

Postprint Version	1.0
Journal website	http://linkinghub.elsevier.com/retrieve/pii/S0738399102002240
Pubmed link	http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=pubmed&cmd=Retrieve&dopt=Abstract&list_uids=14630381&query_hl=10&itool=pubmed_docsum
DOI	10.1016/S0738-3991(02)00224-0

Manipulation of patient–provider interaction: discussing illness representations or action plans concerning adherence

NICOLET C.M. THEUNISSEN^{B,*}, DENISE T.D. DE RIDDER^A, JOZIEN M. BENSING^{A,B}, GUY E.H.M. RUTTEN^C

a Department of Health Psychology, Utrecht University, Utrecht, The Netherlands

b NIVEL, Netherlands Institute for Health Services Research, P.O. Box 1568, Utrecht 3500 BN, The Netherlands

c Julius Center for General Practice and Patient-Oriented Research, University Medical Center, Utrecht, The Netherlands

* Corresponding author. URL: <http://www.ntheunissen.nl>.

ABSTRACT

According to Leventhal's Self-Regulatory Model of Illness, patients have ideas and action plans related to the management of their disease. The aim of this study is to examine whether ideas and action plans relating to hypertension change as a result of general practitioner's (GP's) discussing them during consultation, and whether these changed ideas and actions plans affect adherence. The study employed an experimental design, highlighting three conditions: (0) care-as-usual consultation; (1) discussing patient's ideas about their disorder; and (2) discussing patient's action plans. Ten GP-trainees performed care-as-usual consultations, were subsequently assigned to a training in either Condition 1 or 2, and performed the trained conversations. Hundred and eight patients with hypertension were consecutively assigned to the conditions, and completed questionnaires a week before, immediately after the consultation, and 1 month later. The training resulted in two new, feasible and different types of conversations that managed to affect some of the patient's ideas and action plans. It is concluded that the study provided GPs with a tool to discuss illness representations and actions plan of patients with hypertension. Implications for the management of hypertension adherence in primary care are discussed.

1. INTRODUCTION

For decades, adherence has been considered a topic of great interest in the medical world. In spite of all the efforts undertaken, studies on factors contributing to non-adherence have failed to identify strong determinants [1–3]. Traditionally, medical providers interpret adherence as patient's inability or unwillingness to follow medical advice [4]. As a result, when providers try to change patient's behavior, they mostly employ the ineffective strategy of providing medical information and emphasizing the importance of following the prescribed regimens, without explicitly discussing patient's views on this issue [5,6]. We propose that a theory-based approach to improve patient–provider communication about patient's views is relevant for improving adherence.

In this study, we employ Leventhal's Self-Regulatory Model of Illness [7,8] to explore which issues in patient-provider communication about adherence are relevant. This model consists of three stages. The first stage is the cognitive and emotional representation of a health threat by which the patient identifies the meaning of this threat, also known as 'illness representations'. Earlier studies have identified five domains of illness representations: identity (beliefs about disease label and associated knowledge), time line (beliefs about course), consequences (beliefs about effects of the disease), cause (e.g. beliefs about degree of personal responsibility), and control beliefs (for chronic diseases) or cure (for acute disease) [7,9,10]. A related aspect of illness representations concern people's beliefs about their medication, also known as 'medication representations' [11]. The second stage of the model concerns 'action plans' referring to the way patients act upon illness representations. Action plans relate to both 'action intentions' (the planning of a response) and 'actions' (executing a response by implementation of actions into one's daily routines, such as adhering to medical prescriptions) [12]. In addition, we distinguish 'action self-efficacy', or perceived self-efficacy to act upon action intentions [13,14]. The final third stage of the model relates to the appraisal of the outcome of the action plan. According to Leventhal, interaction between stages proceeds in both directions: a cognitive representation may result in a particular action plan, which may lead to certain appraisal, but equally the perceived outcome of the action plan may feedback to influence illness representations [7,8]. As a result, an intervention aiming at a particular stage may influence the entire Self-Regulatory Model of Illness.

In patient education literature, two approaches can be distinguished that emphasize factors similar to the Self-Regulatory Model of Illness. The first approach aims at mutual assumptions and mutual understanding between patient and provider to improve patient education [15,16]. The approach thus emphasizes the acknowledgement of individual differences in personal illness beliefs. The second approach refers to behavior-oriented instructions tailored to specific characteristics of the patient's medical regimen and his or her daily routines [4,15,17]. This approach thus emphasizes the acknowledgement of personal action plans. In many studies, both approaches have been used simultaneously without determining the relative influence of each approach [4,15,17-21], thus raising the question of whether both approaches are equally important [22,23]. Furthermore, although these two approaches in patient-education come close to the premises of the Self-Regulatory Model of Illness, it is unknown to what extent the physician allows for a discussion of patient views. Because physicians tend to dominate consultations, this could lead to physicians determining the agenda of the consultation [6,24]. In doing so, it is more likely that the physician's ideas about the patient's illness representations and action plans ideas are discussed, instead of the patient's representations themselves. According to a study in which 60 tapes of medical encounters between hypertensive patients and their health care providers were studied, physicians rarely discussed illness representations or action plans with their patients [12].

Until now, Leventhal's model has been often used to understand patient behavior but not for intervention purposes. Therefore, we conducted an experiment in which communication during medical consultations about illness representations or action plans was manipulated in two separate conditions. Hypertension was selected because it makes a strong appeal on the premises of the model. First, although hypertension is an asymptomatic condition, patients have been reported to act upon perceived symptoms to regulate their blood pressure. In addition, hypertension is a risk factor for life-threatening coronary heart disease, which makes it a constant source of anxiety. Hypertension is also a chronic condition requiring long-term adherence. Anti-hypertensive medication may have side-effects. Although adherence to medication can seriously reduce blood pressure levels, non-adherence may not result in increased blood pressure [2,25]. Finally, changes in life style habits (such as low fat diet, non-smoking and enhancing the amount of physical activities) can be effective in reducing blood pressure levels but are hard to achieve [26-28]. Previous studies have shown that patients' ideas and action plans relate to the way patients manage their disorders [7,29]. At the same time, there are indications that patient's ideas often differ from the ideas physicians hold, and that the patient's action plans are inadequate in the eyes of the physician. Not surprisingly, non-adherence to treatment recommendations for hypertension is estimated at 36% [3] or more [30]. Given the high prevalence of hypertension, the morbidity and mortality associated with this disorder, and the high levels of non-adherence to prescriptions, improving adherence in hypertension is of the greatest importance [2].

The aim of this paper is to study whether patient's illness representations and action plans change when general practitioner's (GP's) are trained to discuss one of these aspects. As stated before, it was expected that the patients illness representations and action plans are often incorrect and ineffective. Patients might realize this because of the discussion. It is hypothesized that discussing illness representations primarily affects illness representations while discussing action plans will affect the patient's action plans. Because the Self-Regulatory Model of Illness is a feedback loop model, it was theorized that an intervention aiming at a certain stage might influence the entire model. This implies that when illness representations are affected, also action plans may be affected, or vice versa. In addition, the relationship between possible changes in illness representations or action plans with adherence was studied.

Fig. 1 presents the relationship between the experimental conditions and the Self-Regulatory Model of Illness. The experiment consists of a control condition and two experimental conditions. Each condition consists of a 15-min conversation between a GP-trainee and a patient. The control condition (Condition 0) is a care-as-usual consultation. According to the literature, physicians mostly use a strategy of emphasizing the importance of following the prescribed regimen, and giving medical information [5,6].

[FIGURE 1]

Experimental Condition 1 is called "discussing illness representations". Illness representations often differ from practitioner's views of diseases [31,32]. It has been demonstrated that, when invited to do so, patients are willing to express their subjective views on illness, even when they consider them different from biomedical views (e.g. believing in supernatural causes of disease) [33]. Discussing views can lead to greater congruence between patient and practitioner. This is important because congruent views increase patient satisfaction, which is a factor believed to influence the intention to comply [34–36].

Experimental Condition 2 is named "discussing action plans" and is aimed specifically at the ability to plan and act upon goals related to adherence. Taylor and colleagues found that behavior-oriented instructions aimed at the process for *attaining* a health behavior goal was much more effective than instructions aimed at the health behavior goal itself [37]. According to goal setting theory, it is important to set specific goals instead of vague, non-quantitative goals, such as "do your best" [38]. Furthermore, a health care provider can assist by breaking up complex goals into a series of simpler goals [38]. At the same time, it is important that goals are set that are appropriate for the patient. Furthermore, determining the individual's self-efficacy for performing the behavior and including this into an advice has been recommended [38].

2. METHOD

2.1. Participants

Data were collected from 108 patients with essential hypertension who used anti-hypertensive medication. Twelve patients from the original 120 who gave informed consent, withdrew before the conversations took place (seven) or had to be excluded because of scheduling difficulties (five). Forty-one patients participated in Condition 0, 37 patients in Condition 1, and 31 patients in Condition 2. Fifty-nine percent were female, ages ranged from 26 to 89 years ($M = 59$, $S.D. = 11$). Patients had been using anti-hypertensive medication for 0.5–51 years ($M = 9$, $S.D. = 9.7$). Patient's education level ranged from low (46%) and moderate (31%) to high (23%), according to the Dutch school system. Twelve percent of the patients lived alone. Nineteen percent were in full-time employment, 24% part-time, and 57% did not have a paid occupation. According to variance analyses, patient characteristics did not differ significantly between groups, except for occupation: patients in Condition 2 more often had a (full-time) job.

2.2. Experimental procedure

Patients were invited to participate in the study, which was presented as an evaluation of a training of physicians communication skills regarding hypertension management. They were randomly assigned to either the control condition or one of the experimental conditions. Ten general practitioner trainees

each performed a Condition 0 care-as-usual conversation with four patients on average. Afterwards the GP-trainees were randomly divided in two groups. They received a training in either Condition 1 or 2 communication. Next, each GP-trainee performed the trained condition with seven patients on average. Eight out of ten GP-trainees were female and age ranged from 28 to 31 years. They had on average 3 years of occupational experience as a physician, of which 1 year as a GP-trainee. Conversations were video-recorded to allow for evaluation of experimental manipulation [39]. Patients filled in questionnaires before and immediately after the conversation. One month later they received a similar questionnaire at their home address. Disclosure about the specific characteristics of the three conditions was given by mail afterwards.

The control condition (Condition 0) is a care-as-usual consultation, for which the GP-trainees did not get special instructions. Condition 1, named ‘discussing illness representations’ uses a semi-structured protocol to ensure that relevant issues were covered during consultation (see left-hand side of Fig. 2). Two aspects are addressed: cognitive illness representations (“how do you think . . .”) and emotional illness representations (“ . . . or how do you feel about the advice). This condition aims at discussing emotional or cognitive representations that might hinder adherence, thus influencing the processing of information both at a cognitive and an emotional level as proposed by Leventhal. The actual content of the communication follows the Dutch general practitioners standard for hypertension [40]. Experimental Condition 2 is named “discussing action plans.” A useful technique for forming an action plan is mental simulation, a tool to envision possibilities and develop plans for bringing those possibilities about, by using one’s imagination [37]. Like Condition 1, Condition 2 uses a semi-structured protocol to ensure that relevant issues are covered. The outline is given at the right-hand side of Fig. 2. Two aspects are addressed, namely the management of affect and the ability to plan and solve problems. As such, action plans are evaluated both at a cognitive and emotional level, which were considered important aspects of Leventhal’s Self-Regulatory Model of Illness.

[FIGURE 2]

For both experimental conditions, the training was given in two sessions of about 3 h each. When confronted with the protocols at the start of the training, the trainees were of the opinion that they already had sufficient skills in discussing either patients’ illness representations or action plans. The video feedback convinced them that they did not, which motivated them to develop the skills needed. Both conditions required a mind switch on the part of the GP-trainees, which was achieved during the second session for all GP-trainees.

2.3. Manipulation evaluation

In the second questionnaire following the conversation, patients were asked to express their opinion about how much this conversation resembled a regular consultation with their GP (one item on a 5-point scale). In addition, they expressed their appreciation of the consultation (three items, Cronbach’s alpha = 0.83) as well as their emotions about the consultation (general positive by 3 items, alpha = 0.69; general negative by three items, alpha = 0.80; and feeling supported by four items, alpha = 0.52). As can be seen in Table 1, Condition 0 was considered most similar to a regular consultation, while Condition 2 deviated the most. Furthermore, the appreciation of the interaction with the GP was high in general, but lower in Condition 2 than in Conditions 0 and 1. The emotions afterwards were somewhat different between conditions, with the exception of the ‘general positive’ scale. Scores of the ‘general negative’ scale were generally low, although a trend was caused by a high standard deviation in Condition 2, resulting in a higher score in comparison with Condition 1. Scores of the ‘feeling supported’ scale were significantly higher for Condition 1 when compared with the other Conditions. Altogether, patient appreciation and emotions afterwards were most positive in Condition 1 and least positive—but not extremely negative—in Condition 2.

[TABLE 1]

2.4. Instruments

A global health status measure was used, obtaining the judgment of the patient themselves. It contained two questions: “how healthy are you?” and “how satisfied are you with your health?”. The questions used a 1–7-point Likert scale (“very unhealthy” to “very healthy” and “very unsatisfied” to “very satisfied”).

The Illness Perception Questionnaire is a 80-item questionnaire, comprising the five general components of Leventhal’s illness representations concept, covered by 12 scales [10,40]. In a study with 186 Dutch patients with hypertension (including the 108 at T1 from this study, [41]), nine scales were found (see Table 2 for details): instead of four causal scales we found two (‘stress as cause’ and ‘other causes’), we could not distinguish between personal control and treatment control (therefore the scale ‘control/cure’), and since we added some symptoms often mentioned in hypertension research, we found a specific identity scale (‘heart condition symptoms linked with hypertension’). The symptom scale asks for a yes or no response to each symptom. The other scales use a 5-point Likert scale (“strongly disagree” to “strongly agree”).

[TABLE 2]

The Beliefs About Medicines Questionnaire (BMQ) is a 19-item questionnaire assessing specific representations that are related to medication use in four scales [11]. It comprises four scales (see Table 2). The scales use a 5-point Likert scale (“strongly disagree” to “strongly agree”).

To assess persons’ action intentions, the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES) was used. This instrument has established validity and reliability when used in the field of addictions and diabetes self-management [42,43]. The content of the questions is slightly modified to account for the use in this study (for instance: in the question “I really want to make changes in how I look after my diabetes”, the word diabetes is changed into hypertension). The questionnaire comprises of three scales that use a 5-point Likert scale (“strongly disagree” to “strongly agree”).

A 10-item questionnaire assessed four types of self-efficacy about the possibility to perform actions necessary in the management of hypertension (see Table 2). The items are derived from a study by Lorig et al. [44] and use a 7-point Likert scale (“not at all confident” to “very confident”).

In case of prescribed diet and exercise, other measurements than self-reports of compliance are not available [45]. Therefore, we used self-report instruments for both adherence to medication prescriptions and lifestyle recommendations: the MARS-5 adherence self-report instrument, [46] and an adaptation of the MARS-5 for measuring adherence with lifestyle recommendations, the LARS-5 (see Table 2). Both scales use a 5-point Likert scale (“always true” to “never true”).

2.5. Data analysis

For all questionnaires, scale scores were obtained by adding item scores within scales, and transforming raw scale scores linearly to a 0–100 scale, with higher scores indicating more emphasis put on the scales theme. GP-trainees performed both Care-as-usual consultations (Condition 0) and one of the experimental conditions (Condition 1 or 2) and as a consequence patients were nested ‘within’ GPs. To test the amount of nesting, Intra-Class Correlations Coefficients (ICC) were calculated, using variances and covariances with maximum likelihood estimation (VARCOMP, SPSS 10.0, SPSS Inc., Chicago, 2000) (see [47,48] for other applications). The ICCs with random factor ‘GP’ were close to zero and not significant (range 0.00–0.08). When interaction with the fixed factor ‘Conditions’ was taken into account, the correlations were a little higher but again not significant (range 0.00–0.15). The interaction between GP and fixed factor Time resulted in ICCs of zero. Therefore, it can be concluded that the influence of nesting is negligible. As a result, the 108 consultations can be considered as independent observations.

Intervention of experimental effects were investigated in two steps. First, we examined the impact of experimental conditions on relevant variables (i.e. illness representations and action plans). Next, we determined the impact of experimentally affected components of illness representations and action plans on adherence.

In step one, differences between groups at each time point with respect to manipulation check, patient characteristics, adherence, and the elements of the Self-Regulatory Model of Illness, were tested by Multivariate Analysis of Variance for General Linear Modeling (Multivariate-GLM, a

procedure included in SPSS and comparable with MANOVA). Next to multivariate results, this analysis provides the underlying univariate test results and contrasts between groups. These results will be evaluated in addition. Patient characteristics (age, sex, years of using anti-hypertensive medication use, living situation, level of education, and employment), adherence and health status measured at T0 were added as covariates, to correct for initial differences between patients. For the same reason, the T0 measures of the scales group under testing were added as additional covariates for the Multivariate-GLM at T1 and T2. The illness representations scale 'heart condition symptoms reported' was tested separately from the multivariate test on the illness representations group, because of the relatively large number of missing values (people often scored a 'yes' or left the question open instead of scoring 'no').

In step two, the relationship between variables affected by the intervention with adherence to medication or lifestyle recommendations at T2, were tested using hierarchical regression analyses with adherence as the dependent variable.

3. RESULTS

3.1. Impact of experimental manipulations on illness representations and action plans

In Table 3, the multivariate results at each point in time are described. According to multivariate analyses, differences between groups are found at T1 in the group of scales measuring action self-efficacy (the person's self-efficacy about the possibility to come into action). Fig. 3 shows the univariate results of scales that show significant differences between groups. At the right-hand side of this Fig. 3d-f, the three self-efficacy scales are given that were affected by the intervention. On the whole, patients in Condition 0 (care-as-usual) reported a better action self-efficacy after the intervention. As can be seen in Fig. 4, adherence was not affected by the intervention.

[TABLE 3]

[FIGURE 3]

[FIGURE 4]

Based on Table 3 and Fig. 3, the following profile can be given for the patients in Condition 1 (discussing Illness representations): scores on the 'Lack of coherence' scale, one of the nine Illness representations scales, were somewhat lower right after the consultation (T1) when corrected for the baseline measurements (T0, see Fig. 3a); scores on the other eight components of illness representations were not affected, however. The 'Specific medication concerns' scale (Fig. 3b), one of the four Medication Representations scales, and the 'Self-efficacy medication use' scale (Fig. 3d) were somewhat lower in this group compared to the others a month after the consultation (T2) when corrected for the baseline measurements (T0). In other words, after discussing illness representations, patients experienced their disorder as more coherent and less as a mystery. Furthermore, discussing illness representations lowered patients' concerns about the harmful effects of medicines prescribed. However, patients were less confident that they were able to take medication as prescribed.

The following profile can be given for the patients in Condition 2 (discussing action plans): scores on 'Specific medication concerns' (one of the Medication representations scales, see Fig. 3b) and the 'taking steps' (one of the action intentions scales, see Fig. 3c) exceeded the scores in the other groups when corrected for the baseline measurements (T0). The 'Self-efficacy communication with GP' (Fig. 3e) was lower especially at T1 compared to the other groups. In other words, after discussing action plans, patients were more concerned about the harmful effects of medicines prescribed. Also, patients became less confident that they were able to communicate with their physician about their concerns and opinions. Nevertheless, they reported more often that they were already taking steps to make a positive change in managing their high blood pressure.

3.2. Relationship between adherence and the scales effected by the intervention

As can be seen in Table 4, adherence at T2 is mainly determined by its score at T0 irrespective of the kind of consultation they had (groups did not differ at T0, see Table 3). Furthermore, there is no relationship between the adherence to medication prescriptions and lifestyle recommendations. Irrespective of condition, patients' confidence in their ability to take medication as prescribed ('self-

efficacy medication use') was related to adherence to medication prescriptions right after the consultation (T1), but not 1 month later (T2). Instead, the more they took steps to make a positive change in managing their high blood pressure at T2, the lower their adherence to medication prescriptions was. Furthermore, the less confidence patients were about their ability to communicate with their physician about their concerns and opinions, the better their adherence to medication prescriptions was. Although adherence to lifestyle recommendations is not predicted by adherence to medication prescriptions, surprisingly, it is significantly related to higher patients' confidence in their ability to take medication as prescribed ('self-efficacy medication use') at T2.

[TABLE 4]

4. DISCUSSION AND CONCLUSIONS

It can be seen as promising that after only 6 h of training, GPs were able to discuss patient's illness representations or action plans concerning adherence, and by doing so actually managed to change some of the patients' views. It was hypothesized that both experimental conditions might affect patients' illness representations and action plans because the Self-Regulatory Model of Illness is a feedback loop model. Indeed, both experimental conditions generated modest changes in illness representations and action plans until 1 month after the 15-min conversation. However, the conditions related differently to the scales within illness representations and action plans. After discussing illness representations, patients experienced their hypertension as less of a mystery and patients' concerns about the harmful effects of medicines prescribed decreased. However, patients were less confident that they were able to take medication as prescribed. It seems that a better understanding of one's medical condition may not automatically result in increased motivation to do something about it: some illness representations were positively changed but some action plans were negatively affected. On the other hand, after discussing action plans, patients were more concerned about the harmful effects of medicines prescribed, and became less confident that they were able to communicate with their physician about their concerns and opinions. Nevertheless, they reported more often that they were already taking steps to make a positive change in managing their high blood pressure. In this situation, some action plans were positively changed but some of the illness representations changed negatively. This difference between the experimental conditions implicates that illness representations which are helpful in achieving adherence, do not automatically generate helpful action plans and vice versa. Rather, illness representations and action plans are important elements that both need to be attended to.

This conclusion can be illustrated by looking more closely to some of the findings in this study: people often have specific medication concerns, such as worries about side-effects [11]. In Condition 1, the patients' illness representations were discussed and the specific medication concerns decreased. In Condition 2, the patients' action plans were discussed and the specific medication concerns were highest. Perhaps in this condition people considered increasing their **medication** intake, which generates these worries that in turn might prevent an increase in adherence. Alternatively, perhaps the patients that discussed action plans wanted to increase adherence to **lifestyle** recommendations, which strengthened their aversion to medication use. To know for sure, an illness representations discussion would have been very useful. This indicates the importance of feedback and follow-up as is indicated by many publications, e.g. [21,23,38], but it also points to the necessity to address both topics explicitly in patient-provider communication. Advice should be adjusted, taking into consideration the new challenges, barriers, and other issues (changed illness representations or action plans) regarding adherence that the patient has brought to light [21]. As such, illness representations and action plans should both be discussed.

The three conditions were appreciated differently and evoked different emotions indicating that patients perceived different styles of conversation. Condition 1 (discussing illness representations) was appreciated the most, and evoked the most feelings of support. Condition 2 (discussing action plans) appeared more difficult: it was considered most deviant from regular consultations, and the interaction with the GP-trainee was somewhat less appreciated. This agrees with the GP-trainee evaluation that if the patients differ from the GP in their illness representations, discussing action plans is less pleasant.

Another publication warned that setting a goal for a person not interested will probably have little effect, or may even be counterproductive [38]. Perhaps as a result in Condition 2, the 'Self-efficacy communication with GP' became lower. However, it was found that less 'Self-efficacy communication with GP' and less 'taking steps' at T2, related to better adherence to medication prescriptions at T2. This, at first sight, surprising result might relate to the fact that the GP-trainees do not have a long-term relationship with the patients. The recommendations and the general approach of the GP-trainees might be seen as different from the recommendations of their regular GP, which may decrease the patient's self-efficacy with their physician. Keep in mind that Condition 2 deviated the most. Furthermore, 'taking steps' means that people take action to deal with their high blood pressure, but we found a reversed association between self-reported adherence to medication and self-report of taking steps. A similar result was found in another publication as well [23]. Apparently, taking steps assumes all kinds of actions and does not necessarily mean medication taking. It might be that taking steps refers to lifestyle changes, but no relation was found with adherence to lifestyle recommendations. Again, this may be because lifestyle suggestions made by the GP-trainee might disagree with their regular GP's recommendation. Because lifestyle adherence at T0 mainly predicted lifestyle adherence at T2, the patients probably had the recommendations of their regular GP in mind. Another explanation follows from the context that the GP-trainee helped the patient to break down the goal into sub goals [38]. These sub goals might be considered too modest according to the patient (for instance, eating less cheese in the evening), and as a result are not evaluated as adherence to the lifestyle recommendations of their regular GP. To test these speculations, future research should use a more specific measurement of lifestyle adherence in addition of the general instrument that was used in this study and use GPs instead of GP-trainees to rule out conflicts in medication and lifestyle recommendations.

The 15-min experimental conversation could not bring about direct changes in self-reported adherence. Self-reported adherence levels were already high, especially for medication. As a consequence, a ceiling effect may have occurred with no opportunity for improvement, as was concluded in another study as well [23]. Many patients in our study had been using anti-hypertensive medication for a long time and may have grown accustomed to its threats. Regular consultations (every 3 months) and taking medication are routine actions. In addition, adherence is very resistant to change. Another studies also report that the strongest predictor of adherence is whether or not the patient had adhered in the past [3]. We found the same in our study. Adherence interventions that proved effective were complex, labor-intensive, and probably not cost-effective in non-research settings [22]. Instead of developing a battery of supplementary adherence- supporting techniques, we invested in improving patient's self-management skills in regular practice. That Conditions 1 and 2 with a 15 min consultation managed to change some of the patients' self-management ideas (illness representations) and self-management action plans can be seen as promising.

4.1. Practice implications

Many physicians seem unaware of the relevance of patients' ideas and action plans for improving adherence [11]. Patients do not often explicitly articulate their aversion against taking medication, but even when they voice their concerns or beliefs these are often not explored by GP's. This may result in misunderstandings between GP's and their patients [49]. This misunderstanding is illustrated by the findings of Meyer et al. [29] who demonstrated, that, although all patients were told by their GP that hypertension is an asymptomatic condition, patients continued to act upon symptom experience as a reason for taking their medication.

The employment of the Self-Regulatory Model of Illness model as a frame for discussing illness representations or action plans concerning adherence seems promising. Inspection of videotapes made during the consultations revealed that the GP-trainees did change their communication style according to the instructions [39]. It is of interest to report here that the patients' illness representations were discussed most during Condition 1, and action plans most during Condition 2.

Each of the experimental approaches had its advantage and a combination of techniques is suggested. Some of the patients' illness representations and action plans were changed after discussing them with GP-trainees. The Self-Regulatory Model of Illness provided GPs with a tool to discuss adherence with patients.

ACKNOWLEDGEMENTS

This research was supported by a grant from Zorg Onderzoek Nederland (ZON) and the Research Institute for Psychology & Health. We would like to express our appreciation to Dr. Jan J. Kerssens for sharing his methodological knowledge. We are indebted to the patients and the GP-trainees for their participation.

TABLES AND FIGURES

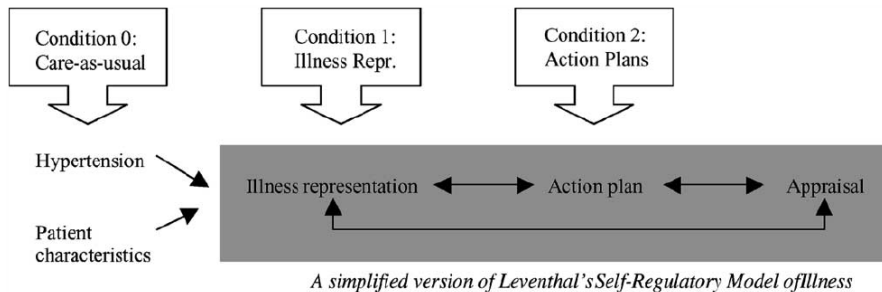


Fig. 1. The experimental conditions in relation to the Self-Regulatory Model of Illness.

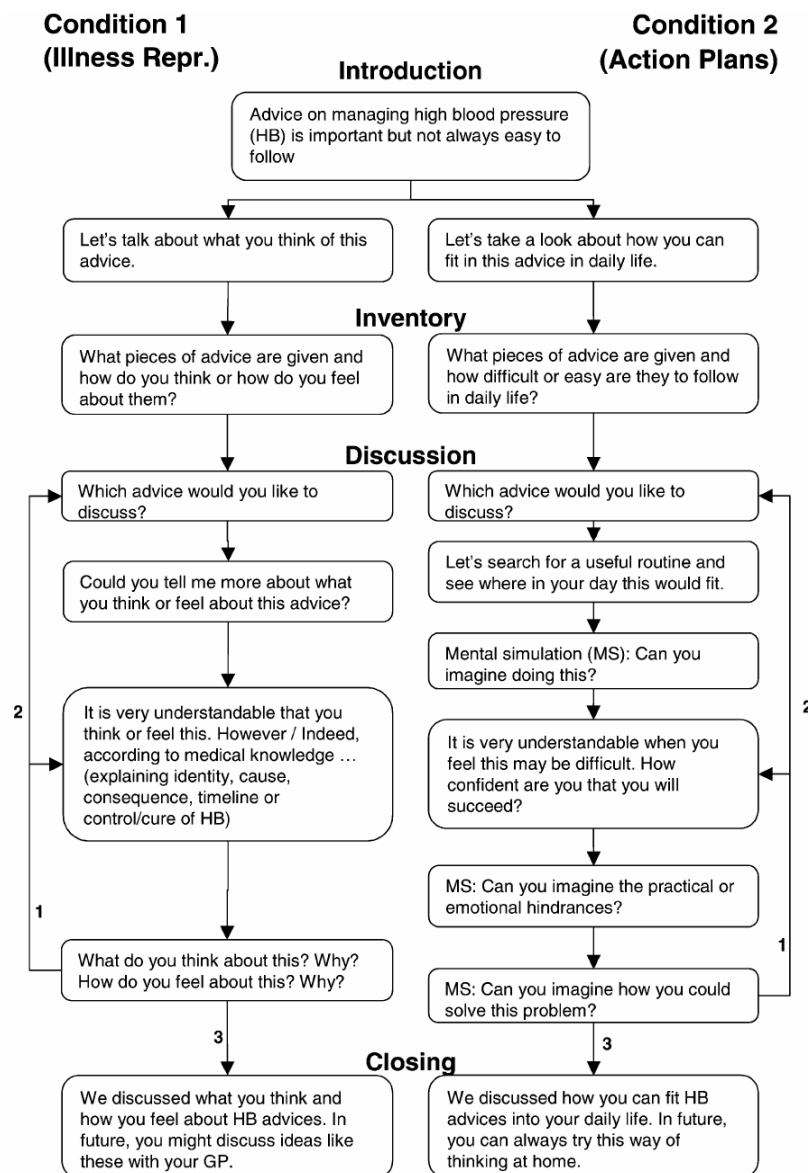


Fig. 2. Outline of the protocols used in the experimental conditions.

Table 1
 Resemblance with regular consultation, patients' feelings afterwards and appreciation of the consultation

	M_{c0} (S.D.)	M_{c1} (S.D.)	M_{c2} (S.D.)	P -value (F -test)	T contrasts ^a
Resemblance with regular consultation	76 (28)	64 (30)	50 (34)	<0.01	$c0 > c2^*$, $c0 > c1^{\#}$, $c1 > c2^{\#}$
Appreciation of the interaction with the GP	91 (12)	91 (12)	80 (19)	<0.01	$c0 > c2^*$, $c1 > c2^*$
Emotions	Multivariate test			0.04	
General positive emotion	25 (44)	25 (44)	23 (43)	NS	
General negative emotion	3 (16)	0 (0)	10 (30)	0.10	$c1 < c2^*$
Social support emotion	33 (47)	64 (49)	39 (50)	0.02	$c0 < c1^*$, $c1 > c2^*$

Note: Scale scores range 0–100; NS: not significant.

^a $c0$: Condition 0, $c1$: Condition 1, $c2$: Condition 2.

* Significance at $P < 0.05$.

[#] Trend $P < 0.10$.

Table 2
 Scale descriptions and examples of scale-items

	Number of items	Cronbach's alpha ^a	Item example
Health status	2	0.90	How healthy are you?
Illness representations			
Heart condition symptoms linked with high blood pressure	6	0.70	Fast heartbeats (related to my high blood pressure)
Chronic time perspective	6	0.81	My high blood pressure is likely to be permanent rather than temporary
Cyclical time perspective	4	0.77	My high blood pressure is very unpredictable
Consequences	5	0.66	My high blood pressure has serious financial consequences
Control/cure	8	0.78	My actions will have no effect on the outcome of my high blood pressure
Lack of coherence	4	0.82	My high blood pressure does not make any sense to me
Negative emotions	5	0.86	My high blood pressure makes me feel afraid
Stress as cause	7	0.77	Stress or worry
Other causes	6	0.70	Alcohol
Medication representations			
Specific medication necessity	5	0.78	My health, at present, depends on medicines
Specific medication concerns	6	0.65	Having to take medicines worries me
General medication overuse	4	0.78	Doctors use too many medicines
General medication harm	4	0.61	Most medicines are addictive
Action intentions			
Ambivalence	3	0.74	Sometimes I wonder if I am looking after my HB properly
Recognition	6	0.74	I know that I have a problem with how I look after my HB
Taking steps	6	0.85	I am not just thinking about improving my HB management, I am already doing something about it
Action self-efficacy			
Self-efficacy medication use	1	–	How confident are you that you ...
Self-efficacy communication with GP	3	0.88	... are able to take your medication according to prescriptions?
Self-efficacy self-management	4	0.84	... can ask your doctor things about your illness that concern you?
			... can do the different tasks and activities needed to manage your high blood pressure?
Self-efficacy depression management	2	0.88	... can prevent from being discouraged when nothing you do seems to help
Actions: adherence			
Adherence to medication prescriptions	5	0.77	I take less than instructed
Adherence to lifestyle recommendations	5	0.95	I follow the recommendations less than instructed

^a Mean across times of measurements.

Table 3
 Patient reports at all points of measurement, corrected for covariates from T0 ($n = 108$)

SRM elements (d.f.)	T0				T1				T2			
	Hypothesis (d.f.)	Error (d.f.)	F -test	P -value	Hypothesis (d.f.)	Error (d.f.)	F -test	P -value	Hypothesis (d.f.)	Error (d.f.)	F -test	P -value
Health status	2	NA	0.91	0.56	2	NA	0.10	0.91	2	NA	0.38	0.69
Illness representations ^a	16	162	0.53	0.93	16	134	1.62	0.07	16	148	1.03	0.43
Medication representations	8	182	0.18	0.99	8	168	1.30	0.25	8	164	1.26	0.27
Action intentions	6	186	0.86	0.52	6	162	0.51	0.79	6	164	0.75	0.61
Action self-efficacy	8	176	0.35	0.95	8	156	2.17	0.03	8	162	1.46	0.18
Adherence (T0 & T2)	4	212	0.29	0.89					4	166	0.06	0.35

Note: Scale scores range 0–100. RM-GLM using Pillai's trace multivariate tests; NA: not applicable.

^a The scale 'heart condition symptoms linked with HYP' was removed from multivariable analyses because of relatively low sample size.

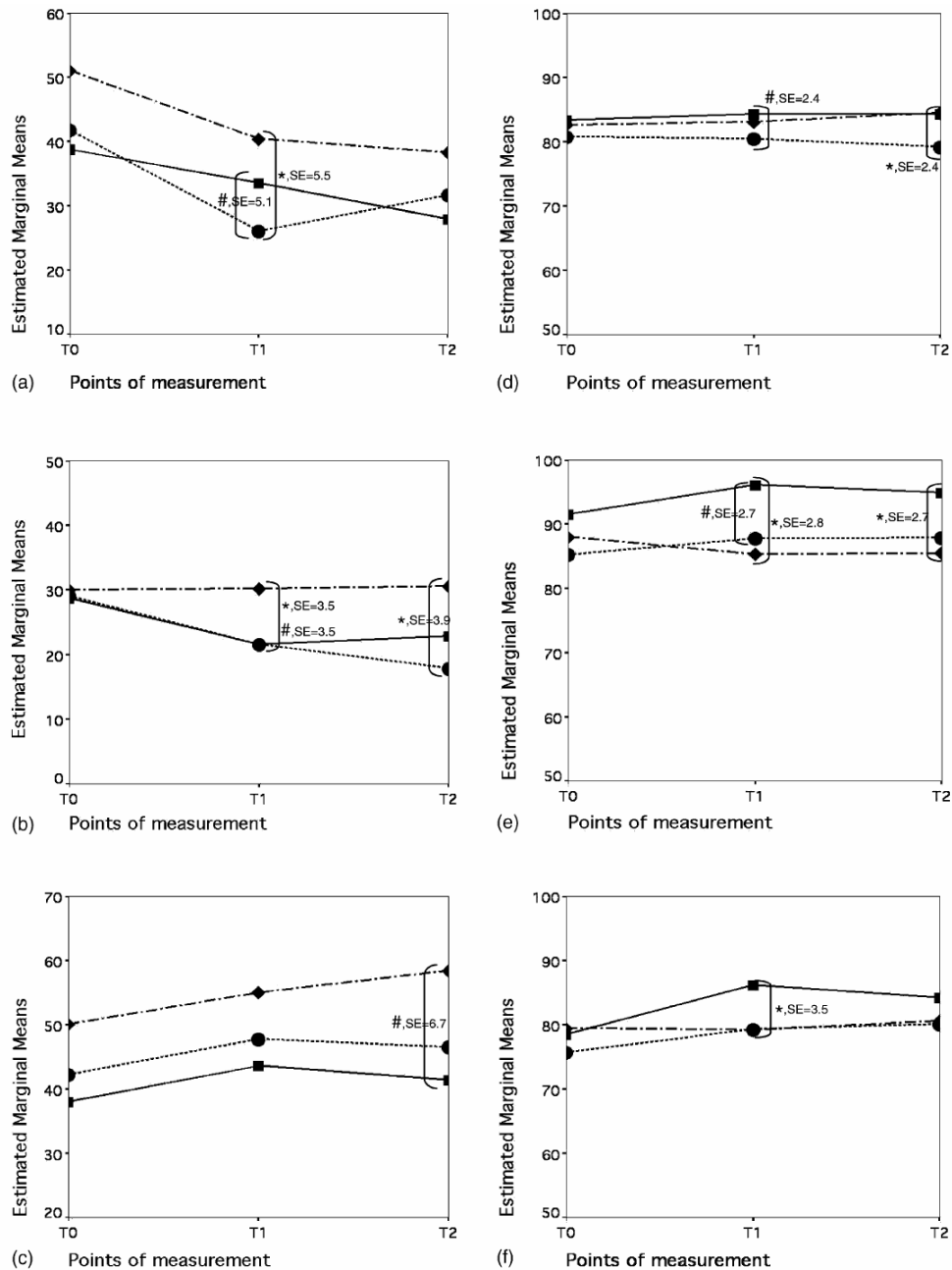


Fig. 3. Estimated marginal means of scales showing differences between groups over time, corrected for covariates: (a) lack of coherence; (b) specific medication concerns; (c) taking steps; (d) self-efficacy medication use; (e) self-efficacy communication with GP; (f) self-efficacy relation self-management. Note: Scale score range 0–100, with higher scores indicating more stress put on the scale's theme; S.E.: standard error; * $P < 0.05$, # $P < 0.10$. Legend: (■) c0 (Condition 0: care-as-usual); (●) c1 (Condition 1: illness representations); (◆) c2 (Condition 2: action plans).

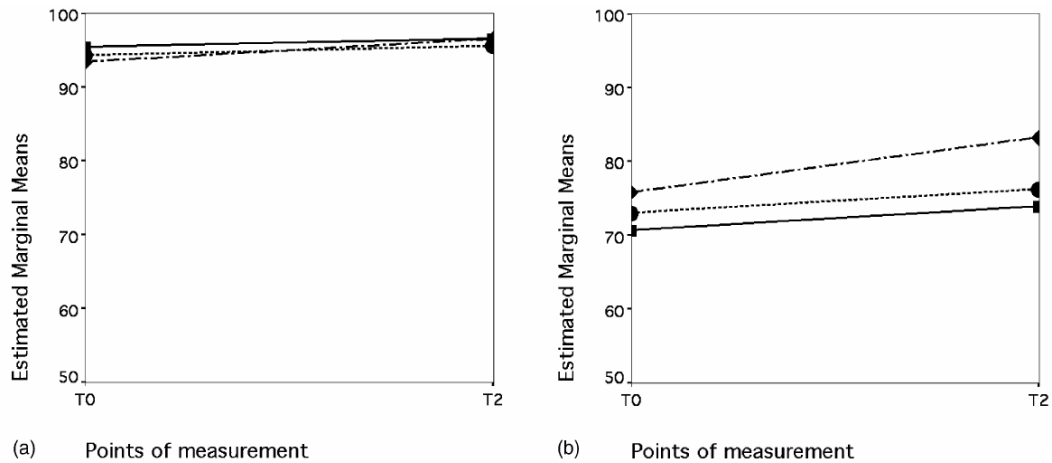


Fig. 4. Estimated marginal means of adherence showing differences between groups over time, corrected for covariates: (a) adherence to medication prescriptions; (b) adherence to lifestyle recommendations. Note: Scale score range 0–100, with higher scores indicating better adherence; SE: standard error; * $P < 0.05$, # $P < 0.10$.

Table 4

Summary of hierarchical regression analysis of the relation between variables affected by the intervention, with adherence to medication prescriptions and lifestyle recommendations at T2

Variables	T2 adherence to ...			
	Medication prescriptions		Lifestyle recommendations	
	β^a	ΔR^2	β	ΔR^2
Step 1: Adherence at T0		0.44*		0.41*
Adherence to medication prescriptions	0.62*		0.02	
Adherence to lifestyle recommendations	-0.05		0.58*	
Step 2: Effected variables at T0		0.01		0.02
Lack of coherence	0.03		-0.22#	
Specific medication Concerns	-0.03		0.01	
Taking steps	0.13		0.05	
Self-efficacy medication use	-0.16		0.16	
Self-efficacy communication with GP	0.29*		-0.25	
Self-efficacy self-management	-0.14		-0.16	
Step 3: Effected variables at T1		0.05		0.06
Lack of coherence	0.03		-0.08	
Specific medication concerns	-0.08		0.10	
Taking steps	0.00		-0.15	
Self-efficacy medication use	0.20*		-0.08	
Self-efficacy communication with GP	0.17		0.02	
Self-efficacy self-management	0.15		0.19	
Step 4: Effected variables at T2		0.09*		0.05
Lack of coherence	-0.04		0.22	
Specific medication concerns	0.05		-0.08	
Taking steps	-0.31*		-0.10	
Self-efficacy medication use	-0.13		0.21*	
Self-efficacy communication with GP	-0.41*		0.14	
Self-efficacy self-management	0.02		0.06	
R^2		0.58		0.53
Adjusted R^2		0.46		0.40

^a Final β as a result of step 4 of the hierarchical regression analysis.

* Significant at $P \leq 0.05$.

Trend $P \leq 0.10$.

REFERENCES

- [1] Noble LM. Doctor-patient communication and adherence to treatment. In: Myers LB, Midence K, editors. *Adherence to treatment in medical conditions*. Amsterdam: Harwood Academic Publishers; 1998. p. 51-82.
- [2] Gidron Y. Adherence in hypertension and coronary heart disease. In: Myers LB, Midence K, editors. *Adherence to treatment in medical conditions*. Amsterdam: Harwood Academic Publishers; 1998. p. 473-96.
- [3] Sherbourne CD, Hays RD, Ordway L, DiMatteo MR, Kravitz RL. Antecedents of adherence to medical recommendations: results from the Medical Outcomes Study. *J Behav Med* 1992;15:447-68.
- [4] Grueninger UJ. Arterial hypertension: lessons from patient education. *Patient Educ Couns* 1995;26:37-55.
- [5] Arborelius E. Using doctor-patient communication to affect patients' lifestyles. Theoretical and practical implications. *Psychol Health* 1996;11:845-55.
- [6] Kjellgren KI, Svensson S, Ahlner J, Saljo R. Antihypertensive medication in clinical encounters. *Int J Cardiol* 1998;64:161-9.
- [7] Leventhal H, Diefenbach M, Leventhal EA. Illness cognition: using common sense to understand treatment adherence and affect cognition interactions. *Cogn Therap Res* 1992;16:143-63.
- [8] Horne R, Weinman J. Predicting treatment adherence: an overview of theoretical models. In: Myers LB, Midence K, editors. *Adherence to treatment in medical conditions*. Amsterdam: Harwood Academic Publishers; 1998. p. 25-50.
- [9] Scharloo M, Kaptein A. Measurement of illness perceptions in patients with chronic somatic illness: a review. In: Petrie KJ, Weinman JA, editors. *Perceptions of health and illness*. Reading: Harwood Academic Publishers; 1997. p. 103-54.
- [10] Moss Morris R, Weinman J, Petrie KJ, Horne R, Cameron LD, Buick D. The revised Illness Perception Questionnaire (IPQ-R). *Psychol Health* 2002;17:1-16.
- [11] Horne R. Representations of medication and treatment: advances in theory and measurement. In: Petrie KJ, Weinman J, editors. *Perceptions of health and illness: current research and applications*. Singapore: Harwood Academic Publishers; 1997. p. 155-88.
- [12] Leventhal H, Nerenz DR, Steele DJ. Illness representations and coping with health threats. In: Baum A, Taylor SE, Singer JE, editors. *Handbook of psychology and health: social psychological aspects of health, vol. IV*. Hillsdale (NJ): Lawrence Erlbaum Associates; 1984. p. 219-52.
- [13] Flanders P, McNamara JR. Prediction of compliance with an over-the-counter acne medication. *J Psychol* 1984;118:31-6.
- [14] Kavanagh DJ, Gooley S, Wilson PH. Prediction of adherence and control in diabetes. *J Behav Med* 1993;16:509-22.
- [15] Lisper L, Isacson D, Sjoden PO, Bingefors K. Medicated hypertensive patients' views and experience of information and communication concerning antihypertensive drugs. *Patient Educ Couns* 1997;32:147-55.
- [16] Bensing JM, Visser A, Saan H. Patient education in The Netherlands. *Patient Educ Couns* 2001;44:15-22.
- [17] Schulman BA. Active patient orientation and outcomes in hypertensive treatment: application of a socio-organizational perspective. *Med Care* 1979;17:267-80.
- [18] Inui TS, Yourtee EL, Williamson JW. Improved outcomes in hypertension after physician tutorials. A controlled trial. *1976;84:646-51*.
- [19] Richardson MA, Simons MB, Annegers JF. Effect of perceived barriers on compliance with antihypertensive medication. *Health Educ Q* 1993;20:489-503.
- [20] Johnson BF, Hamilton G, Fink J, Lucey G, Bennet N, Lew R. A design for testing interventions to improve adherence within a hypertension clinical trial. *Control Clin Trials* 2000;21:62-72.
- [21] Dube CE, O'Donnell JF, Novack DH. Communication skills for preventive interventions. *Acad Med* 2000;75:S45-54.
- [22] Haynes RB, McKibbon KA, Kanani R. Systematic review of randomised trials of interventions to assist patients to follow prescriptions for medications. *Lancet* 1996;348:383-6.
- [23] Glanz K, Kirscht JP, Rosenstock IM. Linking research and practice in patient education for hypertension: patient responses to four educational interventions. *Med Care* 1981;19:141-52.
- [24] Helman CG. Doctor-patient interactions. *Culture, health and illness: an introduction for health professionals*. Oxford: Butterworths- Heinemann; 1990. p. 86-125.

- [25] Hays RD, Kravitz RL, Mazel RM, Sherbourne CD, DiMatteo MR, Rogers WH, et al. The impact of patient adherence on health outcomes for patients with chronic disease in the Medical Outcomes Study. *J Behav Med* 1994;17:347–60.
- [26] Campbell NR, Burgess E, Taylor G, Wilson E, Cleroux J, Fodor, et al. Lifestyle changes to prevent and control hypertension: do they work? A summary of the Canadian Consensus Conference. 1999;160: 1341–43.
- [27] Perry KN, Rapoport L, Wardle J. Adherence to lipid-lowering dietary advice. In: Myers LB, Midence K, editors. *Adherence to treatment in medical conditions*. Amsterdam: Harwood Academic Publishers; 1998. p. 311–42.
- [28] Jones F, Harris P, McGeel L. Adherence to prescribed exercise. In: Myers LB, Midence K, editors. *Adherence to treatment in medical conditions*. Amsterdam: Harwood Academic Publishers; 1998. p. 343–62.
- [29] Meyer D, Leventhal H, Gutmann M. Common-sense models of illness: the example of hypertension. *Health Psychol* 1985;4:115–35.
- [30] Dunbar JM, Agras WS. Compliance with medical instructions. In: Ferguson JM, editor. *The comprehensive handbook of behavioral medicine*, vol. 3. Lancaster: MTP Press; 1980. p. 115–45.
- [31] Cohen MZ, Tripp RT, Smith C, Sorofman B, Lively S. Explanatory models of diabetes: patient practitioner variation. *Soc Sci Med* 1994;38:59–66.
- [32] Helman CG. Communication in primary care: the role of patient and practitioner explanatory models. *Soc Sci Med* 1985;20:923–31.
- [33] Klonoff EA, Landrine H. Culture and gender diversity in commonsense beliefs about the causes of six illnesses. *J Behav Med* 1994;17:407–18.
- [34] Ley P. *Communicating with patients: improving communication, satisfaction and compliance*. Chapman and Hall; 1988.
- [35] Salmon P, Woloshynowych M, Valori R. The measurement of beliefs about physical symptoms in English general practice patients. *Soc Sci Med* 1996;42:1561–7.
- [36] Williams S, Weinman J, Dale J, Newman S. Patient expectations: what do primary care patients want from the GP and how far does meeting expectations affect patient satisfaction? *Fam Pract* 1995;12:193–201.
- [37] Taylor SE, Pham LB, Rivkin ID, Armor DA. Harnessing the imagination: mental stimulation, self-regulation, and coping. *Am Psychol* 1998;53:429–39.
- [38] Strecher VJ, Seijts GH, Kok GJ, Latham GP, Glasgow R, DeVellis B, et al. Goal setting as a strategy for health behavior change. *Health Educ Q* 1995;22:190–200.
- [39] Theunissen NCM, de-Ridder D, van-Dulmen AM. Observing interaction between patients and general practitioners about illness representations and action plans. Under review.
- [40] Weinman J, Petrie KJ, Moss-Morris R, Horne R. The Illness Perception Questionnaire: a new method for assessing the cognitive representation of illness. *Psychol Health* 1996;11:431–45.
- [41] Theunissen NCM, De-Ridder DTD. Illness representations and adherence in patients with hypertension. Unpublished data. The Netherlands: Utrecht University; 2001.
- [42] Campbell WG. Evaluation of a residential program using the Addiction Severity Index and stages of change. *J Addict Dis* 1997;16:27–39.
- [43] Trigwell P, Grant PJ, House A. Motivation and glycaemic control in diabetes mellitus. *J Psychosom Res* 1997;43:307–15.
- [44] Lorig K, Stewart A, Ritter P, Gonzalez V, Laurent D, Lynch J. *Outcome measures for health education and other health care interventions*. Thousand Oaks, CA, USA: Sage Publications, Inc.; 1996.
- [45] Turk DC, Meichenbaum D. Adherence to self-care regimens: the patient's perspective. In: Sweet JJ, Rozensky RH, Tovian SM, editors. *Handbook of clinical psychology in medical settings*. New York: Plenum; 1991. p. 249–66.
- [46] Horne R, Hankins M, Jenkins R. The Satisfaction with Information about Medicines Scale (SIMS): a new measurement tool for audit and research. *Qual Health Care* 2001;10:135–40.
- [47] Clark NM, Gong M, Schork MA, Evans D, Roloff D, Hurwitz M, et al. Impact of education for physicians on patient outcomes. *Pediatrics* 1998;101:831–6.
- [48] Bensing JM, Kerssens JJ, van-der-Pasch M. Patient-directed gaze as a tool for discovering and handling psychosocial problems in general practice. *J Nonverbal Behav* 1995;19:223–42.
- [49] Britten N, Stevenson FA, Barry CA, Barber N, Bradley CP. Misunderstandings in prescribing decisions in general practice: qualitative study. *BMJ* 2000;320:484–8.