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*J Health Psychol* 2006; 11; 141

DOI: 10.1177/1359105306058869

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# The Bases of Goal Setting in the Self-regulation of Hypertension

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ACKNOWLEDGEMENTS. The authors wish to express gratitude to Carolyn Maguire, Janet Nightingale and Trelawny Boynton for preparation of the manuscript.

COMPETING INTERESTS: None declared.

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*Journal of Health Psychology*  
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London, Thousand Oaks and New Delhi,  
www.sagepublications.com  
Vol 11(1) 141-162  
DOI: 10.1177/1359105306058869

## Abstract

We apply a new methodology to investigate goal setting by hypertensive patients that uncovers the reasons why people have a goal to manage hypertension or not (e.g. to reduce/maintain one's current blood pressure). The reasons are found to consist of superordinate goals in support of one's focal hypertension goal and the hierarchical mental network underlying the superordinate goals. We show that, not only do such superordinate goals influence patients' beliefs, feelings and decisions, but the relationships among superordinate goals are particularly efficacious in the formation of beliefs and attitudes, as well as intentions to self-regulate hypertension and actual efforts in doing so. Hypotheses were tested on a sample of 219 patients at a university-based hypertension clinic.

## Keywords

- *goal setting*
- *hypertension*
- *laddering*
- *self-regulation*

A LARGE BODY of research exists studying the role of goals in human behavior. Much of this research focuses on the questions and sequences between questions depicted in Fig. 1. Decision processes are thought to begin with *goal setting* (e.g. Gollwitzer, 1990; Locke & Latham, 1990), where speaking figuratively, a decision maker asks, 'What are the goals I can pursue and why do I want to pursue them?' Following goal setting, a three-stage process of goal striving begins, consisting of the formation of a goal intention ('What is it for which I strive?'), action planning ('How can I achieve my goal?') and action initiation and control ('Am I making progress toward my goal?', 'Are there adjustments that must be made?'). Goal striving then either leads to goal achievement or not, and feedback in the form of one's feelings and judgments in this regard inform subsequent goal setting (see Fig. 1).

Most research to date has examined goal striving processes. This includes, among other advances, work on implementation intentions (Gollwitzer & Brandstätter, 1997), prospective memory (Goschke & Kuhl, 1996), the role of mind sets in the control of action (Gollwitzer & Bayer, 1999), planning (Gollwitzer, 1996) and goal attainment (Locke & Latham, 1990).

Indeed, most research to date has examined the implications of goal setting rather than the *bases* of goal setting (cf. Bagozzi, Bergami, & Leone, 2003; Locke & Latham, 2002). In fact, focus on the determinants of goal setting is a minor part of leading theories of goal-directed behavior. For example, under the action phases model (Gollwitzer, 1996; Heckhausen & Gollwitzer, 1987), the investigation of goal setting is limited to the hypothesis that goal intentions (as opposed to implementation or behavioral intentions under goal striving) are functions of the feasibility and desirability of a goal, but very little empirical research has been done to date in this regard (see Bagozzi, Dholakia, & Basuroy, 2003; Perugini & Connor, 2000). This research does not address the content of goals and the process of goal formation per se. Likewise, Locke and Latham's (1990) 'high performance cycle' does not look at goal setting, per se, but rather examines its effects on achievement. What is needed is research into what constitutes goals chosen by people and how they are formed, as well as their impact on decision making and outcomes.

Three representative studies can be identified in the health and medical literatures dealing with goal setting. Alexy (1985) studied the

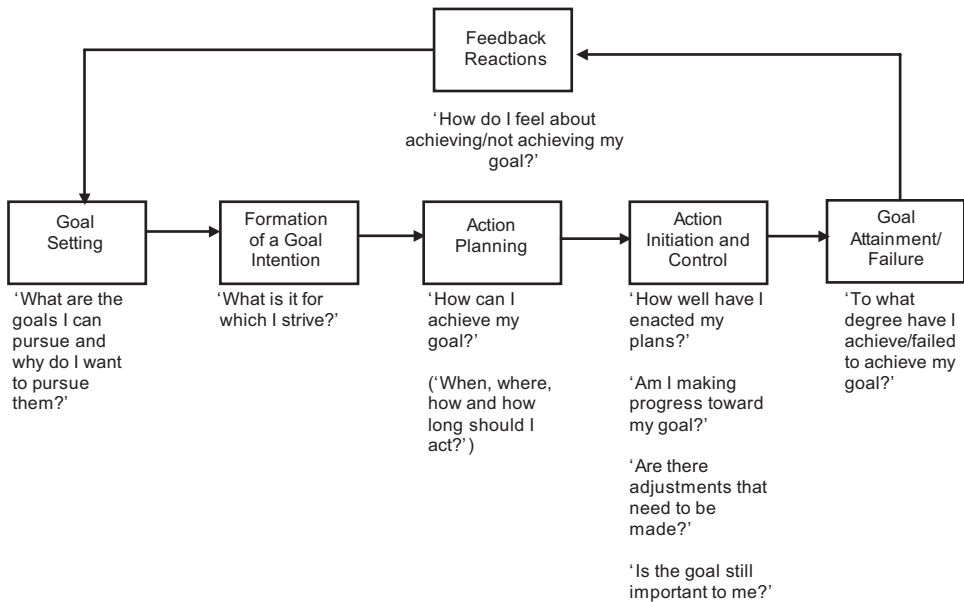


Figure 1. The relationship between goal setting and goal pursuit in the regulation of blood pressure.

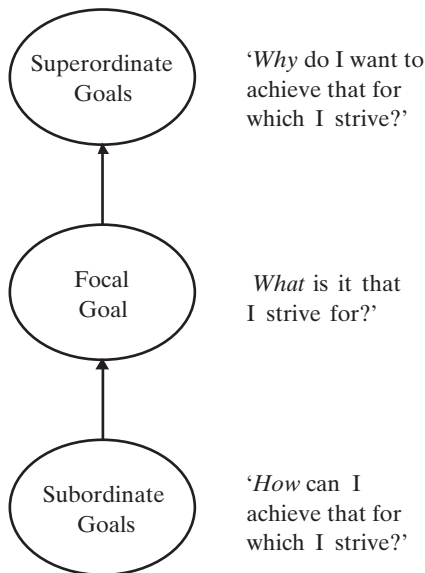
effects of provider-selected versus client-participative goal selection on health risk reduction. The former was more effective than the latter for some contexts, whereas the latter was more effective than the former for others. Again, rather than looking at the actual decision processes of goal setting and the content and structure of goals, this study scrutinized the effects of two alternative strategies imposed on clients. A similar point of view has been taken by Strecher et al. (1995) in their review of the literature, where discussion was limited to the effects of the degree of goal difficulty on level of performance, plus a number of broad, practical issues for future research. Reflecting the dearth of work on the nature and origins of goals, their study, too, emphasized more the impact of goal setting than how goals are acquired and represented in human memory and how they produce the effects that they do in forming the basis for goal striving.

Finally, Bradley, Bogardus, Tinetti and Inouye (1999) recently used qualitative research methods to investigate goal setting of patients with dementia. Interviews were conducted with 10 person clusters, each consisting of a patient, primary care giver, case manager and physician.

Because some people in the clusters were unavailable for interviews, a total of 36 interviews were analyzed. The findings suggest that goals (e.g. 'personal health') are generated from broad values, are hierarchical in nature and are influenced or moderated by individual, disease and interaction characteristics.

Our aim in this study is to further explore the activities people undergo in goal setting and to represent how the bases for their goals are organized in human memory and how this organization (i.e. individual superordinate goals and linkages between these) influences decision making and self-regulation concerning patients' hypertension. As a foreshadowing and sketch of our approach to be illustrated below, it is helpful to begin with the elliptical overview shown in Fig. 2. The left-hand side of the figure presents our categorization of three basic components of any goal situation. Notice that one's focal goal is in the center of the hierarchy and answers the question, 'What is it for which I strive?' This corresponds to one's goal intention (see Fig. 1). Subordinate goals answer the question, 'How can I achieve that for which I strive?' These are the means to goal achievement and thus correspond to instrumental behaviors (see 'action

General Representation of Goal Hierarchy



Example of Goal Hierarchy (abbreviated)

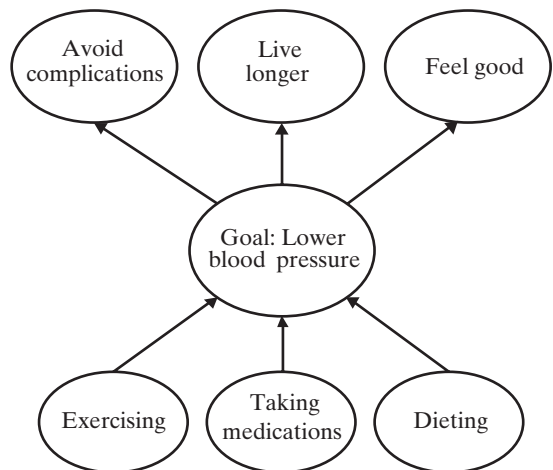


Figure 2. The three-tiered goal hierarchy.

initiation' in Fig. 1). The top of the hierarchy shown in Fig. 2 is termed, superordinate goals, and answers the question, 'Why do I want to achieve that for which I strive?'

Superordinate goals constitute the reasons or motives for goal striving and justify or rationalize one's chosen focal goal. Superordinate goals, thus, are similar in function to beliefs and evaluations found in the theory of reasoned action (Ajzen & Fishbein, 1980) and the theory of planned behavior (Ajzen, 1991). Three differences between the approach we present and expectancy-value models should be pointed out. First, unlike expectancy-value models, our approach does not examine evaluations, *per se*, but elicits superordinate goals. Because respondents self-identify superordinate goals that influence their actual, personally chosen focal goals (i.e. they provide superordinate goals personally important to them in the selection of a focal goal), this should generate superordinate goals that are potentially linked causally to attitudes, subjective norms and perceived behavioral control in a way analogous to beliefs and evaluations. Statistical tests (e.g. multiple regression, *t*-tests) can be used to verify the plausibility of these linkages.

Two other differences between expectancy-value models and the proposed approach reveal advantages of the latter over the former (see Bagozzi, Bergami, & Leone, 2003, p. 916). One advantage is that the proposed approach uncovers the structure among superordinate goals, if any, whereas expectancy-value models presume that all beliefs and evaluations combine multiplicatively and then summate to form a singular overall representation. Expectancy-value models can be disaggregated but pose statistical limitations not shared by the proposed approach (e.g. Evans, 1991). The advantage of examining superordinate goal structures is that individual superordinate goals may differentially affect attitudes, subjective norms and perceived behavioral control, whereas the standard expectancy-value model obscures differential effects, if any. The second limitation of the expectancy-value model is that it makes no provisions for examining linkages among beliefs. The proposed approach explicitly explores linkages among superordinate goals, and these linkages can be used as independent variables to test hypotheses explaining attitudes,

subjective norms and perceived behavioral control.

The right-hand side of Fig. 2 presents an abbreviated example of the goal hierarchy as applied to the focal patient goal of 'lowering my blood pressure'. Notice that three means or subordinate goals are displayed: exercising, taking medications and dieting. Likewise, three reasons (superordinate goals) motivating one to choose the focal goal of lowering blood pressure are shown: 'avoid health complications', 'live longer' and 'feel good'. The actual superordinate goals disclosed by patients in this research contains 11 or 12 superordinate goals, depending on gender, plus specific linkages among these superordinate goals arranged in a hierarchy. No linkages between superordinate goals are shown in Fig. 2 for simplicity, but will be investigated in the present study. We further investigated how the presence or absence of superordinate goals and their interrelationships differ across attitudinal, felt normative pressure, decision making and efforts at regulating one's blood pressure.

## Research approach

To uncover patients' superordinate goals and linkages between goals, we adapt an approach originally developed by researchers in commercial settings to discern motives of consumers for purchasing products or services (e.g. Reynolds & Gutman, 1988). This approach has been called, 'laddering', because people are asked to provide reasons for their choices according to a guided ordering of questions and responses ('ladderings') designed to elicit first the attributes of their choices, followed by the psycho-social benefits of these attributes and finally the instrumental and terminal values that the psycho-social benefits serve. While still popular in commercial settings, this first-generation procedure has been altered to better fit health and medical contexts. Instead of an *a priori* ordering of attributes, psycho-social benefits and values, the newer, second-generation procedure described here uncovers patients' superordinate goals by first asking for personal reasons for choosing a focal goal and then providing justifications for the personal reasons, followed by explanations of the justifications (Pieters, Baumgartner, & Allen, 1995). The

results of such an exercise are idiographic hierarchical superordinate goal structures which can be used to test hypotheses concerning their effects on decision making and actions and, through a process of aggregation and application of principles from network analysis, can be used to construct summary, heuristic diagrams of patient cognitive schemas concerning their motives for choosing a goal. The information provided in tests of hypotheses performed on the individual level of analysis and from the heuristic diagrams provides guidelines for communication strategies directed at influencing patient self-regulation of their hypertension, as developed and illustrated in the following.

The general, second-generation laddering procedure we use herein has found recent application by a number of researchers in the study of household recycling behavior (Bagozzi & Dabholkar, 1994), losing body weight (Bagozzi & Edwards, 1998; Pieters, Baumgartner, & Allen, 1995), purchasing consumer services (Pieters, Bottschen, & Thelen, 1998), supporting political candidates (Bagozzi & Dabholkar, 2000) and enlisting in the military (Bagozzi, Bergami, & Leone, 2003). However, the procedure has not been applied to medical behaviors, in general, or to hypertension, in particular.

### **The present study**

Hypertension may be defined as a regulatory disease in which there is an abnormal elevation of systemic arterial blood pressure. The Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure defines hypertension in an adult as mean systolic blood pressure (SBP) greater than or equal to 140 mm Hg and mean diastolic blood pressure (DBP) greater than or equal to 90 mm Hg or treatment with an antihypertensive medication. Depending on the criteria used for defining hypertension, the prevalence of hypertension is 27.6 percent in North America, compared to 44.2 percent in Europe with a range of 55 percent (Germany) to 38 percent (Italy) (Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC VI), 1997; Wolf-Maier et al., 2003). Hypertension is recognized as a leading public health threat and is the most

common risk factor for cardiovascular disease (US Department of Health and Human Services, 2000; Wolf-Maier et al., 2003).

The management of hypertension is largely under the control of patients. Due to the asymptomatic nature of the condition, the adverse effects associated with drug therapy and resistance to lifestyle changes, hypertensive patients often have different disease management strategies and different goals than those established by health care professionals. This study attempts to elucidate the therapeutic goals of hypertensive patients and evaluate their goal setting and its implications in a clinical setting.

We investigated the role of goal setting in the management of hypertension from both qualitative and quantitative perspectives. First, in the qualitative phase of the study, the bases for goal setting were investigated. In this phase, patients stated their goals with respect to reducing or maintaining blood pressure, as well as their reasons for holding these goals (i.e. superordinate goals), which we used to derive linkages between goals. Goals were coded and hierarchical goal structures constructed using principles from network analysis, as described later under Method and Results. Second, in the quantitative phase of the study, *t*-tests were used to examine the differences in means of attitudes, subjective norms, perceived behavioral control, desire, goal intentions and trying to reduce or maintain one's blood pressure between those holding a superordinate goal or not and between those mentioning a linkage between pairs of superordinate goals or not. These variables are common summary reactions investigated by attitude researchers (e.g. Ajzen & Fishbein, 1980), goal researchers (e.g. Gollwitzer, 1996) and health researchers (Bagozzi & Edwards, 1998) and represent contemporary attitude theory.

The qualitative phase of the study constituted an adaptation and operationalization of the laddering technique, which was originally derived for discovering consumption goals (e.g. Pieters et al., 1998). This procedure has been used only once before in a health-related setting, to the best of our knowledge, and was applied to a convenience sample of students who were trying to control body weight in everyday circumstances (Bagozzi & Edwards, 1998). In our study, the following interviewing

protocol was used, based on guidelines recently established by psychologists (e.g. Bagozzi, Bergami, & Leone, 2003). Actual patients were first asked to state their goals with regard to regulating hypertension and then to provide personal reasons for why they held their particular goals (see Method). Given the set of patient-generated reasons, we next asked patients to explain why each of the reasons they supplied for their goal was important to them. Finally, for the justifications given for each reason, patients were asked to provide a rationale why the stated justification, in turn, was important to them. The result of this procedure is a set of means-end chains explaining why one holds a particular goal and reasons for regulating one's blood pressure. These means-end chains can be summarized in implication matrices by use of network analysis and used to derive schemas ('maps', as illustrated later), where the maps represent heuristic summaries of patient cognitive schemas (i.e. knowledge structures; see Bagozzi, Bergami, & Leone, 2003).

## Method

### Sample and study site

Patients were recruited from a large university hospital hypertension clinic to participate in a study of the self-regulation of hypertension. Criteria for participation included: (1) being 18 years of age or older; (2) attending the clinic regularly (at least once every six months); and (3) having a diagnosis of hypertension within one year prior to completing participation in the study. The definition of hypertension was based on the JNC VI (1997) guidelines. Patients were excluded if they had impairments that inhibited them from completing the survey.

### Sample size

A sample size of 196 was calculated as appropriate for detecting a small effect when the null hypothesis is rejected at alpha of .05 and power of .80. The target sample size was derived based on the population effect size, gamma ( $\gamma$ ) of .2,  $\alpha$  (two-tailed) = .05 and delta ( $\delta$ ) of 2.80 which is equal to effect size times a function of the sample size (Cohen & Cohen, 1983; Weikowitz, Ewen, & Cohen, 1982). Therefore, based on the power analysis, the actual study sample size of 240 provided sufficient power for analysis purposes.

### Study design and data collection

Patients were asked to complete a written survey during a visit to the hypertension clinic. The survey contained two parts: a qualitative goal elicitation exercise and a quantitative inventory of closed-ended questions. The study protocol was approved by the University Institutional Review Board and all patients signed a consent form prior to participation.

### Measures

To operationalize and gather quantitative information to be used to examine differences in means between those who did and did not mention the goals (and linkages) discerned in the qualitative phase of the research (see later), the following variables were investigated: *Attitude toward success* in reducing/maintaining one's blood pressure was measured with three five-point semantic differential scales (Ajzen, 1991; Taylor, Bagozzi, & Gaither, 2001): 'unpleasant-pleasant', 'unhappy-happy', and 'bad-good'. The items were introduced with the following statement, 'Assuming I try to reduce (maintain) my blood pressure during the next four weeks and *succeed*, I think that it would make me feel . . .'

*Subjective norm* was measured with a five-point 'definitely should not-definitely should' item in response to the statement, 'When it comes to reducing (maintaining) my current blood pressure, I think that most people who are important to me think I . . .'

*Perceived behavioral control* was measured with three items (Ajzen, 1991; Armitage & Connor, 1999). The first item was, 'How much control do you feel you have over *trying to reduce (maintain)* your blood pressure during the next four weeks?', followed by a five-point scale going from 'no control' to 'total control'. The second item was, 'How much control do you feel you really have over *actually reducing (maintaining)* your blood pressure during the next four weeks?', followed by a five-point scale going from 'no control' to 'total control'. Finally, the third item asked participants to respond on a five-point scale from 'very difficult' to 'very easy' to the following statement: 'For me, *reducing (maintaining)* my blood pressure would be . . .'

*Desire* to reduce/maintain one's blood pressure was measured with two items (e.g. Perugini & Bagozzi, 2001; Perugini & Connor, 2000). The items were introduced by the statement, 'Please express your *desire* to reduce (maintain) your blood pressure during the next four weeks.' The first item was anchored with a disagree-agree format using a five-point scale, 'I *want* to reduce (maintain) my blood pressure during the next four weeks.' The second measure asked patients to indicate their degree of desire in response to the following statement, 'My *desire* to reduce (maintain) my blood pressure during the next four weeks can best be expressed as ...'. Six response alternatives were used: 'no desire at all', 'very weak desire', 'weak desire', 'moderate desire', 'strong desire' and 'very strong desire'.

*Goal intention* was measured with two items (Ajzen & Fishbein, 1980; Gollwitzer, 1996). The first item was introduced with, 'Please express how likely it is that you intend to reduce (maintain) your blood pressure during the next four weeks: I intend to reduce (maintain) my blood pressure during the next four weeks.' Responses were recorded with a five-point 'unlikely-likely' scale format. The second item was introduced with, 'Please indicate your extent of disagreement or agreement with the following statement: I plan to reduce (maintain) my blood pressure blood pressure during the next four weeks.' A five-point 'disagree-agree' format was used.

*Trying* was measured using four items (Taylor et al., 2001). All four items were expressed on five-point scales: 'not at all', 'very little', 'moderate amount', 'very hard' and 'extremely hard' and were introduced with the question, 'How *hard* did you try [to reduce/maintain your blood pressure] during the *past four weeks* in each of the following senses?': (1) devoting *time for planning* with respect to however you go about trying to reduce your blood pressure; (2) *expending a lot of energy* to reduce (maintain) your blood pressure; (3) maintaining your *will power* to reduce (maintain) your blood pressure; and (4) maintaining your *self-discipline* to reduce (maintain) your blood pressure. These items represent our attempt to capture specific instances of trying, which heretofore have been limited to measures of global or overall trying (e.g. Bagozzi & Warshaw, 1990; cf. Bagozzi & Edwards, 1998).

*Sociodemographic information* such as age, gender, household income level, education and living arrangements was collected as well. Hypertension-related information, such as total number of years with high blood pressure and medication adherence, was also obtained.

### *Instrument validity and reliability*

In this study, a confirmatory factor analysis (CFA) was conducted on the individual items to verify the hypothesized factors. The program, LISREL, was used (Jöreskog & Sörbom, 1996). We formed parcels of items so as to yield two to four indicators per factor as a basis for CFA, depending on the total number of indicators per factor. This approach has been termed the partial disaggregation model in the psychometric literature and tends to smooth out measurement error and yields a satisfactory ratio of sample size to number of parameters to be estimated (Bagozzi & Heatherton, 1994).

Criteria to assess the degree of convergent validity were the size of factor loadings, chi-square goodness of fit ( $\chi^2$ , d.f.), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), non-normed fit index (NNFI) and comparative fit index (CFI). Correlations among the latent variables were assessed for discriminant validity. The goodness-of-fit was satisfactory overall:  $\chi^2(67) = 203$ , RMSEA = .09, SRMR = .06, NNFI = .92 and CFI = .94. Based on the goodness-of-fit indicators, factor loadings and correlation matrix of factors, all hypothesized items were judged satisfactory indicators of their respective factors and displayed adequate convergent and discriminant validity. Construct validity was demonstrated for the items yielding 5 factors with 14 indicators, corresponding to attitudes, trying, perceived behavioral control, desire and goal intention (Jöreskog & Sörbom, 1996; see Table 1). Subjective norm was measured by a single item and was not included in the CFA. Table 1 summarizes the factor loadings and reliabilities of measures.

### *Qualitative elicitation procedure*

In the initial survey, a procedure for eliciting hierarchical goal structures, similar to the laddering technique, was utilized to uncover cognitive schemas related to goal pursuit in the



Table 1. Factor loadings and reliabilities for measures

Construct/items	Factor loading	Reliability
Attitude toward success		.94
Unpleasant-pleasant	.93	
Unhappy-happy	.95	
Bad-good	.87	
Trying		.90
Time for planning	.72	
Expending a lot of energy	.73	
Will power	.90	
Self-discipline	.95	
Perceived behavioral control		.83
Control over trying	.94	
Control over actual behavior	.85	
Difficult-easy	.60	
Desire		.79
Want	.78	
Desire	.84	
Goal intention		.85
Intend	.82	
Plan	.90	

management of hypertension. A data collection protocol was developed based on previous research by Bagozzi and Edwards (1998). This elicitation process formed the basis of goal setting in the management of high blood pressure. Specifically, cognitive schemas were uncovered by first asking patients whether they had a focal goal to: (a) reduce their blood pressure; (b) maintain their current blood pressure; or (c) whether they had no goal one way or the other. Then depending on their stated focal goal, patients provided personal reasons for wanting to reduce or maintain their blood pressure (only 17 patients indicated that they had no goal). Given the set of self-generated reasons, patients were next asked to explain why each of the reasons was important to them. More specifically, patients were asked to list up to five personal reasons for wanting to reduce or maintain their blood pressure and to enter these separately in the left-most column of boxes on a page in the questionnaire (see Appendix). Next, they were instructed to consider the first reason they provided, think about why it was important to them, and place their open-ended answer in

the first box in column 2. Patients were then asked to address this second-level justification and explain why it was important to them. Their reasons were entered in a cell in column 3, adjacent to its corresponding second-level reason in column 2. The process was repeated until all first-level reasons were explained up to three levels. The net result was a table of 5 rows and 3 columns of ordered goals. In sum, each patient could indicate up to 15 goals and 10 linkages between goals (see Appendix).

After coding responses and by the use of principles from network analysis, maps of hierarchical cognitive schemas were constructed based on the content and sequence of justifications supplied for patients' goals (see Bagozzi & Edwards, 1998). In analyzing the structure of the goals, we constructed an implication matrix. The implication matrix displays the number of times each goal leads to each other goal for patients. The information in the implication matrix can be used to yield visual representations of the hierarchical arrangements among the superordinate goals to produce a heuristic visualization of cognitive schemas, as displayed later

under Results. Cut-off levels for the occurrence of linkages were selected to assist in interpretation of the maps and based on the principle of achieving as comprehensive a visualization of cognitive schemas as possible within the limits of interpretability from a presentation standpoint (see Pieters et al., 1995 for a description of criteria for cut-offs). The result is a structured network comprised of sequences of reasons (i.e. superordinate goals) explaining why one holds a particular hypertension management goal. It should be noted that the cognitive schemas as constructed are heuristic summaries of patients' goals and relationships among goals for the entire sample. In tests of hypotheses, the actual idiosyncratic goals and linkages between goals for each patient are used to ascertain the dependence of attitudes, subjective norms, desires, perceived behavioral control, trying and intentions on cognitive schemas as part of a cross-patient analysis. In other words, the schemas provide a summary of key goals and their interconnections for the sample as a whole, whereas the tests of hypotheses are conducted at the disaggregate, individual respondent level of analysis for all goals and interconnections in a cross-sectional design.

### **Data analysis**

To determine if differences exist between those respondents who: (1) mentioned a goal or not; and (2) mentioned a linkage or not, *t*-tests were conducted with the dependent variables contained in the model. That is, to validate the influence of goals and linkages between goals on attitude toward success, subjective norms, perceived behavioral control, desires, goal intentions and trying, *t*-tests were utilized. An a priori significance level of 0.05 was used.

## **Results**

### **Patient characteristics**

Two-hundred and ninety-three patients agreed to participate in the study; 240 patients returned the full closed-end survey, while 219 patients completed the open-ended laddering portion. The overall study response rate was 84 percent. The mean age of the patients was 59.6 years (SD = 11.6). Eighty-five percent of the patients ranged in age from 40 to 80 years old; 67 percent reported their health status as good or very

good. One hundred and twenty-one men and 119 women completed the survey. The majority of the patients were white (80%), the rest Asian, Black or 'other'. A majority of the respondents (52%) reported total household incomes greater than \$50,000. A large percentage (73.8%) of the patients had some college or more education. Twenty percent of the patients lived alone. The mean number of years with hypertension was 18 years (SD = 11.2). The majority (67%) of the patients reported adherence to their antihypertensive medication(s). In regards to goals, 48 percent had a goal to reduce their blood pressure, 45 percent had a goal to maintain their current blood pressure and 7 percent did not have a goal one way or the other with respect to their blood pressure.

### **Psychometric evaluation**

The items representing each factor in Table 1 were averaged, where the scales represent the constructs: attitude toward success, desire, perceived behavioral control, goal intentions and trying. Attitude toward success (Cronbach  $\alpha = .94$ ; 3 items) reflected one factor that measured attitude toward the target goal. Perceived behavioral control ( $\alpha = .83$ ; 3 items) represented perceived control over hypertension. Desire ( $r = .79$ ; 2 items) represented the desire to reduce or maintain blood pressure. Goal intention ( $r = .85$ ; 2 items) consisted of items related to volition concerning the management of hypertension, and trying ( $\alpha = .90$ ; 4 items) represented current behavior associated with hypertension management. As the confirmatory factor analysis supported construct validity, and the coefficient values demonstrated internal consistency of the summated scales, the items were averaged and a mean composite score calculated for each summated scale: attitude toward success ( $M = 4.43$ ,  $SD = .62$ ); perceived behavioral control ( $M = 3.31$ ,  $SD = .84$ ); desire ( $M = 4.37$ ,  $SD = .65$ ); goal intention ( $M = 4.22$ ,  $SD = .72$ ) and trying ( $M = 3.34$ ,  $SD = .84$ ). Subjective norms were measured with a single item, and therefore reliability cannot be computed for this variable (see Table 1).

### **Hierarchical goal structures**

The 219 respondents who completed the qualitative laddering portion of the questionnaire

mentioned a total of 1901 superordinate goals as explanations for wanting to reduce or maintain blood pressure and 774 linkages among the goals, for an average of 8.7 goals and 3.5 linkages, respectively, per patient. The idiosyncratic responses were content analyzed by two independent raters to identify the goals of patients in the management and control of hypertension. Interrater reliability was conducted to ensure consistency among the raters (Perrault & Leigh, 1989). The percentage agreement was 81 percent, and disagreements were resolved and all responses classified. Based on the content analysis, 13 categories of goals were derived. A complete listing of the goals with corresponding examples from the content analysis can be found in Table 2 (i.e. sentence stems from actual patient responses).

From the content analysis, the goals of individuals regarding the management (i.e. reduction or maintenance) of their blood pressure were evaluated and implication matrices constructed separately for men and women. The matrices are displayed in Tables 3 and 4. The matrices also show the number of times each goal leads to another goal. For example, women mentioned that promotion of health ('promote health' in Table 3) leads to overall enhanced

quality of life for 27 respondents. The information in the implication matrix is used to produce summary visual representations of the hierarchical arrangements among superordinate goals. From the implication matrices, hierarchical cognitive schemas were constructed with respect to patients' reasons for desiring to reduce or maintain their blood pressure, where the cut-off level was 6. By these criteria, 12 goals were found for men and 11 were found for women, with 10 in common (only women disclosed 'overcoming genetic predispositions' and only men disclosed 'avoid medical intervention' and 'personal goal').

In selecting a cut-off level, we accounted for the total number of connections that patients made between goals. The information contained in Table 5 was used to aid in the decision to select a cut-off level. In the implication matrix, cells with entries at or above the chosen cut-off level are referred to as 'active cells'. The number of active cells for cut-off levels (1 through 8) can be found in column 1. For example, at the cut-off level of 3, the numbers of active cells are 34 and 44 for men and women, respectively. The table also contains columns with the number of active cells at each cut-off level expressed as a proportion of the number of

Table 2. Goals and examples from qualitative information

<i>Goals</i>	<i>Examples of statements made by patients</i>
Promote health	Improve health, maintain health, for my health, overall health, good health, feel better
Prevent disease	Prevent heart attack, stroke, kidney/renal disease, angina, diabetes, glaucoma (eye problems)
Longevity	Longer life, want to live, live life longer
Quality of life	Good life, well-being, better life, productive life
Avoid premature death	Don't want to die, fear the grim reaper
Active lifestyle	Maintain and promote activity (i.e. travel, sports)
Avoid medical interventions	Avoid surgery, rehabilitation, hospitalization, office visits, dialysis, freedom from drugs
Self-reliance	Control of life, control of medical destiny, not burdening others, self-reliance, independent
Meet family obligation	Care for loved ones, be there for them, spend time with them, provide for them
Emotional health	Reduce anxiety and fear
Prevent disability	Don't want to become invalid, incapacitated, keep body together, don't want to suffer
Overcoming genetic predispositions	Family history of hypertension
Personal goal	Have many life goals want to achieve; want the satisfaction of achieving personal goals

Table 3. Implication matrix and prominence indices for goals associated with regulating hypertension for women ( $N = 113$ )

	<i>Prominence indices</i>														<i>I + O</i>	<i>abstractness</i>	<i>prestige</i>	<i>centrality</i>
	<i>I</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>	<i>13</i>	<i>out</i>				
1 Prevent disease		12	5	9	17	9	7	5	3	7	0	10	5	89	104	0.14	0.04	0.25
2 Promote health	7		1	19	1	27	1	12	8	1	5	6	20	108	144	0.25	0.09	0.35
3 Avoid medical intervention	1	3		0	0	2	0	1	0	1	0	3	2	13	21	0.38	0.02	0.05
4 Longevity	1	3	0		0	6	1	4	0	1	4	0	36	56	93	0.40	0.09	0.23
5 Prevent disability	2	1	0	0		1	0	1	0	0	0	16	2	23	46	0.50	0.06	0.11
6 Quality of life	1	6	1	5	1		0	11	4	0	1	1	8	39	100	0.61	0.15	0.24
7 Avoid premature death	0	0	0	1	2	0		0	0	0	1	1	2	7	18	0.61	0.03	0.04
8 Active lifestyle	0	3	0	1	0	10	0		1	0	0	3	5	23	63	0.63	0.10	0.15
9 Emotional health	1	5	0	0	0	0	1	1		0	3	0	1	12	33	0.64	0.05	0.08
10 Overcoming genetic predispositions	2	0	1	2	0	0	0	0	0		0	0	0	5	15	0.67	0.02	0.04
11 Personal goal	0	2	0	0	0	2	0	1	0	0		1	0	6	23	0.74	0.04	0.06
12 Self-reliance	0	0	0	0	1	0	0	2	0	0	0		8	11	56	0.80	0.11	0.14
13 Meet family obligation	0	1	0	0	1	4	1	2	5	0	3	4		21	110	0.81	0.22	0.27
In degrees	15	36	8	37	23	61	11	40	21	10	17	45	89	413				
Mentions per goal	129	183	30	87	28	107	15	91	60	21	33	70	164					
# mentioning goal >1	75	95	19	70	19	61	11	47	30	12	25	38	70					
Percent	66	84	17	62	17	54	10	42	27	11	22	34	62					

I + O = indegrees plus outdegrees

Table 4. Implication matrix and prominence indices for goals associated with regulating hypertension for men (N = 106)

	<i>Prominence indices</i>													<i>out</i>	<i>I + O</i>	<i>abstractness</i>	<i>prestige</i>	<i>centrality</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>	<i>13</i>					
1 Prevent disease		22	8	2	17	8	6	0	10	2	4	4	9	92	103	0.11	0.03	0.29
2 Promote health	8		11	6	6	0	0	1	21	25	7	0	11	96	129	0.26	0.09	0.36
3 Longevity	0	1		0	0	3	0	5	9	1	1	0	27	47	75	0.37	0.08	0.21
4 Emotional health	1	1	1		1	0	0	1	6	2	0	0	2	15	31	0.52	0.04	0.09
5 Prevent disability	0	0	0	2		1	1	0	2	5	8	0	1	20	48	0.58	0.08	0.13
6 Avoid premature death	0	0	3	0	0		0	2	1	2	0	1	2	11	28	0.61	0.05	0.08
7 Avoid medical intervention	0	2	0	1	0	0		0	0	0	0	0	1	4	11	0.64	0.02	0.03
8 Personal goal	0	1	0	1	0	2	0		1	1	1	0	1	8	23	0.65	0.04	0.06
9 Quality of life	2	4	3	1	2	2	0	2		5	3	0	8	32	93	0.66	0.17	0.26
10 Active lifestyle	0	2	0	2	1	0	0	4	6		1	0	6	22	66	0.67	0.12	0.18
11 Self-reliance	0	0	0	0	1	0	0	0	0	1		0	3	5	30	0.83	0.07	0.08
12 Overcoming genetic predispositions	0	0	1	0	0	0	0	0	0	0	0		0	1	6	0.83	0.01	0.02
13 Meet family obligation	0	0	1	1	0	1	0	0	5	0	0	0		8	79	0.90	0.20	0.22
In degrees	11	33	28	16	28	17	7	15	61	44	25	5	71	361				
Mentions per goal	140	166	76	49	33	29	12	26	103	81	27	9	132					
# mentioning goal >1	58	84	57	27	25	23	10	22	64	50	20	7	60					
Percent	55	79	54	26	24	22	9	21	60	47	19	7	57					

I + O = indegrees plus outdegrees

possible (non-diagonal) cells in the implication matrix and the number of active cells at each cut-off level expressed as a proportion of the number of active cells for a cut-off level of 1. For example, cells that are active at a cut-off level of 1 represent a connection between two goals that is mentioned at least once, across all subjects and linkages. Column 4 of Table 5 depicts the number of connections between goals of active cells at each cut-off. As depicted in column 4, the number of linkages between active cells decreases as the cut-off level increases. To obtain the number of linkages, the number of times the selected cut-off appears in the implication matrix is counted and multiplied by the cut-off level, which represents the number of linkages, and the result is subtracted from the number of linkages in the previous row. For men, if 2 is selected as the cut-off level, the number of times that 2 appears in the implication matrix is counted (15) and multiplied by 2, then the result is subtracted from 361, resulting in 331 linkages. Column 5 indicates the proportion of the total number of connections actually made by patients at each of the cut-off levels.

We used the following heuristic for choosing a cut-off level (see Pieters et al., 1995, 1998). We compared the proportion of active cells in the implication matrix, summarized in columns 2 and 3 in Table 5, to the proportion of all connections between goals accounted for at a given cut-off (column 5). This method most directly accounts for a large percentage of the total

number of goal connections made by the patients with a small number of distinct relations between goals. Based on this heuristic, a cut-off level of 6 was selected as most appropriate in our case. At this cut-off level, we can account for 68 and 66 percent of all connections between goals made by men and women, respectively (column 5) using only 14 percent of all possible cells in the implication matrix (column 2) and only 27 and 25 percent of the cells that contain a non-zero entry (column 3). Note that a cut-off of 5 yields an incomprehensible, cluttered diagram, while a cut-off of 7 yields too sparse a diagram, for purposes of interpretation.

Hierarchical goal structures were then constructed to show the ordering of goals from concrete to abstract and the key paths among goals (see Figs 3 and 4). This was done by plotting each goal and linking the goal to other goals to which it serves as an origin or target, according to the implication matrix. The goals in Figs 3 and 4 are arranged vertically according to their scores on abstractness (see Tables 3 and 4).

From the hierarchical goal structures, it can be seen that the concrete goals (e.g. 'prevent disease', 'promote health') work through intermediary goals (e.g. 'quality of life') and indirectly lead to abstract end-state goals (e.g. 'family obligation'). The goals in Figs 3 and 4 can be grouped into three categories that reflect the desire of patients to be autonomous, fulfill family obligations and maintain overall quality of life and well-being.

Table 5. Statistics for determining a cut-off level for men and women

<i>Cut-off</i>	<i>(1) Number of active cells</i>	<i>(2) Number of active cells as a proportion of all cells</i>	<i>(3) Number of active cells as a proportion of all cells mentioned at least once</i>	<i>(4) Number of active linkages</i>	<i>(5) Number of active linkages as a proportion of all linkages</i>
1	83 (89) <sup>a</sup>	0.53 (0.57)	1.00 (1.00)	361 (413)	1.00 (1.00)
2	51 (55)	0.33 (0.35)	0.61 (0.62)	331 (379)	0.92 (0.92)
3	34 (44)	0.22 (0.28)	0.41 (0.49)	297 (355)	0.83 (0.86)
4	30 (34)	0.19 (0.22)	0.36 (0.38)	282 (331)	0.78 (0.80)
5	26 (30)	0.17 (0.19)	0.31 (0.34)	266 (311)	0.74 (0.75)
6	22 (22)	0.14 (0.14)	0.27 (0.25)	246 (271)	0.68 (0.66)
7	15 (19)	0.10 (0.12)	0.18 (0.21)	210 (253)	0.58 (0.61)
8	14 (16)	0.09 (0.10)	0.17 (0.18)	203 (232)	0.56 (0.56)

<sup>a</sup> Men not in parentheses; women in parentheses

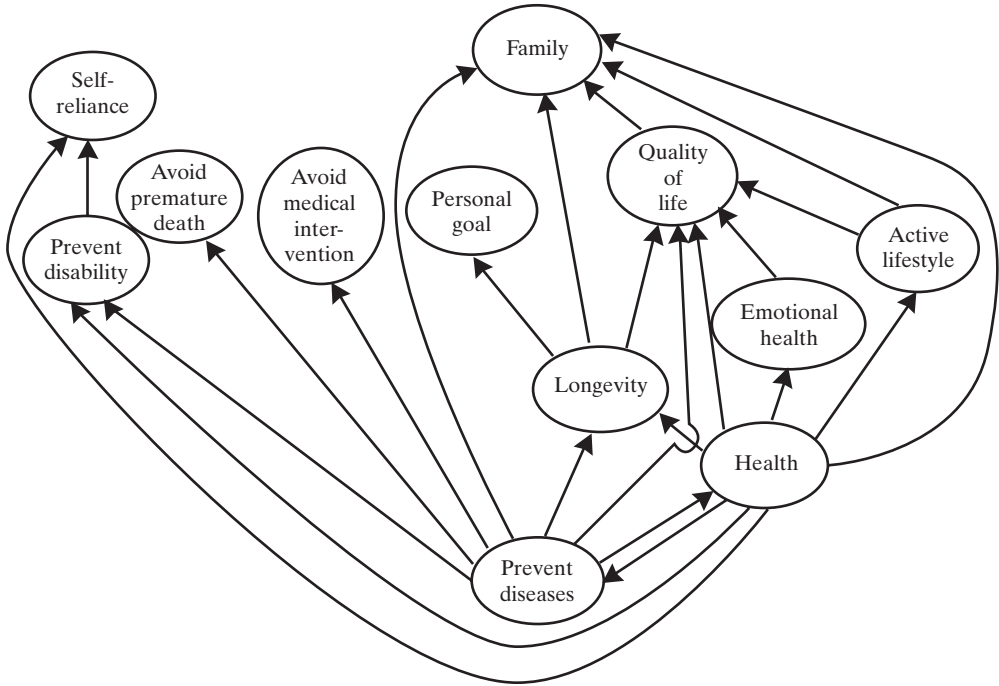


Figure 3. Hierarchical goal structures for men.

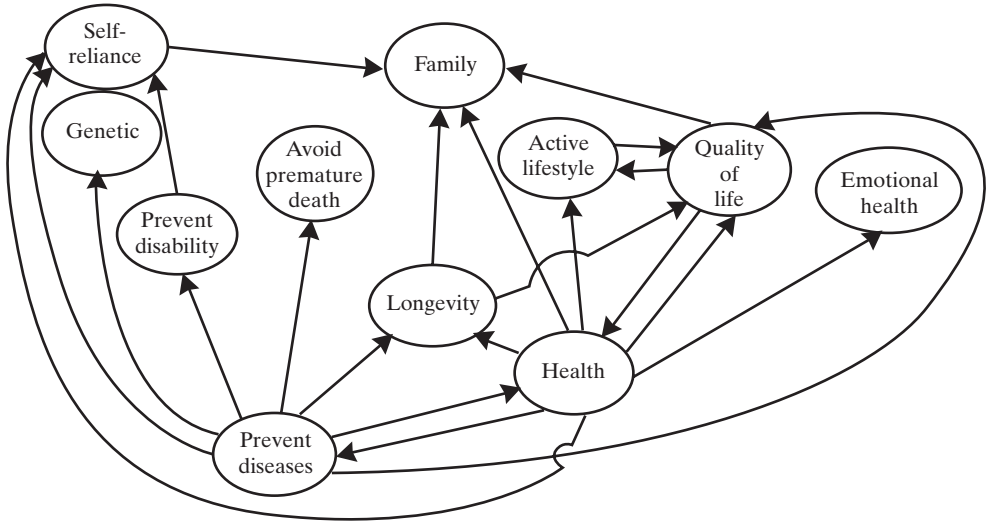


Figure 4. Hierarchical goal structures for women.

As mentioned, some goals are more abstract than other goals. A formal measure of abstractness is calculated by taking the ratio of in-degrees to the sum of in-degrees plus

out-degrees (see Tables 3 and 4). In-degrees are how often a goal is the object or end of a relation, whereas out-degrees indicate how often the goal is a source or origin (Bagozzi &

Edwards, 1998). This ratio measures the proportion of times a goal is the destination in the hierarchy. Goals that are thought to be more abstract are more likely to be end-state goals. 'Family obligation' was at the highest level of abstractness for both men and women. Some goals at an intermediate level of abstraction were ends as well as sources and included, for example, 'self-reliance', 'quality of life', 'emotional health' and 'personal goal'. At the lowest level of abstraction for men and women was the goal, 'prevent disease' (see Figs 3 and 4).

Goal importance can be determined by calculating prominence indices (Faust & Wasserman, 1992). By examining prominence indices, we were able to assess the degree to which a goal serves as a source and/or object in the goal hierarchy. Additionally, prominence indices depict the relative salience of a goal relative to other goals. The prominence index, *prestige*, is computed as the ratio of in-degrees of a specific goal to the total number of cell-entries in the implication matrix. This essentially measures the extent to which a particular goal is the target of other goals. In the present study, 'family obligation' was the most important goal for women, followed by 'quality of life', in terms of number of goals leading to it. For men, the most important goal was 'quality of life', followed by 'active lifestyle'. The prominence index, *centrality*, is computed as the ratio of the sum of in-degrees plus out-degrees for a particular goal to the total number of cell-entries in the implication matrix. This index shows the frequency that a particular goal is involved in linkages with other goals. The most central goal for both men and women was 'promote health'. The prominence indices can be found in Tables 3 and 4 for men and women, respectively.

Another indicator of goal organization in a cognitive map is the centralization index (Faust & Wasserman, 1992; Freeman, 1979). This index ranges from 0 to 1, inclusive. The index equals 1 when one goal is connected to all other goals and none of the other goals is connected to any other. This is the so-called 'asterix' pattern, where one goal dominates all others. An index of 0 indicates that all goals have exactly the same centrality index; in other words, no goal dominates. This is the circular pattern. The centralization index thus measures the extent to which one goal is central and the others are

peripheral (Bagozzi & Edwards, 1998). For men, the centralization index was .56, and for women the index was .60, where the most central goal for both groups was 'promote health'; this goal channels the flow of influence of a number of goals and functions to bind goals together in the network (see Figs 3 and 4).

To address underlying motives, cognitive schemas were investigated separately for men and women, because previous research suggests that men and women differ somewhat in decision making with respect to the self-management of hypertension (e.g. Taylor et al., 2001). But the similarities across gender and across goal outcome suggest that no significant differences exist when gender and goal outcome are allowed to vary. In analyzing the hierarchical goal structures, the prominence indices were similar for men and women. From the figures, the overall goals 'self-reliance', 'family obligation' and 'emotional health' were the highest motivations of both men and women for reducing or maintaining blood pressure. The goals reflect the desire to remain autonomous, to fulfill family obligations and to maintain overall quality of life and well-being. Nevertheless, there were differences between men and women. Men had a somewhat more complex goal hierarchy than women. Men had 12 goals and 23 linkages, with 10 extended paths. Women had 11 goals and 22 linkages, with 7 extended paths. Overall, however, the goal hierarchies were remarkably similar for men and women. Similar goal hierarchies were found for people attempting to lower their blood pressure and people trying to maintain their blood pressure, when men and women were combined. The sample sizes were too small to do separate analyses for the four samples marked by gender-by-goal (reduce/maintain) combinations.

### *Exploring the effects of goals and linkages*

To gain further insight into the role of goals and linkages in the self-regulation of blood pressure, goals and linkages were treated as independent variables, and variables contained in traditional attitude theories (e.g. attitude, desire, intention) were treated as dependent variables. To test the differences between those patients that mentioned the goal and those that did not mention the goal, *t*-tests were conducted. The



*t*-tests were also used to assess differences with respect to the presence of linkages. Because of sample size restrictions, the analyses were performed on the combined sample of men and women. Given the results reported earlier, showing the similarity in goals and goal structure for men and women, this should pose no problem.

Based on the analyses, there were significant differences for the goal, 'family obligation'. The differences in the means for those who mentioned the goal, 'family obligation', on subjective norm and desire were significant ( $t = 2.80, p = .01$  and  $t = 2.07, p = .04$ , respectively). This suggests that subjective norms and the desire to reduce or maintain one's blood pressure are functions of the goal, 'family obligation'.

Table 6 shows that there are many significant differences in means of the dependent variables for those who mentioned specific linkages versus those who did not mention specific linkages. Specifically, significant differences occurred for the following linkages: 'promote health' → 'active lifestyle', 'promote health' → 'family obligation', 'promote health' → 'emotional health', 'promote health' → 'prevent disability', 'prevent disease' → 'promote health', 'prevent disease' → 'avoid medical intervention', 'prevent disease' → 'avoid premature death', 'prevent disease' → 'quality of life', 'prevent disease' → 'overcoming genetic predispositions', 'prevent disease' → 'family obligation', 'prevent disease' → 'self-reliance', 'longevity' → 'family obligation', 'quality of life' → 'promote health', 'quality of life' → 'active lifestyle' for the dependent variables (see Table 6). For example, those who mentioned 'promote health' → 'active life style' had a stronger attitude toward reducing or maintaining their blood pressure ( $t = 2.37, p = .02$ ).

## Discussion

We explored hypertensive patients' reasons for choosing to reduce or maintain their blood pressure, using a cognitive elicitation process to generate idiographic responses. The current research represents one of the first studies to investigate the use of both means-end chain theory and goal setting theory in a health or medical context with actual patients. One of our

objectives was to discover the key superordinate goals that hypertensive patients have in the self-management of their blood pressure and the hierarchical relationships among these superordinate goals.

Overall, 13 key superordinate goals were uncovered (see Table 2). The goals can be seen to cluster into three categories: self-determination, family obligation and quality of life. Self-determination reflects patients' desire to achieve a certain degree of control over their blood pressure and its physical consequences (e.g. 'self-reliance', 'avoid medical intervention', 'prevent disease', 'avoid premature death'). Family obligation expresses patients' concern for their loved ones and significant others (e.g. 'I want to see my grandchildren grow up', 'My children need me'). Quality of life addresses patients' personal end-state goals for well-being and health (e.g. 'longevity', 'emotional health', 'active lifestyle'). The three goal clusters are similar to the three fundamental categories of human needs identified by Ryan and Deci (1999); i.e. the need for autonomy, relatedness and effectance, respectively. However, Ryan and Deci (1999) did not explore the relationships among human needs, which was one of the focal questions studied in our investigation. Psychologists have termed such categories of needs or goals, 'declarative knowledge', which refers to cognitive representations of factual information and abstract ideas (Anderson, 1983).

In addition to identifying individual superordinate goals, we investigated the linkages among superordinate goals. The pattern of linkages and sequence of patient elicitation of the goals permitted us to organize them into a hierarchical structure by use of network analysis principles. The hierarchical arrangements are displayed in Figs 3 and 4, where we can see that the superordinate goals are interconnected and are suggestive of if-then propositions (e.g. 'if I prevent disease, I will prolong my life'). Psychologists term such mental connections, 'procedural knowledge' (Anderson, 1983).

Some goals are more central than others. 'Promote health' was the most central goal for men and women and had a total of nine paths leading to or from it. 'Prevent disease' and 'quality of life' were also central goals with eight and six linkages to other goals, respectively, for men, and eight and seven linkages, respectively,

Table 6. The *t*-test for linkages

Linkages	Dependent variable	<i>t</i> -value ( <i>p</i> -value)
Promote health → Active lifestyle	Attitude toward success	2.37 (.02)
Promote health → Active lifestyle	Trying	2.13 (.04)
Promote health → Meet family obligation	Attitude toward success	2.87 (.01)
Promote health → Meet family obligation	Subjective norm	2.60 (.01)
Promote health → Emotional health	Trying	2.58 (.01)
Promote health → Prevent disability	Goal intention	2.37 (.02)
Prevent disease → Avoid medical intervention	Trying	2.03 (.04)
Prevent disease → Avoid premature death	Desire	3.84 (.00)
Prevent disease → Quality of life	Desire	2.59 (.01)
Prevent disease → Avoid premature death	Goal intention	2.76 (.01)
Prevent disease → Avoid premature death	Perceived behavioral control	2.73 (.01)
Prevent disease → Overcoming genetic predispositions	Perceived behavioral control	2.41 (.03)
Prevent disease → Meet family obligation	Subjective norm	6.02 (.00)
Prevent disease → Avoid premature death	Subjective norm	2.01 (.05)
Prevent disease → Overcoming genetic predispositions	Subjective norm	5.28 (.00)
Longevity → Meet family obligation	Desire	2.22 (.03)
Quality of life → Promote health	Desire	2.15 (.03)
Quality of life → Active lifestyle	Attitude toward success	2.24 (.04)

for women. Because spreading activation theories of memory posit that affect connected to ideas can be aroused and the arousal spreads to ideas and other affect connected to the aroused state, central superordinate goals might be targeted by change agents as routes to attitude change and motivation (Anderson, 1983).

Although it is useful to examine links between pairs of goals, further insight can be gleaned by tracing the full length of paths from lower- to higher-level goals. For men, four paths involved four linkages: 'prevent disease' → 'promote health' → 'emotional health' → 'quality of life' → 'family obligation'; 'prevent disease' → 'promote health' → 'active lifestyle' → 'quality of life' → 'family obligation'; 'prevent disease' → 'promote health' → 'longevity' → 'quality of life' → 'family obligation'; and 'promote health' → 'prevent disease' → 'longevity' → 'quality of life' → 'family obligation'. For women, one path traverses five linkages: 'quality of life' → 'promote health' → 'prevent disease' → 'prevent disability' → 'self-reliance' → 'family obligation'. Also for women, three paths encompassed four linkages: 'prevent disease' → 'promote health' → 'longevity' → 'quality of life' → 'family obligation'; 'quality of life' → 'promote health' → 'prevent disease' → 'self-reliance' → 'family obligation'; 'quality of life' → 'promote health' → 'prevent disease' →

'longevity' → 'family obligation'. These paths point to indirect routes for influencing higher-order superordinate goals. That is, a change agent might influence an end-state superordinate goal by targeting one or more of its upstream causes. This would be a viable strategy where an end-state is difficult or unethical to target directly.

One value of uncovering patients' hierarchical superordinate goal structures is the information it provides to health care change agents for effective communication of therapeutic strategies. The goals and linkages supply first-hand information on the specific thoughts, inferences and values patients place on their hypertension control goals. The information is first-hand because it is expressed in the words and concepts used by patients. This permits change agents the opportunity to gain an understanding of the patient from the patient's point of view. The interpretive information can be used as input to persuasive appeals in therapy, brochures, advertisements, telephone communications and other media designed to communicate to patients.

Heretofore, such leading health care frameworks as the health belief model (e.g. Sheeran & Abraham, 1996), protection motivation theory (Rogers, 1983), the theory of reasoned action (Ajzen & Fishbein, 1980) and the theory

of planned behavior (Ajzen, 1991) have relied on researcher-provided criteria for decision making and self-regulation. In addition, the leading frameworks do not model the implicit inference processes patients undergo in goal setting. For example, the theory of planned behavior, arguably the most frequently applied model in contemporary health research (e.g. Connor & Sparks, 1996), ascertains beliefs about the consequences of acting, sources of normative pressure to act and control over one's actions. But the theory of planned behavior, like other leading frameworks, does not account for the relationships among beliefs. Our study explicitly attempted to examine linkages among beliefs as they relate to procedural-like knowledge in patient inference making with regard to goal setting.

A second objective of the study was to evaluate the impact of goal setting on specific dependent variables: attitudes toward success, subjective norms, desire, goal intentions, perceived behavioral control and trying. By using *t*-tests, we investigated the differences in means for the dependent variables for those patients that mentioned a superordinate goal and those patients who did not mention a superordinate goal. Additionally, the mean differences on the dependent variables were assessed for those patients that mentioned linkages between superordinate goals and those patients that did not. The differences in the means for those who mentioned the goal, 'family obligation', on subjective norm and desire were significant. Felt normative pressure was a function of the goal 'family obligation'. Desire was also a function of the goal, 'family obligation'. This appears to be a gateway goal for persuasive communication.

Differences in the means were found for 18 linkages between superordinate goals. For example, attitude toward success of reducing or maintaining blood pressure was found to be a function of the linkages 'promote health' → 'active lifestyle' and 'promote health' → 'family obligation'. The presence of the linkage between these superordinate goals explained hypertensive patients' attitudes toward successfully reaching their goals. Table 6 shows that linkages between goals explain attitudes, subjective norms, perceived behavioral control, desire, goal intention and trying. These dependent variables

represent the key variables in the theory of reasoned action, the theory of planned behavior and the model of goal-directed behavior, and thus provide linkages to these theories. That is, the present study can be considered as an investigation of the *bases for* attitudes, subjective norms, desires, perceived behavioral control, intention formation and trying analogous to that found in expectancy-value models but without the disadvantages noted in the introduction of this article. The present study showed that patient-generated superordinate goals and linkages between these goals are important antecedents of the subjective and more abstract variables found in contemporary theories. The two most pervasive and influential goals found in our study in terms of influencing abstract psychological states were 'promoting health' and 'preventing disease'. Along with 'meeting family obligations', these appear to be the most fruitful targets for persuasive communications.

The validation of the impact of superordinate goals and linkages between superordinate goals on the dependent variables has practical relevance in the following sense. It verifies which particular superordinate goals and inferences are relevant for decision making, volition and trying efforts with respect to the patient's hypertension goals. Again, this information is provided from the patient's perspective and can be used to design persuasive appeals in therapeutic and communication contexts.

### Limitations

The data were collected in a hypertension clinic where respondents were often referred by their primary care physician, and therefore generalization of results to other hypertensive patients from other health care settings should be done with caution. Additionally, the present data are correlational and therefore preclude causal inferences. A final limitation relates to the laddering procedure. In the present study, patients were restricted to five reasons for reducing or maintaining blood pressure, and three layers of underlying motivations. Although this procedure has been found to work well in past research (e.g. Bagozzi, Bergami, & Leone, 2003; Bagozzi & Dabholkar, 1994; Bagozzi & Edwards, 1998), it is possible that more information can be gained by

increasing the number reasons and justifications for reasons (cf. Bagozzi & Dabholkar, 2000).

## Conclusion

Our research proposes to advance an area that is a growing public health threat. The mortality and morbidity data suggest that cardiovascular conditions remain a significant societal problem from health and economic perspectives. By examining the self-regulation of patients with hypertension, change agents can design interventions to improve the health status of this population, which in turn can subsequently reduce morbidity and ultimately mortality. Much research has been conducted related to the treatment and prevention of associated health conditions. But research is limited into the strategies that individuals take to manage their own health conditions. A new procedure for modeling cognitive schemas was introduced herein to elicit patients' actual thoughts and self-justifications for their thoughts and goal selection. The research evaluated the utility of this methodology in the assessment of health-related goals of patients with hypertension.

As demonstrated in the study, the use of cognitive schemas adds value as a means of searching for and understanding goals of patients with chronic health conditions. First, the research provides information on particular superordinate goals of patients in regards to the management of their chronic conditions. Specifically, the research utilized a hierarchical goal structure methodology to identify the actual goals of patients with hypertension and

the relationships among these goals. This information is important because it is derived from the patient's perspective, not assumed a priori (i.e. it focuses on self-set goals versus assigned goals), and provides insight into how patients form goals, how the reasons for goal pursuit are stored in memory and how one superordinate goal influences another. Second, the research examined attitude toward success, subjective norms, perceived behavioral control, desire, goal intentions and trying of patients in their efforts to lower or maintain their blood pressure. These classic variables selected from frameworks commonly used in health care research were shown to be functions of patients' goals and especially linkages between goals.

With the growing emphasis on primary illness prevention, health care providers are concerned with persuading individuals to adopt the types of behaviors that reduce the risks of coronary artery disease and stroke or promote health-enhancing behaviors. The information obtained from the present study may be used to influence individual health behavior in the management of chronic conditions. The results of this study provide useful information to health care professionals in the development of health education materials and intervention strategies. Because we are in the early stages of investigating cognitive schemas and their influence on health behavior, it would be informative to study patients with recent diagnoses of hypertension and across the socioeconomic spectrum, in addition to the types of patients we investigated herein.

**Appendix**

We would like you to express *your personal reasons* for reducing your blood pressure. For the questions below, please follow this sequence: 1. List five reasons you have for wanting to reduce your current blood pressure and place these in the boxes in Column #1 under REASONS. 2. Then take your first reason and think about why this is important to you. Place your answer in the box adjacent to your first reason in Column #2 (if you have difficulty identifying why the reason is important to you, think about how you would feel if the reason was thwarted or did not take

place). 3. After answering why your first reason is important to you, think about why the answer you give is, in turn, important to you and put your response in the box in Column #3 (again, if you have difficulty, think about how you would feel if the answer in the box in Column #2 did not happen). 4. Repeat steps 2 and 3 for each remaining reason in Column #1. We have placed numbers in the upper left corners of each box to remind you of the sequence to follow. Again, please list your own personal reasons for reducing your blood pressure.

<u>REASONS</u>	<u>WHY - 1</u>	<u>WHY - 2</u>
<p><b>Reason 1 for reducing your blood pressure</b></p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">1</div> <div style="flex-grow: 1;"></div> </div>	<p>Why is it important to you?</p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">6</div> <div style="flex-grow: 1;"></div> </div>	<p>Why is it important to you?</p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">11</div> <div style="flex-grow: 1;"></div> </div>
<p><b>Reason 2 for reducing your blood pressure</b></p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">2</div> <div style="flex-grow: 1;"></div> </div>	<p>Why is it important to you?</p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">7</div> <div style="flex-grow: 1;"></div> </div>	<p>Why is it important to you?</p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">12</div> <div style="flex-grow: 1;"></div> </div>
<p><b>Reason 3 for reducing your blood pressure</b></p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">3</div> <div style="flex-grow: 1;"></div> </div>	<p>Why is it important to you?</p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">8</div> <div style="flex-grow: 1;"></div> </div>	<p>Why is it important to you?</p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">13</div> <div style="flex-grow: 1;"></div> </div>
<p><b>Reason 4 for reducing your blood pressure</b></p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">4</div> <div style="flex-grow: 1;"></div> </div>	<p>Why is it important to you?</p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">9</div> <div style="flex-grow: 1;"></div> </div>	<p>Why is it important to you?</p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">14</div> <div style="flex-grow: 1;"></div> </div>
<p><b>Reason 5 for reducing your blood pressure</b></p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">5</div> <div style="flex-grow: 1;"></div> </div>	<p>Why is it important to you?</p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">10</div> <div style="flex-grow: 1;"></div> </div>	<p>Why is it important to you?</p> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 50px; display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; width: 20px; text-align: center; margin-right: 5px;">15</div> <div style="flex-grow: 1;"></div> </div>

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