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It's all a matter of necessity and concern: A structural equation model of adherence to antihypertensive medication

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ABSTRACT

Objective: Hypertension is often treated pharmacologically, yet adherence is poor. Beliefs about antihypertensive medicine, i.e., the necessity-concern framework (NCF), are valuable for explaining adherence. Therefore, a model structure is transferred from hypercholesterolemia to hypertension, assuming a mediating role of the NCF.
Methods: Patients with hypertension (n = 273) were surveyed online about demographics, health- and treatment-related factors, control beliefs, necessity and concern beliefs about their medication, and adherence. The data were analyzed using structural equation modeling (SEM).
Results: Necessity was positively ($\beta = 0.26$, $p = 0.009$) and concern was negatively ($\beta = -0.51$, $p = 0.020$) associated with adherence. The NCF mediated the influence of background variables on adherence. Necessity was associated with comorbidity ($\beta = -0.36$, $p < 0.001$), treatment time ($\beta = 0.19$, $p = 0.004$), emotionally supportive doctor-patient communication ($\beta = 0.12$, $p = 0.045$), side effects ($\beta = 0.16$, $p = 0.013$), personal control ($\beta = -0.13$, $p = 0.022$), and treatment control ($\beta = 0.29$, $p < 0.001$). Concern was associated with side effects ($\beta = 0.38$, $p < 0.001$) and beliefs about medicine in general being harmful ($\beta = 0.61$, $p < 0.001$). The model fit was acceptable (RMSEA = 0.61).
Conclusion: The transferred adherence model with the necessity-concern framework as a mediating factor was confirmed in hypertension, explaining more variance than previous approaches (23%).
Practice implications: A personalized, emotionally supportive doctor-patient communication could be key to addressing beliefs about medicine and therefore to increasing adherence.

1. Introduction

Hypertension is a major health issue that affects approximately 1 billion adults worldwide [1]. Patients with hypertension require blood pressure control to prevent cardiovascular events, as well as cardiovascular and kidney diseases [2,3]. Lifestyle adjustments (exercise and changes in nutrition, for example, less fat and salt) are recommended for all individuals with hypertension [4]. Additionally, antihypertensive drugs are often prescribed to more effectively lower a patients' blood pressure [5].

Unfortunately, adherence to blood pressure medication is poor [6]. Adherence describes the extent to which a patient's health behavior (e.g., taking antihypertensive medication) reflects a health plan that was jointly set up by the patient and the clinician [7]. A major obstacle to achieving satisfactory adherence in patients with hypertension is that hypertension rarely causes noticeable symptoms [8], while antihypertensive drugs can cause side effects that lower drug adherence [9]. This contrast is particularly important since the patients do not feel any relief by taking the medication but are advised to take them for an indefinite time. Patients who are not completely adherent often fail to achieve blood pressure control and are falsely categorized as patients with resistant hypertension [10]; thus, they do not receive optimal care.

Health behavior in chronic illness has been conceptualized in various models, e.g., the Health Belief Model [11], the Common-Sense Model of Illness Representation [12], or the Self-Regulatory Model [13,14]. In the field of drug treatment of chronic illnesses, these models can be used to illustrate how patients decide to engage in health behavior (i.e., adherence to the pre-agreed treatment plan). A widely recognized model to explain these conscious processes prior to adherent behavior is the necessity-concern framework (NCF) [15]. The NCF postulates that patients' key beliefs about a medical treatment determine their common-sense evaluation and thus the extent of adherence. These beliefs primarily consist of two categories: the patients' perception of how

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much they need the specific treatment (necessity beliefs) and concerns about the adverse effects of that treatment (concern beliefs). The NCF is well established and has been applied to adherence in over 30 different conditions, including cardiovascular diseases [16]. Various cross-sectional analyses have investigated the contribution of beliefs about necessity and concern to adherence in hypertension [17–19]. All these studies included necessity and concern in regression models as 2 predictors among many other variables. In hypercholesterolemia, Berglund, Lytsy, and Westerling [20] assumed that the NCF is a central construct in the explanation of variance in adherence, mediating the influence of other predictors. While this mediating influence of necessity could be demonstrated, the role of concern remained rather unclear.

The mediating influence of the NCF on adherence to cardiovascular-related long-term treatment has been investigated. To prove its applicability in hypertension, a confirmatory analysis is necessary. The previously assumed structure of factors was therefore transferred with minor adjustments to the treatment of hypertension regarding adherence to antihypertensive medication. The following important background variables were included in the model since they are factors that are already known to be associated with adherence in cardiovascular diseases. First, demographic variables such as higher age [21], female gender [22], and higher education [23] are related to a higher drug adherence. Second, a higher adherence is connected to numerous health- and treatment-related factors: comorbidities (e.g., diabetes mellitus [23]) and treatment perception, i.e., general beliefs about medicine [24]. Another influential treatment-related factor appears to be the "explanation satisfaction" of patients—i.e., how satisfied they are with their physician's explanation regarding their illness and treatment options [20]. The key to a satisfactory explanation could be patient-centered communication, which is also linked to adherence [25]. Berglund et al. [20] also included health locus of control in their structural equation model, which was significantly associated with the NCF.

Although many individual factors of adherence to antihypertensive drugs have already been identified, this study aimed to integrate all these assumed factors in a coherent model that would allow a comparison of the different adherence-related variables with regard to their importance. Therefore, the model described by Berglund et al. [20] was transferred from hypercholesterolemia to a hypertensive sample where no confirmatory model has been published so far. Additionally, the model was improved by replacing "explanation satisfaction" with a more differentiated measure of emotionally supportive doctor-patient communication. This study is the first to provide a confirmatory analysis of a previously established model in order to prove the relevance of the NCF in adherence to antihypertensive medication.

2. Methods

This article adheres to the reporting standards for structural equation modeling (SEM) established by Schreiber, Nora, Stage, Barlow, and King [26].

2.1. Sampling

This study was approved by the ethics committee of the Department of Psychology at Philipps-University Marburg. Data collection was carried out online via Unipark (https://www.unipark.de). The online survey was active from June 2016 to January 2017; the link to participation was published in online forums and spread via various mail distributors (e.g., the German Society for Hypertension). The link was also printed on flyers that were distributed to pharmacies and hospitals. To be included, participants must have been 18 years or older and must have received a prescription for antihypertensive medication at least once in their lifetime. Potential participants were informed that for participation in the study, whether they were still taking their medication was not important. The first page of the survey explained precisely the purpose of the study. Further, participants were informed that their data was transmitted encrypted and anonymously. Participants could then click a button to give their informed consent. At the end of the survey, a mailing address could be entered independently from the other data to participate in a prize drawing of 4 50€ vouchers for an online retailer.

A total of 515 participants provided informed consent. Of these, 161 dropped out directly after the informed consent and did not provide any data. Another 81 dropped out before finishing the survey (mean age: 48 years; 51% female). The remaining 273 participants were checked for inclusion criteria and plausibility of answers and were all included in the analysis.

2.2. Measures

2.2.1. Rief adherence index (RAI)

The RAI is a 4-item self-reporting scale to assess drug adherence [27]. The items are formulated as statements describing non-adherent behavior. Participants had to rate these statements on a 5-point Likert scale: 1 = (almost) never happened, 2 = rarely happened (in 20–40% of cases), 3 = often happened (in 40–60% of cases), 4 = happened most of the time (in 60–80% of cases), and 5 = (almost) always happened (in 80–100% of cases). Before answering the RAI, participants were instructed to consider all past behaviors concerning their antihypertensive medication.

2.2.2. Beliefs about medicines questionnaire (BMQ)

The BMQ assesses individual attitudes toward medication and was usually divided into two parts: the first focused on individually prescribed (specific) medication and the second aimed at beliefs about medicine in general [15,28]. The specific medication part consisted of the scales' necessity and concern, which represented the NCF for antihypertensive drugs. Participants were asked to answer these items with regard to their beliefs about their individual antihypertensive medication. The general part consisted of three subfacets (general harm, general overuse, and general benefit). The general harm scale focused on medication as a source of harmful effects. All items were rated on a five-point Likert scale (1 = strongly agree, 2 = agree, 3 = uncertain, 4 = disagree, and 5 = strongly disagree).

2.2.3. Generic assessment of side effects scale (GASE)

The GASE is a 36-item scale that includes the most common side effects among 6000 different drugs [29]. Participants rate the intensity of every symptom on a four-point Likert scale ("not present" to "severe") and specify whether, in their opinion, the symptom was related to their antihypertensive medication (drug attribution, yes/no). The intensity score of drug-attributed symptoms is calculated by adding the ratings (0–4) of every antihypertensive drug-attributed symptom. The German GASE has been validated in a large sample (>2500 participants), revealing good internal consistency [30].

2.2.4. Preference-matching scale

To operationalize patients' communication preferences, the Communication Preferences of Patients with Chronic Illness Questionnaire (KOPRA) [31] and the Communication Behavior Questionnaire (KOVA) [32] were used. Both questionnaires consist of the same four scales (emotionally supportive communication, effective and open communication, communication about personal circumstances and patient participation, and patient

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