

# Influence of Illness Representations on Self-Management Behaviors in Korean Hypertensive Patients

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## Abstract

**Purpose:** The purposes of this study were to investigate the factors related to illness representations and their influence on self-management behaviors in hypertensive patients, based on Leventhal's common-sense model.

**Method:** A cross-sectional study was conducted with a convenience sample of 149 patients with hypertension. Illness representations were assessed with the Illness Perception Questionnaire-Revised (IPQ-R) and data were analyzed using t-test, ANOVA, Pearson's correlations, and hierarchical regression analysis.

**Results:** There were differences in patients' illness representations depending on their demographic and health-related characteristics including medication adherence and the amount of time since hypertension diagnosis. Two dimensions of illness representations, in terms of predictability ( $\beta=-0.226$ ,  $p=0.036$ ) and coherence ( $\beta=0.246$ ,  $p=0.029$ ), were significant factors predicting self-management behaviors, indicating that patients who believed hypertension was more predictable and who were more confident of their awareness about hypertension engaged more actively in self-management behaviors.

**Conclusion:** This study demonstrates the critical role of illness representations, leading to self-management behaviors of hypertensive patients. The findings highlight that a concrete assessment of illness representations is an essential task when developing nursing interventions to facilitate active self-management of hypertension.

**Keywords:** Hypertension; Perception; Disease management; Self-care

## Introduction

Hypertension is a representative chronic illness that requires life-long management to prevent severe cardiovascular and cerebrovascular illnesses [1-3]. Cerebrovascular and heart diseases that are complications of chronic high blood pressure are the second and third leading causes of death in Korea, and their mortality rates have continued to increase along with a growing proportion of patients diagnosed with hypertension [1]. Among adults over 30 years of age in Korea, 32.4% of males and 22.2% of females had high blood pressure in 2013 according to the Korea National Health and Nutrition Examination Survey and the proportion of younger hypertensive patients has rapidly increased in recent decades [1]. In addition, despite development of pharmacological and non-pharmacological regimens for hypertension, the proportion of uncontrolled hypertension (26%) is relatively high compared to other countries such as the US (5.7%), Canada (7.4%), and Europe (12-25%) [2]. These empirical data indicate an urgent need to develop strategies to effectively manage high blood pressure.

It is very important that hypertensive patients adopt a variety of life-long behaviors that are beneficial to manage high blood pressure, since there is no cure for hypertension. Solid guidelines for such behaviors in daily life have been confirmed through a number of empirical studies [1-4]. For example, compliance with a medication regimen and lifestyle modifications in diet, physical activity, weight control, and stress management are considered the most essential issue. A substantial body of literature and theory-based studies have revealed the pivotal role of perceptions that individuals have regarding their illness by demonstrating the impacts on health-related behaviors [4-7]. As a cognitive behavioral theory, the common-sense model proposed by Leventhal and colleagues posits that individuals have their own illness representations, which are defined as a set of beliefs that individuals have formed towards experiencing and managing a health problem [8,9]. They explain that illness representations, whether or not they are medically scientific, become the key to guiding individuals' health behaviors and subsequently could affect their health outcomes.

The common-sense model classified illness representations into seven components: timeline, predictability, controllability-personal, controllability-treatment, consequences, coherence, and emotional representation [9]. Timeline refers to individuals' perceptions about whether a health problem is acute or chronic and predictability refers to the belief regarding whether or not a health problem is predictable. Controllability-personal refers to individuals' beliefs that they are efficient in managing a health problem, while controllability-treatment refers to individuals' beliefs about the ability of a medical treatment to cure the illness. Consequence is individuals' beliefs about how much their health problems would affect their physical and social lives. Coherence refers to the extent of individuals' understanding about their illness, and emotional representation refers to individuals' emotional status due to their illness such as being depressed and anxious.

Guided by the common-sense model, a number of empirical studies have investigated illness representations in various age groups including adolescence [10] and older people [11], as well as patients with diverse chronic illnesses, such as asthma [12], diabetes [13], and hemodialysis [14]. Although illness representations of hypertensive patients have been investigated in other countries including Taiwan [4], the United Kingdom [5], and the US [6] and a number of studies regarding beliefs of hypertensive patients have been conducted in Korea, little research has focused on illness representations in Korea based on the common-sense model. With an increasing need to care for the growing number

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Received December 18, 2015; Accepted January 13, 2016; Published January 21, 2016

Citation: Yeom HE (2016) Influence of Illness Representations on Self-Management Behaviors in Korean Hypertensive Patients. J Nurs Care 5: 326. doi:10.4172/2167-1168.1000326

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of hypertensive patients, understanding the illness representations that individuals have regarding their hypertension might lay the groundwork for improving active self-management of hypertension. Therefore, given the important role of the perceptions guiding health behaviors on the basis of the common-sense model, the purposes of this study were to investigate illness representations of Korean patients with hypertension and the factors related to illness representations. In particular, a major purpose of this study was to investigate whether these illness representations affect self-management behaviors to manage their high blood pressure.

## Method

### Design

A descriptive cross-sectional study was used.

### Samples and procedures

Participants were recruited from outpatient clinics at a university hospital, local clinics, and community centers in two metropolitan cities of South Korea. Inclusion criteria for this study were as follows: (a) aged 18 years or older, (b) medically diagnosed with hypertension by a doctor, (c) at least six months after a diagnosis of hypertension, (d) able to understand and respond to questions in the questionnaire, and (e) psychologically and cognitively healthy by self-report. Also excluded were people who were not sure about the diagnosis of hypertension and/or were self-diagnosed instead of by a doctor. Individuals who had any critical episodes (i.e., stroke, heart attack) and complications (e.g. dialysis patients) related to hypertension were also excluded.

To recruit participants, information including the purpose, procedure, and criteria for participation in this study was advertised on the hospital posting and community centers two weeks before the starting date of recruitment. Potential participants interested in the study were asked to contact the primary investigator via phone. The data were collected through face-to-face interviews by two research assistants who were trained by the primary investigator to enhance inter-rater reliability. During the first contact, the research assistants screened potential participants who were interested in the study concerning their availability for participation and then explained the purpose, benefits, and risks of the study. Written consent forms were obtained for those who voluntarily agreed to participate in the study. A total 158 interviews were completed. However, nine questionnaires with several missing responses were excluded and finally, the data of 149 questionnaires were used for data analysis. With the conditions of the desired power level (0.8), the  $\alpha$  value (0.05), a medium effect size of 0.15, and 13 independent variables using G-power test, the required sample size was 89; thus, the sample size of 149 was satisfactory for the study.

### Ethical consideration

The study was approved by the Institutional Review Board of the University Hospital where the principal investigator was affiliated. Approval to access the study sites was obtained from the participating hospitals. Standard procedures for human rights protection including explanation of patient rights, study purposes, patient confidentiality and obtaining informed consent were carefully followed before data collection.

### Instruments

**Illness perception questionnaire-revised (IPQ-R):** Illness representations about hypertension were assessed with the Illness Perception Questionnaire-Revised (IPQ-R) which was theoretically

driven by Leventhal's common-sense model [15]. The IPQ-R has been widely used to assess illness perceptions of a variety of illnesses including hypertension [6,16], diabetes [13], and asthma [12], and its reliability and validity have been demonstrated by numerous empirical studies [7]. Seven dimensions of illness representations for hypertension were measured with 26 items with four items for timeline, four items for predictability, four items for controllability-personal, three items for controllability-treatment, five items for consequences, a single item for coherence, and five items for emotional representation. Each item was ranked on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree) and the mean score for each illness representation was calculated. Higher scores of each dimension indicate that respondents believe their hypertension is relatively chronic (for timeline), unpredictable or more variable (for predictability), controllable through personal effort (for controllability-personal), curable by medical treatment (for controllability-treatment), influential on their physical and social lives (for consequence), and understandable (for coherence). Higher scores in the emotional dimension mean that a respondent feels more depressed and anxious. The internal consistency in this study was  $\alpha=0.720$  for timeline,  $\alpha=0.705$  for predictability,  $\alpha=0.698$  for controllability- personal,  $\alpha=0.737$  for controllability-treatment,  $\alpha=0.775$  for consequence, and  $\alpha=0.872$  for emotion, respectively.

**Adherence to self-management:** Performance of self-management for hypertension in daily living was assessed by the Self-Management Behaviors (SMB) questionnaire. The SMB was a modified version of the Inventory of Adherence to Self-Management Adherence (IASM), which was developed to assess patients' adequate behaviors to manage hypertension in daily living on four domains of healthy and unhealthy diet, exercise regimen, and appointment keeping [4], with the added dimension of stress management. The SMB consists of 15 items and asks about how much a respondent performs self-management in daily living on a 4-point Likert scale ranging from 1 (little) to 4 (very much). The self-management behaviors include regulating diet (i.e., low salt, sugar, and fat), abstaining from alcohol and smoking, managing stress, being physically active, maintaining adequate weight, maintaining a regular sleep pattern, and seeking health information. The mean score of the 15 items was computed with a higher score indicating that a respondent performed greater self-management behaviors in daily living. The reliability in this study was  $\alpha=0.84$ .

**Demographics and health-related characteristics:** General demographic information including age, gender, education, income, and marital and living status were assessed with a demographic data sheet.

As for the characteristics of hypertension, respondents were asked about the duration after a hypertension diagnosis and whether or not they had taken the medication prescribed for hypertension and how regularly they had taken it. In addition, comorbid chronic illnesses and medications were assessed. Respondents were asked whether they were medically diagnosed as having any of the chronic illnesses (i.e., gastro-intestinal, diabetes, osteoarthritis, liver disease, respiratory illness), which are prevalent in the Korean adult population, and the number of chronic illnesses was summed. With regard to symptom experience, respondents were asked if they had experienced any of 19 symptoms that hypertensive patients may or may not experience related to hypertension. The sum of the "yes" responses was calculated.

### Data analysis

Statistical analyses were performed using SPSS 18.0. All variables for this study were screened for accuracy of data entry, missing values, outliers, and fit between the distributions and assumptions of

multivariate analysis, such as linearity, homoscedasticity, and normality. Descriptive statistics (i.e., mean, standard deviation, and skewness) were used to assess the distribution of variables. Values of all variables were found to be within range, and means and standard deviations were plausible.

T-test and ANOVA test analyses were conducted to examine the relationships between demographic and health-related characteristics and illness representations. Pearson's correlation coefficients were computed to examine the reciprocal relationships between illness representations. Hierarchical regression analyses were conducted to examine the relative influence of demographic health-related characteristics and illness representations on self-management behaviors.

## Results

### Descriptive information of general characteristics

Table 1 shows the characteristics of the demographic and health-related characteristics. The average age of the participants was 57.8 (SD=10.61, range=32-90) years old and over half of them were male (n=90, 59.6%). Approximately 40.3% (n=60) of the participants'

| Variables                               | Categories          | M ± SD or n (%) |
|---|---------------------|-----------------|
| Age                                     |                     | 57.8 ± 10.6     |
|   | ≤ 45                | 19 (12.7)       |
|   | 46~65               | 101 (67.8)      |
|   | ≥ 65                | 29 (19.5)       |
| Gender                                  | Male                | 90 (59.6)       |
|   | Female              | 59 (39.1)       |
| Educational status                      | ≤ Elementary school | 27 (18.1)       |
|   | Middle school       | 26 (17.4)       |
|   | High school         | 36 (24.2)       |
|   | ≥ College           | 60 (40.3)       |
| Marital status                          | Married             | 133 (89.3)      |
|   | Widowed or divorced | 12 (8.0)        |
|   | Unmarried           | 4 (2.7)         |
| Living with                             | Someone else        | 133 (89.3)      |
|   | Alone               | 16 (10.7)       |
| Job                                     | Yes                 | 98 (65.8)       |
|   | No                  | 48 (32.2)       |
|   | Missing             | 3 (2)           |
| Monthly allowance<br>(10,000 won/month) | ≤ 150               | 56 (37.6)       |
|   | 150-300             | 58 (38.9)       |
|   | ≥ 300               | 31(20.8)        |
|   | Missing             | 4 (2.7)         |
| Comorbidity                             | Yes                 | 83 (55.7)       |
|   | Gastrointestinal    | 31 (20.5)       |
|   | Diabetes            | 22 (14.6)       |
|   | Arthritis           | 18 (11.9)       |
|   | Liver disease       | 8 (5.3)         |
|   | Respiratory         | 6 (4.0)         |
|   | No                  | 66 (44.3)       |
| Year after HTN diagnosis                | ≤ 1year             | 33 (22.1)       |
|   | 1-5 year            | 52 (34.9)       |
|   | ≥ 5 year            | 64 (43.0)       |
| Medication intake for HTN               | Regularly           | 98 (65.8)       |
|   | Irregularly         | 21 (14.1)       |
|   | No intake           | 30 (20.1)       |

Table 1: Demographic characteristics (N=149).

education level was college level, and 18.1% (n=27) had not graduated from elementary school. Most of the participants (n=133, 89.3%) were married and lived with family members and 65.8% (n=98) were employed.

A majority of the participants (n=116, 77.9%) had been diagnosed at least one year previously and 44.3% (n=66) of them had lived with hypertension over five years. More than half of the participants (n=98, 65.8%) had regularly taken the medication prescribed and the proportion of patients who had taken it irregularly or had taken no medication was 14.1% (n=21) and 20.1% (n=30), respectively. Participants reported an average of 3.49 (SD=4.47) symptoms among the 19 symptoms and 55.7% (n=83) of participants had comorbid chronic illnesses and the most frequently reported illnesses were gastrointestinal illness (n=31, 20.5%) and diabetes (n=22, 14.6%).

### The relationships between illness representations

The mean scores of the seven dimensions of illness representations were 3.05 (SD=0.79) for timeline, 2.16 (SD=0.62) for predictability, 3.20 (SD=0.75) for controllability-personal, 3.52 (SD=0.82) for controllability-treatment, 1.96 (SD=0.63) for consequence, 3.25 (SD=0.94) for coherence, and 2.46 (SD=0.86) for emotional representation, respectively. This information indicates that patients believed that hypertension tended to be relatively chronic, predictable, and controllable through personal effort or by medical treatment and that hypertension had relatively little influential on their lives. Patients also believed that they had relatively good understanding of their own hypertension and rarely felt negative emotions due to hypertension.

The reciprocal relationship among the seven domains of illness representations is presented in Table 2. Timeline was significantly related to controllability-treatment (r=0.15, p=0.044), consequence (r=0.27, p=0.001), and emotional representation (r=0.42, p<0.000), indicating that patients who believed their hypertension was chronic were more likely to believe hypertension could be controlled by medical treatment and more influential in their lives and to have more negative feelings. Predictability was significantly related to consequence (r=0.35, p<0.000), coherence (r=0.17, p=0.032), and emotional representation (r=0.42, p<0.000). Coherence was significantly related to controllability-personal (r=0.34, p<0.000) and controllability-treatment (r=0.51, p<0.000), respectively. There were also significant correlations between controllability-personal and controllability-treatment (r=0.41, p<0.000) and between consequence and emotional representation (r=0.58, p<0.000). In addition, a significant correlation between the number of symptoms and the predictability of hypertension (r=0.231, p=0.022) was found, indicating that patients who experienced more symptoms were likely to believe that their hypertension was unpredictable.

### Factors related to illness representations

Table 3 summarizes the associations between sociodemographic and health-related characteristics and illness representations. There were significant differences in timeline, controllability-personal, and controllability-treatment depending on age in terms of young, middle-aged, and older adults. Compared to young and older adults, middle-aged patients were more likely to perceive that their hypertension was relatively chronic (F=2.61, p=0.045), and that their illness was less likely to be manageable through personal efforts (F=3.35, p=0.035) or by medical treatment (F=4.69, p=0.009).

Significant differences in timeline and emotional representations between male and female patients were found. Male patients believe that hypertension tended to be relatively chronic, compared to female patients (t=2.51, p<0.001). In addition, female patients compared to

|                              | 1              | 2             | 3              | 4              | 5              | 6             | 7             |
|------------------------------|----------------|---------------|----------------|----------------|----------------|---------------|---------------|
| 1. Timeline                  |                |               |                |                |                |               |               |
| 2. Predictability            | 0.134 (0.110)  |               |                |                |                |               |               |
| 3. Controllability-personal  | 0.017 (0.872)  | 0.065 (0.435) |                |                |                |               |               |
| 4. Controllability-treatment | 0.151 (0.044)  | 0.076 (0.346) | 0.417 (0.000)  |                |                |               |               |
| 5. Consequence               | 0.273 (0.001)  | 0.365 (0.000) | -0.031 (0.707) | -0.081 (0.323) |                |               |               |
| 6. Coherence                 | -0.015 (0.953) | 0.175 (0.032) | 0.346 (0.000)  | 0.514 (0.000)  | -0.004 (0.957) |               |               |
| 7. Emotion                   | 0.417(0.000)   | 0.415 (0.000) | 0.026 (0.757)  | 0.101 (0.213)  | 0.583(0.000)   | 0.131 (0.108) |               |
| 8. Number of symptoms        | 0.122 (0.231)  | 0.231 (0.022) | 0.051 (0.613)  | -0.034 (0.740) | 0.106 (0.296)  | 0.072 (0.482) | 0.129 (0.202) |

Table 2: The correlations between illness representations.

| Variables                  | Categories  | Timeline |               | Predictability |               | Control-Personal |               | Control-Treatment |               | Consequence |               | Coherence |               | Emotion |               |
|----------------------------|-------------|----------|---------------|----------------|---------------|------------------|---------------|-------------------|---------------|-------------|---------------|-----------|---------------|---------|---------------|
|                            |             | Mean     | t or F (p)    | Mean           | t or F (p)    | Mean             | t or F (p)    | Mean              | t or F (p)    | Mean        | t or F (p)    | Mean      | t or F (p)    | Mean    | t or F (p)    |
| Age                        | 45          | 2.69     |               | 2.27           |               | 3.57             |               | 3.59              |               | 1.83        |               | 3.42      |               | 2.44    |               |
|                            | 46-65       | 3.14     | 2.61 (0.045)  | 2.11           | 1.01 (0.315)  | 3.10             | 3.35 (0.035)  | 3.39              | 4.66 (0.009)  | 1.98        | 0.47 (0.612)  | 3.21      | 0.39 (0.666)  | 2.45    | -0.98 (0.961) |
|                            | >65         | 3.06     |               | 2.27           |               | 3.27             |               | 3.91              |               | 1.97        |               | 3.25      |               | 2.48    |               |
| Gender <sup>1</sup>        | Male        | 2.87     | 2.51 (0.001)  | 2.13           | 3.69 (0.486)  | 3.16             | 0.69 (0.640)  | 3.48              | 0.07 (0.455)  | 1.96        | -0.46 (0.947) | 3.31      | 0.74 (0.330)  | 2.32    | 6.29 (0.013)  |
|                            | Female      | 3.34     |               | 2.21           |               | 3.22             |               | 3.58              |               | 1.97        |               | 3.15      |               | 2.68    |               |
| Education                  | Low         | 3.23     | 3.61 (0.001)  | 2.15           | -0.01 (0.975) | 3.18             | -0.47 (0.617) | 3.62              | 1.74 (0.083)  | 1.95        | -0.14 (0.892) | 3.13      | -1.73 (0.100) | 2.53    | 1.49 (0.144)  |
|                            | High        | 2.77     |               | 2.16           |               | 3.24             |               | 3.38              |               | 1.97        |               | 3.40      |               | 2.32    |               |
| Marital status             | Married     | 3.04     | 0.71 (0.477)  | 2.16           | 0.43 (.687)   | 3.24             | -1.75 (0.082) | 3.53              | -0.49 (.623)  | 1.94        | 1.41 (0.162)  | 3.29      | -1.66 (0.098) | 2.43    | 1.02 (0.310)  |
|                            | Others      | 3.20     |               | 2.23           |               | 2.88             |               | 3.42              |               | 2.18        |               | 2.86      |               | 2.68    |               |
| Living status <sup>2</sup> | Alone       | 3.15     | 0.55 (0.615)  | 2.15           | -0.08 (0.935) | 2.91             | -1.65 (0.100) | 3.45              | -0.35 (0.744) | 2.12        | 1.04 (0.298)  | 2.93      | -1.42 (0.163) | 2.60    | 0.67 (0.506)  |
|                            | With family | 3.03     |               | 2.17           |               | 3.23             |               | 3.53              |               | 1.94        |               | 3.29      |               | 2.44    |               |
| Job <sup>3</sup>           | Yes         | 2.41     | 2.53 (0.012)  | 2.16           | 0.11 (0.914)  | 3.18             | 0.73 (0.467)  | 3.45              | 1.42 (0.156)  | 2.05        | -2.05 (0.042) | 3.30      | -2.04 (0.286) | 2.41    | 1.03 (0.306)  |
|                            | No          | 3.29     |               | 2.18           |               | 3.28             |               | 3.66              |               | 1.82        |               | 3.12      |               | 2.57    |               |
| Income                     | ≤ 150       | 3.12     |               | 2.10           |               | 3.09             |               | 3.52              |               | 1.90        |               | 3.07      |               | 2.53    |               |
|                            | 150-300     | 2.97     | 0.53 (0.593)  | 2.17           | 0.31 (0.731)  | 3.48             | 5.91 (0.003)  | 3.64              | 1.37 (0.257)  | 1.91        | 2.15 (0.120)  | 3.43      | 2.17 (0.118)  | 2.33    | 0.87 (0.420)  |
|                            | ≥ 300       | 3.08     |               | 2.21           |               | 3.60             |               | 3.33              |               | 2.18        |               | 3.32      |               | 2.55    |               |
| Comorbidity <sup>4</sup>   | Yes         | 3.09     | -0.80 (0.528) | 2.21           | -0.91 (0.378) | 3.14             | 1.01 (0.302)  | 3.58              | -0.96 (0.291) | 2.03        | -1.42 (0.155) | 3.22      | 0.37 (0.761)  | 2.56    | -1.63 (0.108) |
|                            | No          | 2.99     |               | 2.11           |               | 3.27             |               | 3.45              |               | 1.88        |               | 3.28      |               | 2.33    |               |
| Years after HTN            | ≤ 1year     | 2.71     |               | 2.20           |               | 3.20             |               | 3.48              |               | 2.05        |               | 3.22      |               | 2.39    |               |
|                            | 1-5 year    | 2.76     | 8.37 (0.000)  | 2.20           | 0.13 (0.875)  | 3.37             | 0.77 (0.463)  | 3.43              | 0.29 (0.743)  | 1.95        | 0.41 (0.662)  | 3.33      | 0.10 (0.908)  | 2.57    | 0.29 (0.746)  |
|                            | ≥ 5 year    | 3.26     |               | 2.14           |               | 3.16             |               | 3.56              |               | 1.93        |               | 3.25      |               | 2.45    |               |
| Medication                 | Regularly   | 3.17     |               | 2.14           |               | 3.25             |               | 3.66              |               | 1.98        |               | 3.35      |               | 2.46    |               |
|                            | Irregularly | 3.25     | 9.61 (0.000)  | 2.47           | 3.67 (0.029)  | 3.09             | 0.674 (0.503) | 3.48              | 5.20 (0.008)  | 1.95        | 0.09 (0.910)  | 3.45      | 4.68 (0.012)  | 2.65    | 3.05 (0.364)  |
|                            | No intake   | 2.51     |               | 2.00           |               | 3.11             |               | 3.12              |               | 1.92        |               | 2.80      |               | 2.30    |               |

<sup>1</sup>Reference group: Female, <sup>2</sup>Reference group: Living with family, <sup>3</sup>Reference group: No job <sup>4</sup>Reference group: No comorbid illness

Table 3: Associations between general characteristics and illness representations.

male patients (F=6.29, p=0.013) were more likely to perceive negative feelings such as being depressed or anxious due to hypertension. Significant differences among the seven dimensions of illness representations were also found depending on marital or living status.

Timeline and coherence were significantly different depending on job status. Patients who were employed tended to perceive their hypertension as less chronic (t=2.53, p=0.012) and to believe that hypertension was more influential on their physical, social, and psychological quality of life (t=-2.05, p=0.042). Corresponding to increased income level, controllability-personal tended to increase (t=5.01 p=0.003), indicating that patients with higher income levels were likely to believe that hypertension could be controlled through their personal efforts.

With regard to morbidity periods of hypertension, patients who had been diagnosed for longer periods were more likely to believe that their hypertension was chronic (F=8.37, p<0.001). There were also significant differences of timeline, predictability, controllability-treatment, and

coherence depending on adherence to medication. Patients who had taken the medication regularly also reported the strongest belief that their hypertension could be controlled by medical treatment (F=5.20, p=0.008), compared to patients who had taken medication irregularly or had never taken medication. Patients who had taken the medication irregularly were more likely to believe that their hypertension was chronic (F=9.61, p<0.001) as well as unpredictable (F=3.67, p=0.029), compared to those who had taken medication regularly or those who took no medication. They also believed that they knew about their hypertension, compared to the other groups (F=4.68, p=0.012).

### Influence of illness representations on self-management behaviors

Before conducting regression analyses, the multicollinearity between independent variables was screened. The tolerance ranged from 0.35 to 0.89 (i.e., lower than the standard of 1.0) and the variance inflation factor (VIF) was 1.09-2.03 (i.e., lower than the standard of 10). The information demonstrated no problems in multicollinearity and the

|  | Model 1       |       |         |                | Model 2       |       |         |                |
|--|---------------|-------|---------|----------------|---------------|-------|---------|----------------|
|  | B             | SE    | $\beta$ | t (P)          | B             | SE    | $\beta$ | t (P)          |
| Age                                      | 0.002         | 0.005 | 0.063   | 0.478 (0.634)  | 0.004         | 0.005 | 0.095   | 0.732 (0.466)  |
| Gender <sup>1</sup>                      | -0.097        | 0.096 | -0.112  | -1.011 (0.315) | -0.107        | 0.096 | -0.124  | -1.11 (0.268)  |
| Education <sup>2</sup>                   | 0.071         | 0.120 | 0.079   | 0.595 (0.553)  | 0.036         | 0.119 | 0.040   | 0.301 (0.764)  |
| Years after diagnosis <sup>3</sup>       | 0.172         | 0.089 | 0.202   | 1.936 (0.054)  | 0.104         | 0.092 | 0.122   | 1.129 (.262)   |
| Medication adherence <sup>4</sup>        | -0.016        | 0.079 | -0.021  | -0.208 (0.836) | -0.053        | 0.085 | -0.068  | -0.626 (0.533) |
| Symptoms                                 | 0.025         | 0.010 | 0.257   | 2.50 (0.014)   | 0.022         | 0.010 | 0.228   | 2.279 (0.025)  |
| Timeline                                 |               |       |         |                | 0.061         | 0.072 | 0.100   | 0.851 (0.397)  |
| Predictability                           |               |       |         |                | -0.163        | 0.076 | -0.226  | -0.131 (0.036) |
| Controllability-personal                 |               |       |         |                | 0.055         | 0.063 | 0.089   | -0.873 (0.385) |
| Controllability-treatment                |               |       |         |                | -0.007        | 0.061 | -0.13   | -0.112 (0.911) |
| Consequences                             |               |       |         |                | -0.112        | 0.094 | -0.139  | -1.201 (0.233) |
| Coherence                                |               |       |         |                | 0.115         | 0.052 | 0.246   | 2.226 (0.029)  |
| Emotion                                  |               |       |         |                | 0.034         | 0.069 | 0.62    | 0.498 (0.620)  |
| F(p)                                     | 2.565 (0.024) |       |         |                | 2.589 (0.005) |       |         |                |
| R <sup>2</sup> , Adjusted R <sup>2</sup> | 0.146, 0.089  |       |         |                | 0.288, 0.177  |       |         |                |

<sup>1</sup>Coded male as 1 and female as 0

<sup>2</sup>Coded if education is over college level as 1 and otherwise as 0

<sup>3</sup>Coded if years after hypertension diagnosis is over 5 years as 1 and if not, as 0

<sup>4</sup>Coded if a patient had taken a medicine for hypertension as 1 and otherwise as 0

**Table 4:** Influence of illness representations on self-management behaviors.

value of the Durbin-Watson statistic (2.114) also verified no problems in autocorrelation. The results of the outlier analysis also showed that the model exhibited satisfactory levels of linearity, normality, and homoscedasticity.

Table 4 shows the results of hierarchical multiple regression analysis. The first model including demographic and health-related characteristics accounted for 8.9% of the variance in self-management behaviors. When seven domains of illness representations were added in the second model, the explanation power of the final model increased to 17.7%. In the first model, the duration of hypertension ( $\beta=0.202$ ,  $p=0.054$ ) and the number of symptoms that patients had experienced ( $\beta=0.257$ ,  $p=0.014$ ) were significant factors predicting the self-management behaviors, after adjusting for age, gender, education level, and medication adherence. Finally, two representation dimensions of predictability ( $\beta=-0.226$ ,  $p=0.036$ ) and coherence ( $\beta=0.246$ ,  $p=0.029$ ) were significant factors predicting self-management behaviors, after adjusting for the influence of age, gender, education, the duration of hypertension and medication adherence. The results indicate that patients who had stronger beliefs that their hypertension was predictable and that they were aware of their hypertension were more likely to engage self-management for hypertension.

## Discussion

Understanding individuals' perceptions about their illnesses provides a key for developing effective strategies to cope with chronic illnesses. For each dimension of illness representations, patients in this study tended to believe that their hypertension was relatively chronic ( $M=3.05$ ), predictable ( $M=2.16$ ), controllable through personal efforts ( $M=3.20$ ) and medical treatment ( $M=3.52$ ), and less influential on their lives. Participants had relatively strong beliefs that they were reasonably aware of their hypertension ( $M=3.25$ ) and felt only modest levels of negative emotions ( $M=2.46$ ). Interestingly, the levels of illness representations are similar to and consistent with previous findings about hypertensive patients in other countries, such as the United Kingdom (range=2.56-3.55) and Taiwan (range=2.54-3.74) [4,5]. Patients from these three countries commonly reported the strongest

beliefs about controlling hypertension using medical treatment (i.e., 3.52 in Korea, 3.53 in the UK, 3.74 in Taiwan), but the levels of consequence were relatively low (i.e., 1.96 in Korea, 2.63 in UK, 2.55 in Taiwan) for the seven dimensions of illness representations [4,5]. The findings indicate that hypertensive patients generally tended to believe that their hypertension could be cured through medical treatment and that their lives might not be affected by a hypertension diagnosis, and particularly Korean patients were less likely to worry about the negative influence of hypertension on their lives.

Of particular concern were the differences in the illness representations of timeline and controllability through personal efforts and treatment among three age groups (younger, middle-aged, and older). Compared to younger and older patients, middle-aged patients tended to believe that their hypertension was chronic and were less confident about the possibility to control hypertension through personal efforts or medical treatment. This study also found a difference in emotional representations by gender, indicating that female patients had more negative feelings about their hypertension. In addition, as might be expected, patients who lived with hypertension for a longer time were more likely to believe that their hypertension was chronic rather than acute. Although previous research has reported differences in behaviors for managing health problems according to patients' demographic characteristics such as age and gender [6,16], it has been somewhat unclear whether such differences might be rooted in patients' illness perceptions. Thus, the findings of this study indicate the importance of considering the characteristics of illness representations depending on the patient's age, in order to enhance health-related behaviors.

This study found that patients with more symptoms tended to believe that their hypertension was unpredictable, building on prior evidence on the relationship between symptom experience and illness perceptions of hypertension [17]. This finding is of concern in that even though hypertension is an asymptomatic illness, patients reported symptoms after a diagnosis of hypertension [17]. In addition, it is necessary to consider patients' lay views of symptoms to determine

whether or not the nature of the symptoms is related to their specific illnesses since empirical studies have reported that experiencing specific symptoms and perceptions about such symptoms could be a major reason patients perform self-management of hypertension [4,6,18,19]. These studies indicate a need for further study focusing on the relationships between symptom experiences, perceptions about the causes of the symptoms, and behaviors in patients with hypertension.

Medication adherence is also a critical issue for the management of hypertension. This study found that patients who regularly took medication had a stronger belief that their hypertension could be controlled through medical treatment, compared to those who irregularly or never took medication. An important finding is that patients who irregularly took medication tended to believe that their hypertension was chronic and unpredictable. In particular, their confidence in their awareness of hypertension was higher than patients who regularly or never took medication. These findings imply that overestimating self-awareness about hypertension rather than being confident of the ability of medication to cure hypertension could lead to poorer medication adherence.

It is also very concerning that patients who never took medication reported greater beliefs that their hypertension was acute rather than chronic, and their belief about the controllability of hypertension through medical treatment was the lowest. In general, hypertensive patients' poor compliance to medication is regarded as the consequence of forgetfulness or carelessness [17]. However, patients may intentionally or unintentionally avoid taking medication as prescribed, and the findings of this study imply that poor adherence to medication might be associated with misconceptions or inaccurate information about hypertension, which is consistent with another empirical study [4,5,12,17,20,21].

There is little information that is theoretically based on the common-sense model on illness representations of patients with hypertension in Korea. Although perceptual factors of illness representations may not lead to a full understanding of patients' decisions and self-management behaviors for hypertension, the findings of this study illustrate the critical role of illness representations in guiding patients to engage in health-related behaviors. This study builds on the applicability of the common-sense model to explore illness representations of Korean patients with chronic illnesses. The maintenance of self-management behaviors for hypertension should be a life-long effort, for which patients need additional motivation and support. The common-sense model postulates that illness representations are formulated through subjective personal experience and information from experts and lay people within a sociocultural environment [10]. Taken together, the current study underscores that the sociocultural contexts regarding hypertension need to be reviewed and those patients' lay views about hypertension in terms of seven dimensions of illness representations should be a target component in developing interventions to enhance self-management engagement.

Careful interpretation of the findings of this study is necessary. This study is a cross-sectional study so the results should not be interpreted as showing a causal impact of illness representations on self-management behaviors. However, the finding that illness representations affect self-management behaviors is consistent with the direction postulated in the common-sense model. Thus, further longitudinal studies are necessary to provide more solid conclusions identifying the causal influence of illness representations on health behaviors. The assessment of self-management behaviors was done by self-reporting. Therefore, future studies need to measure objective data on self-management behaviors

using dietary diaries and actual recording about the types and duration of physical activities. Finally, the participants of this study were recruited in two cities in Korea. Further studies including patients with more diverse sociodemographic characteristics need to be conducted.

## Conclusion

Guided by Leventhal's common-sense model of illness representations, this study investigated the extent to which hypertensive patients perceived illness representations, factors related to illness representations, and their role in predicting self-management behaviors in a sample of 149 community-dwelling patients with hypertension.

This study demonstrated some differences illness representations, in terms of timeline and controllability-personal, and controllability-treatment, depending on socio-demographic characteristics such as age groups (young, middle-aged, and older) and gender, as well as health-related characteristics including medication adherence and time since the hypertension diagnosis. Attention should be drawn to the finding that patients who took medication regularly had relatively strong beliefs about their ability to control their hypertension through treatment, while patients who took medication irregularly tended to have strong confidence in their awareness of hypertension and believed that their hypertension was chronic. The findings highlight the importance of careful assessment of illness representations according to the patients' characteristics in order to facilitate effective management of hypertension.

This study demonstrates the essential role of two illness representations in terms of predictability and coherence to predict patients' engagement in self-management behaviors. This information could help health professionals support active behaviors to manage hypertension on the basis of understanding patients' perceptions. It could also direct educational strategies for nursing interventions for patients with hypertension. The common-sense model posits that individuals play a role as active participants in solving their own health problems by generating plans and strategies to cope with their health treatments according to their beliefs, which are developed based on sociocultural contexts. The current study supports this concept and therefore highlights the importance of investigating illness representations in order to facilitate active self-management of hypertensive patients. A concrete assessment of the illness representations based on the common-sense model could set the groundwork for developing nursing interventions to enhance coping strategies for hypertension.

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