice characteristics, an explorative analysis was carried out in which different forms of communication problems between patients and GPs were included as predictor variables in the model. The results of this analysis suggest that concentrating on the number and types of incidents between GPs and patients might be a fruitful method to gain an insight into factors that are possible causes for decreasing satisfaction. Questions like "Did your GP ever refuse to prescribe medicines?" or "Did you ever have the feeling that you were not taken seriously by your GP?" seem to be strong indicators of prevalent feelings of dissatisfaction. Not only the fact that such events have occurred, but also the number of incidents (ranging from "frequently" via "sometimes" and "hardly ever" to "never"), have a strongly significant effects on patients' satisfaction scores and explain between 10% and 30% of the variance on the patient level. Because these preliminary conclusions are based on a data set not designed for studying the problem of differences in patient satisfaction-the exact wording of the questions and the sequence in which these questions about the occurrence of communication problems and other incidents were asked, leave room for improvement-future research in this area will have to prove the value of these findings.

Our findings do show that to increase patient satisfaction more attention should be paid to the interaction process between patients and health care workers and especially to malcommunication, but perhaps also to other patient characteristics that so far have been largely neglected in health care research. Examples of such characteristics at the level of the individual users of health care facilities are personal medical history, the medical histories and experiences of relatives and friends, the role played by health care workers in these histories and the more general attitudes toward health care workers, the organization of health care facilities, and life in general. More attention for these types of variables might reveal that part of the dissatisfaction of the users of health care facilities is related to a more general satisfaction dimension. Persons who are in general rather dissatisfied, will also show greater dissatisfaction with the general practitioner, irrespective of other characteristics that influence the doctor-patient relationship. Improving the interaction process between patient and health care worker might also effect variables related to patient satisfaction, like compliance at the patient level.³⁻⁵

In this article we have successfully applied multilevel modeling techniques to explain differences in patient satisfaction with their GP, in a sense that we were able not only to confirm the findings of earlier patient satisfaction studies but also to discriminate between variables at different levels regarding their contribution to the percentage of variance explained. At the same time, because of the low predictability of the MLA models applied and the assumed independence of the three satisfaction scales we are warned that some of the small but significant effects may be caused simply by chance or misspecification, at the patient level in particular. This warning is further strengthened by additional multivariate analyses carried on the full data set, in which the three dimensions of patient satisfaction were considered to be part of an overall satisfaction score, allowing us to look at the

correlations between the three sub-scales for patient satisfaction on both the level of the individual patients and the GP-level. At the GP-level, patient satisfaction scores for the humaneness scale and the scale for the information given by the GP tend to be highly correlated, and on the patient-level the correlation between these two scales is moderate to high. The sub-scale with patient satisfaction scores about the accessibility of general practice is clearly covering a different dimension. General practitioners who get relatively high satisfaction scores for the amount of information given or for their attitude toward the patients, receive relatively low scores for the accessibility dimension (see [Appendix B](#)). These findings correspond with reality. General practitioners who are appreciated for their emphatic behavior and who spend a lot of time explaining things and giving information to their patients, are probably the same doctors who tend to get behind schedule. Because of their attitude, these general practitioners will be highly valued by the consulting patient, but at the same time they will be given lower scores for accessibility by the same patient when the latter is faced with prolonged waiting times.

Multilevel analysis offered us the opportunity to divide the total variance into separate variance components on two different levels, and to find more precise parameter estimates for differences in patient satisfaction in a hierarchical data set. In doing so, we have limited ourselves to two-level analyses because of the structure of the data set. In principle, MLA also allows analysis at a third level or even a fourth level. A three-level analysis would be appropriate if there were several visits made by each patient, and with each visit being rated or evaluated by the patient. In such a three level analysis, the research question would be how much of the explainable variance is due to the visit/patient/GP components. A fourth level analysis would be appropriate if for example groups of GPs, working together in health centers or group practices, have developed a common workstyle toward the treatment of patients. In that case it would be relevant to look at the variance components at four levels: the visit level, the patient level, the level of the individual GP, and the group level.

However, the relevance of techniques like MLA for research in this area is of limited importance as long as a theoretical foundation behind the concept of patient satisfaction is missing. In a recent review article about measurement instruments for patient satisfaction and quality of care, one of the main conclusions concerned the almost complete absence of a theoretical framework behind most satisfaction scales developed so far.⁵⁰ Although most leading health care researchers in the area of patient satisfaction explicitly or implicitly regard patient satisfaction as a function of expectations and experiences,⁵¹⁻⁵³ measurement instruments that reflect this distinction between expectations and experiences are scarce. With most studies concentrating on the results-that is to say patient satisfaction, or rather patient dissatisfaction-instead of on the two basic components of the satisfaction concept, little progress is being made in what generally is understood to be the main function of "quality of care" research: quality assessment and improvement as seen from the perspective of the users of health care facilities. Here, a fruitful approach might be to link patient satisfaction or quality of care research among specific morbidity categories with research on consumer satisfaction with business services. Based on, for instance, the Service Quality Model of Parasuraman et al,⁵⁴ patient satisfaction as an indicator of good quality of care as seen from the patients' perspective can be defined as a set of individual, expectation-related judgments about different aspects of health care services. These aspects have in common that they are all regarded as important by the patient. The underlying assumption is the sequence: service delivered-service perceived-value judgment. In this respect a quality judgment on the basis of patient evaluation can be labeled as a cognitive reaction, whereas a quality judgment on the basis of "patient satisfaction" is an affective reaction.

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TABLES AND EQUATIONS

Table 1. Dependent and Independent Variables used to Explain Differences in Patient Satisfaction Scores with General Practitioners ($n^{\text{patient}} = 7659$; $n^{\text{GP}} = 152$)

Variables		Characteristics
Dependent Variables		
Access	Patient satisfaction with the accessibility of general practice; 4-items scale ($\alpha = 0.65$)	Mean: 15.2 (SD: 2.2)
Humane	Patient satisfaction with humaneness of the GP; 3-items scale ($\alpha = 0.81$)	Mean: 13.7 (SD: 2.1)
Inform	Patient satisfaction with information or advice given by the GP; 4-item scale ($\alpha = 0.78$)	Mean: 17.7 (SD: 3.1)
Independent Variables		
Level 1 (patient)		
Page	Patient's age, in years	Mean age: 41.9 (SD: 17.5)
P health	Perceived health status (5-point scale: poor to excellent)	Mean: 4.1 (SD: 0.7)
P socprob	Psychosocial complaints; 16 items on 5-point scale ($\alpha = 0.79$)	Mean: 0.15 (SD: 2.1)
P chroprob	Number of chronic diseases; 27 items sum-score	Mean: 1.1 (SD: 1.4)
P sex	Patient's gender; dummy (0 = male, 1 = female)	% female respondents: 47.8
P childfam	Children (< 15 years) in family; dummy (0 = no, 1 = yes)	% respondents: 34.1
P freqgp	Frequency of visits to GP; number of contacts per 3 months	Mean: 0.8 (SD: 1.2)
Level 2 (GP): Personal characteristics		
G age	GP's age, in years	Mean age: 42.3 (SD: 7.8)
G sex	GP's gender; dummy (0 = male, 1 = female)	% female GPs: 16.3
G exper	Number of years working as a GP	Mean: 11.8 (SD: 7.8)
G demoatt	Attitude patients' democratic rights; 7 items on 5-point scale ($\alpha = 0.75$)	Mean: 3.2 (SD: 0.57)
G techatt	Technical skills performed by GP; 11 items on 5-points scale ($\alpha = 0.77$)	Mean score: 2.9 (SD: 0.81)
G presatt	Attitude on prescribing medicines; 8 items on 5-points scale ($\alpha = 0.65$)	Mean score: 2.6 (SD: 0.52)
G inforate	Information given by GP, average number of contacts per 1000	502 (SD: 242.4)
G techrate	Technical interventions by GP, average number of contacts per 1000	84 (SD: 30.4)
G presrate	Medicines prescribed by GP, average number of contacts per 1000	509 (SD: 94.8)
G refrate	Patients referred to specialist, average number of contacts per 1000	55 (SD: 15.7)

Table 1. (Continued)

Variables		Characteristics
Level 2 (GP): Practice setting		
G practype	Type of practice (1 = single, 2 = duo, 3 = group, 4 = health center)	34.2%, 37.3%, 18.4%, 10.1%
G urban	Practice location (1 = rural, 2 = semi-rural, 3 = city, 4 = large city)	37.7%, 38.9%, 17.1%, 6.3%
G listsize	Personal listsize of GP	Mean: 2006 (SD: 749.0)
G conshr	Consultation without appointment possible; dummy (0 = no, 1 = yes)	% yes: 38.6
G instru	13 instruments available within practice; sum score on 0-1 scale	Mean: 6.4 (SD: 0.15)
G conssp	Appointment on the same day possible; dummy (0 = no, 1 = yes)	% yes: 84.2
Level 1 (patient): Patient's previous experiences		
P incid1	Waiting time usually > 30 minutes; dummy (0 = no, 1 = yes)	% yes: 8.2
P incid2	Not taken seriously; dummy (0 = no, 1 = yes)	% yes: 16.6
P incid3	Disagreement about prescription/referral; dummy (0 = no, 1 = yes)	% yes: 19.8

GP, general practitioner; SD, standard deviation.

Equation 1

$$Y_{ij} = \gamma_{00} + (\mu_{0j} + \varepsilon_{ij})$$

Equation 2

$$Y_{ij} = \gamma_{00} + \gamma_{10}X_{1ij} + \gamma_{20}X_{2ij} + \dots + \gamma_{q0}X_{qij} + \gamma_{01}W_{1j} + \dots + \gamma_{0r}W_{rj} + (\mu_{0j} + \varepsilon_{ij})$$

Table 2. Multilevel Analysis of Differences in Patient Satisfaction with Accessibility, Humaneness, and Information of the General Practitioner: Regression Coefficients and t Values

	Accessibility		Humaneness		Information	
	Coefficient	t	Coefficient	t	Coefficient	t
Fixed Part						
Intercept	16.13		10.13		13.28	
Level 1 (patient)						
P age	0.017	7.40*	0.016	8.81*	0.023	7.53*
P sex	0.126	1.95	-0.081	1.52	-0.075	0.80
P health	0.058	1.10	0.041	0.96	0.150	2.05 [‡]
P socprob	-0.097	5.83*	-0.127	9.81*	-0.114	5.19*
P chroprob	-0.079	2.83 [‡]	-0.052	2.29 [‡]	-0.163	4.32*
P childfam	-0.099	1.38	0.156	2.62 [‡]	0.106	1.00
P freqgp	0.011	0.41	0.044	1.90	0.074	1.95
Level 2 (GP)						
G age	-0.003	0.15	0.000	0.02	-0.006	0.19
G sex	0.105	0.50	0.183	1.13	-0.023	0.08
G exper	-0.011	0.46	0.004	0.26	0.015	0.50
G demoatt	0.101	0.81	0.276	2.93 [‡]	0.399	2.34 [‡]
G techatt	0.172	1.89	0.097	1.45	0.422	3.50*
G presatt	-0.086	0.62	-0.137	1.32	-0.061	0.33
G techrate	-0.000	1.21	0.003	1.52	0.003	0.91
G presrate	-0.001	1.92	0.001	2.38 [‡]	0.003	2.84 [‡]
G inforate	0.000	0.96	0.000	2.33 [‡]	0.001	2.22 [‡]
G refrate	0.000	1.00	0.007	2.04 [‡]	0.012	2.03 [‡]
G listsize	-0.000	0.53	0.000	1.74	-0.000	0.68
G practype	0.029	0.42	0.053	1.04	0.004	0.04
G conshr	-0.084	0.69	0.009	0.10	-0.086	0.53
G conssp	-0.446	2.76 [‡]	-0.065	0.53	-0.185	0.85
G instru	-0.696	1.42	0.185	0.50	-0.384	0.58
G urban	-0.155	1.65	0.116	1.70	0.218	1.87
Aggregated level 1 (patient)						
XP age	0.020	1.26	0.002	0.17	-0.015	0.70
XP sex	-0.074	0.13	1.059	2.15 [‡]	1.727	2.35 [‡]
XP health	0.010	0.03	0.176	0.49	0.001	0.00
XP socprob	-0.278	2.14 [‡]	-0.278	2.45 [‡]	-0.605	3.81*
XP chroprob	-0.242	1.04	0.257	1.18	0.001	0.00
XP childfam	0.213	0.42	-0.318	0.69	-0.314	0.44
XP freqgp	0.283	1.24	0.257	1.18	0.282	0.96
Random Part	See Table 3					

GP, general practitioner.

* $P < 0.001$.

[‡] $P < 0.01$.

[‡] $P < 0.05$.

Table 3. Estimated Variances and Standard Errors, Percent "Explained Variance," and Intraclass Correlations for Differences in Patient Satisfaction with the General Practitioner on the Basis of the Two-Level Model Specified in Table 2, Compared with the "Null Model"

	Estimated Variances (SE)		
	Null Model	Applied Model	% Explained Variance
Accessibility of GP			
Level 1, Patient (ϵ_{ij})	4.198 (0.0943)	4.070 (0.0914)	6.6%
Level 2, GP (μ_0)	0.462 (0.0737)	0.282 (0.0516)	27.1%
% variance at level 2, GP (intraclass correlation)	9.9%	6.5%	
Information given by GP			
Level 1, patient (ϵ_{ij})	9.080 (0.1985)	8.820 (0.1930)	5.6%
Level 2, GP (μ_0)	0.759 (0.1282)	0.465 (0.0917)	24.6%
% variance at level-2, GP (intraclass correlation)	7.7%	5.0%	
Humaneness of GP			
Level 1, patient (ϵ_{ij})	4.341 (0.0784)	4.198 (0.0758)	5.3%
Level 2, GP (μ_0)	0.242 (0.0411)	0.142 (0.0287)	26.3%
% variance at level 2, GP (intraclass correlation)	5.3%	3.3%	

SE, standard error; GP, general practitioner.

Table 4. Multilevel Analysis of Differences in Patient Satisfaction with the Accessibility, Humaneness and Information Given by the General Practitioner: Explorative Model, with Incidents Included

	Accessibility		Humaneness		Information	
	coefficient	t	coefficient	t	coefficient	t
Fixed Part						
Intercept	15.05		13.31		18.61	
Level 1 (patient)						
P age	0.015	7.29*	0.010	6.43*	0.013	4.80*
P sex	0.156	2.54†	0.014	0.28	-0.007	0.09
P socprob	-0.055	3.48*	-0.043	3.64*	-0.006	0.32
P chroprob	-0.071	2.90†	0.002	0.11	-1.290	4.13*
P incid1	-0.447	5.62*	-0.617	9.80*	-1.009	9.49*
P incid2	-0.514	6.04*	-2.097	31.10*	-3.406	29.82*
P incid3	-1.910	13.36*	-0.241	2.07†	-0.230	1.15
Level 2 (GP)						
G inforate	0.000	0.69	0.000	2.21†	0.000	1.59
G urban	-0.175	2.29†	0.024	0.44	-0.051	0.54
G demoatt	0.021	0.21	0.186	2.61†	0.316	2.55†
G presrate	0.002	2.57†	0.000	0.72	0.001	0.89
G sex	0.073	0.42	-0.009	0.07	0.044	0.19
Aggregated patient level						
GP age	-0.002	0.14	-0.016	1.74	-0.022	1.46
GP sex	-0.657	1.33	0.728	1.75	0.707	1.14
GP socprob	-0.221	1.87	-0.103	1.09	-0.144	1.03
GP chroprob	0.037	0.22	0.360	2.44†	0.077	0.34
GP incid1	-0.650	1.10	-1.561	2.81†	-1.455	1.77
GP incid2	-1.479	2.11†	-3.513	6.51*	-5.911	7.52*
GP incid3	-2.596	6.16*	-0.352	1.14	0.390	0.72
Random Part	See Table 5					

GP, general practitioner.

* $P < 0.001$.

† $P < 0.01$.

‡ $P < 0.05$.

Table 5. Estimated Variances and Standard Errors, Percent "Explained Variance" and intraclass Correlations for Differences in Patient Satisfaction with the General Practitioner on the Basis of the Two-Level Model as Specified in Table 4, Compared with the "Null Model"

	Estimated Variances (SE)		
	Null Model	Applied Model	% Explained Variance
Accessibility of GP			
Level 1, patient (ϵ_{ij})	4.108 (0.0913)	3.727 (0.0828)	13.2%
Level 2, GP (μ_0j)	0.462 (0.0725)	0.240 (0.0446)	35.6%
% Variance at level 2, GP (intraclass correlation)	10.1%	9.5%	
Information given by GP			
Level 1, patient (ϵ_{ij})	9.072 (0.2000)	6.872 (0.1510)	26.6%
Level 2, GP (μ_0j)	0.781 (0.1310)	0.359 (0.0710)	42.2%
% Variance at level 2, GP (intraclass correlation)	7.9%	5.0%	
Humaneness of GP			
Level 1, patient (ϵ_{ij})	4.298 (0.0785)	3.450 (0.0630)	21.9%
Level 2, GP (μ_0j)	0.260 (0.0429)	0.108 (0.0230)	43.7%
% variance at level-2, GP (intraclass correlation)	5.7%	3.0%	

SE, standard error; GP, general practitioner.

appendices

Appendix A. Scale Items and Answers of Respondents with Respect to the Three Satisfaction Dimensions (in Percentages)

	Always/ Usually	Sometimes	Hardly ever/ Never
Accessibility			
1. I can reach my GP (or his/her replacement) during the weekends and holiday periods.	89.3	5.1	5.6
2. I can reach my GP (or his/her replacement) during the evenings and nights.	90.0	4.7	5.3
3. My GP is willing to make a house call when I ask for it.	92.8	6.1	1.1
4. The time I have to spend in the waiting room is too long.	14.8	—	85.2
Humaneness			
1. My GP keeps patients at a distance.	9.5	8.7	81.8
2. My GP treat patients as objects.	4.1	4.0	91.9
3. My GP takes enough time to help solve my problems.	90.9	5.3	3.8
Informativeness			
1. My GP carefully explains what is wrong with me.	82.7	10.5	6.8
2. My GP carefully explains what to do, when I am ill.	87.0	7.0	6.0
3. My GP tells me exactly how serious my problems are.	86.5	6.9	6.6
4. I can discuss all my problems with my GP.	84.2	6.6	9.2

GP, general practitioner.

Level 2 (General Practitioner)	Accessibility	Humaneness	Information
Accessibility	1		
Humaneness	-0.15	1	
Information	-0.09	0.89	1
Level 1 (Patient)	Accessibility	Humaneness	Information
Accessibility	1		
Humaneness	0.14	1	
Information	0.21	0.52	1

Appendix B. Correlation Matrices for the Dependent Variables at Level 1 (Patient) and Level 2 (General Practitioner)

To get an idea of how well the three patient satisfaction scales can detect different aspects of patient satisfaction at the two levels, a multivariate multi-level analysis was performed.⁴⁶ In this analysis an extra level beneath the patient level was added, which contains the three scale measurements. In this design the three scale measurements are modeled as nested with each patient. The fixed part of this model is the same as that of Table 3, only the intercept is divided into three intercepts for every separate scale. The random part is different. At the lowest level the random part is empty because this level is a kind of dummy level and the variance at this level is of no interest to us. At the second, patient, level and the third general practitioner level we modeled a variance-covariance matrix for the three scales by using dummy variables to indicate every scale. This procedure is further elaborated in Woodhouse et al.⁴⁶ After estimating the model we got one variance-covariance matrix for the general practitioner level and one for the patient-level, on the basis of which we were able to calculate the following correlation matrices at both levels: Table