

# Development and validation of the Patient's Health Belief Questionnaire on Psychiatric Treatment

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**Background:** Our previous studies with regard to adherence to psychiatric medications measured pharmacophobia, psychological reactance, and locus of control using a 42-item questionnaire requiring ~1.5 hours for completion. This study aims to develop the Patient's Health Belief Questionnaire on Psychiatric Treatment, a 17-item inventory which requires only 15 minutes to complete.

**Methods:** Our new questionnaire with five subscales was based on 17 items from three previously validated scales (on pharmacophobia, psychological reactance, and locus of control). In 588 consecutive Spanish psychiatric outpatients taking 1,114 psychiatric medications, we studied the responses to the questionnaire; to validate it, medication adherence was assessed by the Sidorkiewicz tool.

**Results:** Validation of the construct was addressed by performing two exploratory factor analyses independent of each other (one for the eight-item section measuring the attitudes of patients toward psychotropic drugs and one for the nine-item section measuring perceived health locus of control [HLOC]), which led to five subscales that were called Positive and Negative Aspects of Medications, Doctor-HLOC, Internal-HLOC, and Psychological Reactance. The five subscales showed better internal consistency when corrected by number of items than the original 17-item scale. Logistic regression models of the continuous scores, dichotomized subscales, and Chi-squared Automatic Interaction Detector (CHAID) analysis indicated that all five subscales help in predicting adequate adherence, although the various subscales behave differently in different analyses.

**Conclusion:** Future studies need to verify and further extend the preliminary findings of this study that the questionnaire may have construct and predictive validity.

**Keywords:** attitude to health, medication adherence, health behavior, psychiatry

## Plain language summary

**Why was the study done?** There are psychological attitudes that influence whether psychiatric patients take their medications or not (adherence).

**What did the researchers do?** They studied 588 adult psychiatric outpatients using 1,114 psychiatric drugs who were treated in the Canary Islands (Spain). In these patients, they studied the usefulness of a new 17-item "Patient's Health Belief Questionnaire on Psychiatric Treatment" which has five subscales and takes only 15 minutes to complete; it was created from three older psychological scales that included 42 items and required ~1.5 hours to complete.

**What did the researchers find?** Complex statistical analyses indicated that the five subscales help in predicting adequate medication adherence, although the various subscales behave differently in different analyses.

**What do these results mean?** Future studies need to verify and further extend the preliminary findings of this study that the questionnaire may be useful.

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## Introduction

Adherence to appropriate and effective prescribed treatment constitutes one of the most relevant health-related behaviors usually correlated with good health outcome.<sup>1,2</sup> Poor adherence to treatment of chronic diseases is a worldwide problem of striking magnitude. According to the WHO, adherence to long-term therapy for chronic illnesses in developed countries averages 50%, and the rates are even lower in developing countries.<sup>3</sup> Research suggests that rates of non-adherence in patients with psychiatric disorders are comparable to those of patients with other long-term conditions.<sup>4,5</sup> The association between adherence and better outcomes may be complex and not causal, since some studies suggest that people who are adherent to placebo have lower mortality and morbidity rates than those who are non-adherent.<sup>6</sup> Inadequate adherence in psychiatric patients is associated with poorer outcomes, including increases in hospital admissions,<sup>7</sup> violent behaviors,<sup>8</sup> suicide, and premature mortality.<sup>9</sup>

To understand which variables or interventions may predict psychiatric patients' non-adherence to their prescribed treatments, it is imperative to utilize an appropriate theoretical framework.<sup>10</sup> The Theory of Planned Behavior is a psychological theory that associates one's beliefs and behavior; it was developed in 1985 based on the Theory of Reasoned Action.<sup>11</sup> This model is characterized by its simplicity, parsimoniousness, relative ease of operationalization, and application to a wide range of behavioral studies.<sup>12</sup> Our research team has been working extensively for the last decade to analyze the influence of health belief model variables on treatment adherence. From this perspective, we have acquired considerable experience on the role of the relevant variables from the Theory of Planned Behavior that influence treatment adherence in psychiatric health care. According to this social-cognitive model, a patient's involvement, or lack of involvement, in health-promoting behavior, such as adherence to prescribed treatment, is influenced by 1) his/her beliefs and attitudes about the indicated treatment including pharmacophobia, 2) subjective norms including psychological reactance, and 3) perceived behavioral control.<sup>11,13,14</sup>

Concerning psychiatric patient beliefs and attitudes toward their prescribed medications, pharmacophobia (dislike of medication in general) has been shown to play a relevant role in lack of adherence to psychiatric treatment.<sup>15–18</sup> The concept of pharmacophobia was developed by using the Drug Attitude Inventory (DAI). This inventory originally had 30 items (DAI-30) but a shorter version with ten items (DAI-10) measures a unique clinical cluster of attitudes toward prescribed treatment relevant to non-adherence.<sup>19</sup>

Our clinimetric version of the DAI-10 was developed to provide a measure of pharmacophobia more suitable for clinical use by reducing the number of items from ten to eight, replacing the original dichotomy response format by a 6-point Likert scale and confirming a 2-factor orthogonal structure reflecting positive and negative effects of the prescribed medication.<sup>20</sup>

In relation to patients' subjective norms, related to their beliefs about people of importance, psychological reactance has been demonstrated to be of crucial importance in determining the possibility of adequate adherence to treatment.<sup>21,22</sup> Psychological reactance is an emotional reaction in response to rules or regulations that threaten or suppress freedom and autonomy<sup>23,24</sup> and could lead patients to ignore recommended treatments. The Hong Psychological Reactance Scale (HPRS)<sup>25,26</sup> is a 14-item self-report questionnaire usually employed to measure an individual's proneness to reactance, that is, a person's trait propensity for experiencing psychological reactance.

Concerning psychiatric patients' beliefs about control within the context of health, their thoughts and cognitions about their ability to positively influence their own health are among the more reliable determinants of patients' health behavior and health outcomes.<sup>27</sup> These beliefs can be measured using Form C of the Multidimensional Health Locus of Control (MHLC) Scale,<sup>28</sup> an 18-item scale comprising four subscales. De Las Cuevas et al<sup>29</sup> have found, by using structural equation modeling, that perceived health control variables such as health locus of control [HLOC], which is the extent to which individuals attribute their health to their own actions or to external agents,<sup>30–32</sup> play a relevant role in the adherence of psychiatric patients to their prescribed treatment. According to these study results, treatment adherence was positively associated with psychiatric patients' trust in their doctor and negatively with psychiatric patients' belief that their mental health depends on their own actions.

Our research studies measured health beliefs using three self-report inventories comprising a total of 42 items. These items provided extensive information about each patient but required considerable effort from these patients to answer the questions, producing what has been called response burden.<sup>33,34</sup> Even though response burden has frequently been mentioned as a reason to make the questionnaires shorter, a review of the scientific literature showed limited evidence indicating that shorter instruments are preferable.<sup>35</sup> On the other hand, our experience in the psychiatric clinical setting recommended the development of a new instrument brief enough to ensure the participation of patients; this

new instrument should integrate the potential of the source instruments.

Our studies have only investigated stable outpatients and have focused on the patients' beliefs and attitudes toward their prescribed medications, but other adherence studies have paid attention to the importance of different stages of illness. In a study concerning first psychotic episode, Hickling et al<sup>36</sup> emphasized the need to consider the various stages of a patient's illness and the importance of lack of insight into non-adherence of patients with first psychotic episodes. If there is need to incorporate additional variables associated with lack of adherence, including lack of insight, it appeared particularly important to reduce the length of the inventory of beliefs and attitudes toward their prescribed medications as much as possible to make it more practical in the clinical environment.

The aim of conducting this study in stable psychiatric outpatients was to develop and validate a shorter inventory measuring pharmacophobia, psychological reactance, and locus of control, and we call it the Patient's Health Belief Questionnaire on Psychiatric Treatment ([Supplementary materials](#)). We have reduced its size from 42 to 17 items and its completion time from ~1.5 hours to 15 minutes. In the process, we have moved from three independent inventories on health beliefs that have been used for research to three subscales that are scored independently and are more suitable for clinical use.

## Methods

### Questionnaire items

The design of the Patient's Health Belief Questionnaire on Psychiatric Treatment was based on pre-existing questionnaire items from three previously validated instruments that were tested extensively by our research team in studies on the influence of psychological variables on psychiatric patient adherence to prescribed treatment. From the 42 items in the three inventories, 17 items were selected, based on their weight within the total score of their source questionnaire and their ability to predict treatment adherence. Patients were asked to rate, on a 6-point Likert scale, the degree to which they agreed or disagreed with each statement, from strongly disagree to strongly agree. An even number of ratings on the scale was chosen in order that the respondents would commit to either the negative or the positive end of the scale.

Attitudes of psychiatric patients toward psychiatric medication were assessed by an improved clinimetric version of the DAI,<sup>25</sup> specifically modified to obtain a more accurate prediction of non-adherence.<sup>20</sup> To assess patients' differences in reactance proneness, that is, individuals' trait propensity to

experience psychological reactance, the three most representative items of the HPRS<sup>22,26</sup> were selected. In order to assess the extent to which patients attribute their health to their own actions or to their doctors, the three most representative items of the Internal and Doctor subscales from Form C of the MHLC<sup>28,31</sup> were selected. Internal items assess the belief that a patient's own behaviors affect her/his health status, while Doctor items assess the belief that doctors are the ones who determine patient's health outcomes. The higher the score on these items, the greater is a patient's belief in that type of control. Table 1 shows the items that make up the Patient's Health Belief Questionnaire on Psychiatric Treatment as well as the instruments from which they come.

### Medication adherence

Medication adherence was assessed using the Spanish version of the validated Sidorkiewicz instrument to assess treatment adherence for each individual drug taken by a patient.<sup>37,38</sup> This instrument contains five questions with two or three possible answers, illustrated with practical examples and pictographs, to help patients recognize their different medication-taking behaviors for each drug taken. The major advantage of the Sidorkiewicz tool is allowing clinicians to identify how patients adhere to drug prescription during polypharmacy.<sup>37,38</sup>

This tool scores self-reported patient adherence on a scale ranging from 1 to 6. A lower score is indicative of better adherence, whereas the highest score represents discontinuation. Considering that values of 1–3 on the scale correspond to adequate adherence, whereas values of 4–6 correspond to inadequate adherence, we proceeded to dichotomize the variable.

### Participants

Throughout the year 2017, 588 consecutive psychiatric outpatients taking at least one psychiatric drug were recruited from Community Mental Health Centers of the Canary Islands Health on Tenerife Island, Spain. Table 2 shows the sociodemographic and clinical variables.

### Data analysis

The data were analyzed using SPSS version 25 for Macintosh.<sup>39</sup> The usual level of significance was set to  $P < 0.05$ , and 95% CIs were described when required to measure variability.

### Confirmation of subscales by factor analyses

To perform exploratory factor analyses to confirm the subscales, a principal component analysis with varimax

**Table 1** Patient's Health Belief Questionnaire on Psychiatric Treatment (N=588)

Items	Mean±SD	Source
I am directly responsible for my condition getting better or worse	4.7±1.7	MHLC-Internal
If I see my doctor regularly, I am less likely to have problems with my condition	4.6±1.7	MHLC-Doctor
When someone forces me to do something, I feel like doing the opposite	2.7±1.8	HPRS
For me, the good things about medication outweigh the bad	4.6±1.7	DAI-I0
I feel strange, "doped up", on medication	3.1±2.0	DAI-I0
The main thing which affects my condition is what I myself do	4.2±1.8	MHLC-Internal
Following doctor's orders to the letter is the best way to keep my condition from getting any worse	4.9±1.5	MHLC-Doctor
I resist the attempts of others to influence me	3.3±1.9	HPRS
Medications make me feel more relaxed	4.9±1.5	DAI-I0
Medication makes me feel tired and sluggish	3.7±2.0	DAI-I0
I feel more normal on medication	4.3±1.8	DAI-I0
If my condition takes a turn for the worse, it is because I have not been taking proper care of myself	4.2±1.9	MHLC-Internal
Whenever my condition worsens, I should consult a medically trained professional	5.5±1.2	MHLC-Doctor
It is unnatural for my mind and body to be controlled by medications	2.9±1.9	DAI-I0
My thoughts are clearer on medication	4.0±1.9	DAI-I0
Taking medication will prevent me from having a breakdown	4.1±1.9	DAI-I0
I become angry when my freedom of choice is restricted	4.2±1.8	HPRS
Subscales		
Attitudes toward medication		
Positive Aspects of Medications	18.1±4.8	5 items from DAI-I0
Negative Aspects of Medications	9.7±4.2	3 items from DAI-I0
Perception of health controls		
Doctor-HLOC	15.1±3.4	3 items from MLHC-Doctor
Internal-HLOC	12.9±4.2	3 items from MHLC-Internal
Psychological Reactance	10.2±3.8	3 items from HPRS

**Abbreviations:** DAI-I0, Drug Attitude Inventory-I0 items; HLOC, health locus of control; HPRS, Hong Psychological Reactance Scale; MHLC-Doctor, Multidimensional Health Locus of Control-Doctor subscale; MHLC-Internal, Multidimensional Health Locus of Control-Internal subscale.

rotation was selected because it simplifies interpretation of the factors.<sup>39</sup> The number of factors for each exploratory analysis was selected by using an eigenvalue >1. The items with a score for each of the factors were used to develop subscales. Only those items with factorial loads >0.350 were included in the subscales.

## Construct validity of subscales

Our original long scales measure both positive and negative attitudes toward psychiatric medications and three components of HLOC: Doctor-HLOC, Internal-HLOC, and psychological reactance. We consider it proof that our new shorter scale has appropriate construct validity<sup>40</sup> in that exploratory factor analyses demonstrated that these five subscales existed and their internal consistency appear to be reasonable. Psychometricians use internal consistency, an index of whether a scale is measuring only one unique concept by calculating Cronbach's  $\alpha$ .<sup>41</sup> This measure is heavily influenced by the

number of items on the scales; scales with many items tend to have high  $\alpha$ . Cronbach provided a method of correction with an index that Cronbach called  $r_{ij}$ .<sup>41</sup> Thus, in this study, we proposed that the five subscales would have higher  $r_{ij}$  indices than the original 15-item instrument from which they were derived.

## Predictive validity of subscales

The predictive validity<sup>40</sup> of the subscales will be established by demonstrating that these five subscales predict poor adherence in a multivariate logistic regression using the dimension score and after dichotomizing as high and low using median scores. Dichotomization into high and low scores by using median scores has been used by us to standardize across countries, since these dimensions appear to be influenced by cultural differences. These dichotomized subscales were used to further determine their ability to predict adequate adherence in Chi-squared Automatic Interaction Detector

**Table 2** Sociodemographic and clinical characteristics of the samples studied (588 psychiatric patients, 1,114 psychiatric drugs used)

Variables	Mean±SD	Percentage
Age (years)	45.7±13.1	
Time as psychiatric patient (months)	85.2±93.6	
Number of admissions <sup>a</sup>	2.64±2.66	
Number of psychiatric medications	1.9±1.1	
Duration of psychiatric medication use (months)	42.0±50.2	
Sex		
Female		53% (310/588)
Male		47% (278/588)
Educational level		
Can read and write		3% (16/588)
Primary school		27% (160/588)
Secondary school		44% (258/588)
University		26% (154/588)
Diagnosis		
Depressive disorder		38% (224/588)
Anxiety disorder		28% (169/588)
Schizophrenia		23% (134/588)
Bipolar disorder		7% (40/588)
Personality disorder		3% (16/588)
Substance use disorder		<1% (1/588)
Other diagnoses		<1% (4/588)
Prior psychiatric admission		28% (165/588)
Prior involuntary admission		19% (111/588)
Self-reported adherence		
High		44% (490/588)
Good		7% (81/588)
Moderate		15% (165/588)
Poor		11% (128/588)
Very poor		7% (73/588)
Discontinuation		16% (177/588)

Note: <sup>a</sup>In 156 patients with at least one admission.

(CHAID) analysis, which builds classification trees in the sample of psychiatric outpatients using a systematic algorithm to detect the strongest association among the five subscales of the questionnaire dichotomized as high/low according to their medians.

## Results

### Sample description

Throughout the year 2017, 588 consecutive psychiatric outpatients were recruited. Table 2 shows the sociodemographic and clinical variables including a mean age of 45.7 years; 53% were women, 44% completed secondary

education, and 26% completed university studies. Depressive disorder was the most prevalent diagnosis (38%), followed by anxiety disorders (29%), schizophrenia (23%), and bipolar disorders (7%). Patients used a total of 1,114 psychiatric medications, with a mean number of different drugs prescribed per patient of 1.9. Self-reported adherence was high in 44% of psychoactive drugs prescribed, good or moderate in 22%, and poor or very poor in 18%; 16% discontinued medication use.

### Description of adherence to medication

The 588 patients were taking at least one psychiatric medication, and more than half of them (51%, 297/588, 95% CI 46.4%–54.6%) were taking more than one medication up to a maximum of six different psychiatric drugs (average number of drugs per patient: 1.9 [95% CI 1.81–2.0]); a different level of adherence is possible with each drug. For this reason, we have a record (case) of each drug used by each patient, totaling 1,114, which is the number of valid cases with which the rest of the study is addressed from now on, focusing on validating the instrument as an effective predictor of adherence to treatment.

Table S1 describes distribution using the Sidorkiewicz tool, which can range from 1 to 6. The lack of normality in the distribution is suggested by a mean of 2.8 versus a median of 2.0, which is explained by a high number of scores of 1 (footnote 1 of Table S1).

Of the 1,114 self-reports on adherence to psychiatric medications, 66% (736/1,114, 95% CI 63%–69%) were adequate ( $\leq 3$  in the total score), whereas the other 378 or 34% (95% CI of 31.2%–36.8%) self-reported inadequate adherence ( $> 3$  in the total score).

### Questionnaire description

The questionnaire consists of 17 items with each rated on a 6-point scale ranging from totally disagree (1) to totally agree (6), where higher values indicate a more favorable position concerning the content of the item. All of them were answered by the 588 participants in our sample. There were no lost or invalid answers. Carried out as a first descriptive study, it was observed that the item to which participants most favorably responded was, “Whenever my condition worsens, I should consult a medically trained professional”, which was the only item registering an average value greater than 5 (5.48). Conversely, the items to which participants least favorably self-reported were, “When someone forces me to do something, I feel like doing the opposite” (2.69) and “It is unnatural for my mind and body to be controlled



by medications” (2.95), which are the only ones with average values below 3 points (Table 1).

The 17 items that comprise the questionnaire are structured in five subscales that we decided to call Positive Aspects of Medications (five items), Negative Aspects of Medications (three items), Doctor-HLOC (three items), Internal-HLOC (three items), and Psychological Reactance (three items).

## Developing two subscales from the measurement of patient attitudes toward psychiatric medication

Table S2 shows how the eight items that measured patients’ attitudes toward psychiatric medication loaded in a factor analysis based on two factors which explained ~50% of the total variability. The first factor explained ~30% of the variance and included five items. After reviewing the content of the statements of these items, we named it Positive Aspects of Psychiatric Medications. The second factor explained ~22% of the variance and included three items. After reviewing the content of the statements of these items, we named it Negative Aspects of Psychiatric Medications. Therefore, the factorial structure of these items validates two expected dimensions and indicated construct validity. Moreover, the internal consistency corrected by number of items ( $r_{ij}$ ) also demonstrated an improvement (Table S3).

The Positive Aspect subscale was developed by adding the five items with high loading in factor 1, with a possible range of 5–30; its mean score is described in Table 1. Similarly, the Negative Aspect subscale was developed by adding the three items with high loading in factor 2, with a possible range of 3–18; its mean score is described in Table 1. Table S3 shows that the Positive and Negative Aspect subscales had normal distributions (footnote b, Table S4). Table S5 describes the association between the dichotomized versions of these two subscales.

## Developing three subscales from perception of health control

Table S6 shows the factor analysis of how these nine items measuring perception of health control loaded in three factors which explained ~53% of the total variability. The first factor explained ~19% of the variance and included three items from the MHLC-Doctor subscale. The second factor explained ~19% of the variance and included three items from the MHLC-Internal subscale. The third factor explained ~15% of the variance and included three items from the Psychological Reactance subscale. Therefore, the

factorial structure of these items validates three expected subscales within the perception of health control, indicating construct validity. Moreover, the internal consistency corrected by number of items ( $r_{ij}$ ) also demonstrated an improvement (Table S3).

The Doctor-HLOC, Internal-HLOC, and Psychological Reactance subscales were developed by adding the three items with high loading in their respective factors, with a possible range of 3–18.

Table S7 shows that Internal-HLOC and Psychological Reactance subscales had normal distribution, whereas the MHLC-Doctor was not normally distributed (footnote a). Tables S8 and S9 describe the association between the dichotomized versions of these three subscales.

## Predictive validity of associations with adequate adherence to treatment by using subscale scores

The first column of Table 3 shows that independently each of the five dimensions was significantly associated with adequate adherence in the univariate analyses. The second column shows that the backward stepwise logistic regression included all five subscales. None of the confounding variables were entered in the model when added (footnote a).

## Predictive validity of associations with adequate adherence to treatment by dichotomizing subscales as high and low

The first column of Table 4 shows that independently each of the five dichotomized subscales was significantly associated with adequate adherence in the univariate analyses. The second column shows that the backward stepwise logistic regression indicated that the Internal-HLOC subscale was

**Table 3** Odds ratios (95% confidence interval) of five continuous subscales (dependent variable: adherence [yes/no]) (N=1,114 drugs)

Subscales	Univariate	Multivariate (only 5 subscales)*
Positive Aspects of Medications	1.07 (1.04–1.10)	1.39 (1.01–1.07)
Negative Aspects of Medications	0.917 (0.889–0.945)	0.938 (0.909–0.969)
Doctor-HLOC	1.12 (1.08–1.16)	0.961 (0.929–0.993)
Internal-HLOC	0.990 (0.961–1.02)	1.10 (1.06–1.15)
Psychological Reactance	0.945 (0.914–978)	0.963 (0.929–0.998)

**Notes:** \*Hosmer and Lemeshow test: chi-square 13.497,  $df$  8,  $P=0.096$ . None of the confounding variables (gender, age, and education) were significant and were not included in the backward step model.

**Abbreviation:** HLOC, health locus of control.

**Table 4** Odds ratios (95% confidence interval) for five dichotomized psychological subscales (dependent variable: adherence [yes/no]) (N=1,114 drugs)

Subscales	Univariate	Multivariate (only 5 subscales) <sup>a</sup>	Multivariate (confounders) <sup>b</sup>
High Positive Aspects of Medications	1.48 (1.16–1.91)	1.28 (0.98–1.68)	ns
Low Negative Aspects of Medications	1.89 (1.47–2.43)	1.70 (1.32–2.20)	1.76 (1.36–2.29)
High Doctor-HLOC	1.77 (1.37–2.28)	1.57 (1.20–2.05)	1.61 (1.24–2.09)
Low Internal-HLOC	1.16 (0.90–1.49)	1.25 (0.96–1.61)	ns
Low Psychological Reactance	1.44 (1.12–1.85)	1.25 (0.97–1.62)	1.31 (1.01–1.70)

**Notes:** <sup>a</sup>Hosmer and Lemeshow test: chi-square 3.546, *df* 8, *P*=0.896. <sup>b</sup>Confounding variables include education in years (*P*=0.073). Gender and age were not significant and were not included in the backward step model. Hosmer and Lemeshow test: chi-square 8.211, *df* 8, *P*=0.413.

**Abbreviations:** HLOC, health locus of control; ns, not significant.

no longer significant after controlling for the other four subscales. The third column shows the final logistic regression model after controlling for confounders; it included three dichotomized subscales that were significant.

## Further exploration of predictive validity using a CHAID analysis

[Figure S1](#) indicates that the first predictor was Negative Attitude toward medications, and Psychological Reactance, Internal-HLOC, and Doctor-HLOC appeared later. Table 5 provides an easier-to-understand summary of the trees. Psychological Reactance was important in patients with low Negative Aspects of Medications. Internal-HLOC was important in patients with low Negative Aspects attitude and low Psychological Reactance. Doctor-HLOC was important in patients with high Negative Aspects of Medications. The effectiveness of this tree was high: total predictive efficiency was 66.1% and sensitivity was 100%.

## Correlations among five subscales

The five subscales were developed with the idea of measuring relatively independent dimensions. Table 6 describes the nine correlations among the five subscales. Eight of them were insignificant or small with values <0.24.<sup>42</sup> There was only one with a medium value<sup>42</sup> of 0.38 (between Positive Aspects of Medication and Doctor-HLOC), but it still

indicated these two subscales shared less than 15% of variance ( $0.38^2=0.144$ ).

## Discussion

We have found that the Patient's Health Belief Questionnaire on Psychiatric Treatment appears to adequately integrate the concepts of attitudes toward psychiatric medication, HLOC, and psychological reactance. These five subscales have better internal consistency than the long questionnaire. Combining the logistic regression models of the continuous scores and dichotomized subscales with the CHAID analysis, we conclude that all five subscales help in predicting adequate adherence, although different subscales behave differently in the various analyses. We presented a total of five independent analyses (two in Table 2 and three in Table 3) in which five scales were tested for significant association with adherence: Negative Aspects of Medications, Doctor-HLOC, and Psychological Reactance were significant in all five statistical analyses, whereas Positive Aspects of Medication and Internal-HLOC were significant in four of the five statistical analyses. The CHAID analysis suggests that the combination of four subscales (all except Positive Aspects of Medication) was the best way to classify patients.

The five subscales are scored independently, providing scores for five cognitive dimensions that may contribute to explaining lack of adherence in different patients.

**Table 5** Summary of CHAID analysis group

Subgroup of patients	N	Adequate adherence (%)	Node
Low Negative Aspects of Medications and high Psychological Reactance	259	67	4
Low Negative Aspects of Medications, low Psychological Reactance, and high Internal-HLOC	157	69	8
Low Negative Aspects of Medications, low Psychological Reactance, and low Internal-HLOC	204	82	7
High Negative Aspects of Medications and low Doctor-HLOC	303	50	6
High Negative Aspects of Medications and high Doctor-HLOC	303	71	5

**Abbreviations:** CHAID, Chi-squared Automatic Interaction Detector; HLOC, health locus of control.

**Table 6** Correlations among the five subscales (N=588 individuals)

	Negative Aspects of Medication	Doctor-HLOC	Internal-HLOC	Psychological Reactance
Positive Aspects of Medications	−0.19	0.38	0.20	−0.15
Negative Aspects of Medications	–	−0.10	−0.19	0.22
Doctor-HLOC	–	–	0.22	−0.12
Internal-HLOC	–	–	–	0.09

**Abbreviation:** HLOC, health locus of control.

Table 6 indicates that in this sample, these five subscales appeared to have very limited overlap, since 8/9 correlations were extremely low.

The Theory of Planned Behavior, on which our questionnaire is based, is well recognized by researchers and practitioners as a theoretical framework that has guided research on health-related behaviors for the past 30 years. In a 2014 editorial in the journal *Health Psychological Review*, Sniehotta et al<sup>43</sup> proposed that it was time to retire the Theory of Planned Behavior because the theory had been thoroughly discredited, at least as a guide to predicting and changing health-related behavior. However, our results are in line with the multiple responses generated by the editorial, especially with the commentary from Aizen<sup>44</sup> that the Theory of Planned Behavior is alive and well and not ready to retire. Sniehotta et al<sup>43</sup> began their editorial by quoting Richard Freeman, “It doesn’t matter how beautiful your theory is, it doesn’t matter how smart you are. If it doesn’t agree with experiment, it’s wrong”. In our case, the theory fits perfectly with the experiment and the claims of the theory; we recognize its usefulness in predicting patient adherence to prescribed treatment.

Nonetheless, as with other theories that try to explain human behavior, the Theory of Planned Behavior has its weak points, specifically that it places too much emphasis on the rationality of the person and little attention to other psychological factors, such as emotions, which can also play a relevant role in the determination of behaviors.<sup>45</sup> These limitations do not detract from the theory, but do make it necessary for the researcher to take into consideration the nature of the behavior to be studied and the objective of the research.

This brief new questionnaire appears to gather relevant information that provides detailed understanding of some of the factors determining psychiatric patient adherence to prescribed treatments. In addition, to confirm the relevant role played by patient attitudes toward medication, we have confirmed the importance of the HLOC, which influences psychiatrist–patient relationship, and also identified the role played by psychological reactance.

Thus, the various levels of information provided by the questionnaire will allow personalization of patient approach in order to improve treatment adherence. The various dimensions of the questionnaire and the patient profiles it provides will clarify when it is necessary to insist on: provision of adequate information about medications prescribed in order to enhance medication compliance, lack of coercion during prescribing, involvement of the patient in treatment decisions, and development of a positive relationship with the prescriber.

## Limitations

Before we describe the limitations of the study, the idea of developing a shorter questionnaire is based on the untested hypothesis that these measures in the future may be relevant in improving adherence. We acknowledge that in an ideal world the original scales, with a total of 42 items, would provide a much richer measure of attitudes. Unfortunately, our experience is that the burden of time required to complete the original scales is too great to use them as a practical measure that could be extrapolated to clinical practice in the future. Thus, this shorter version of 17 items was produced with the hope that in the future these concepts can be incorporated into clinical practice by developing specific interventions targeting lack of adherence due to pharmacophobia, skepticism, psychological reactance, or internal locus of control. In that way, this brief scale incorporates the best of three longer scales without major loss of fundamental concepts. In summary, we have preferred practicality and simplicity to time burden and richness.

Besides that a priori decision, there are three study limitations that need to be considered. First, generalizability of this research could be limited as a consequence of the patient sample studied proceeding from a convenience sample of consecutive psychiatric outpatients attending Community Mental Health Centers within the public National Health Care System. This patient sample was relatively stable and could collaborate in completing the scales; therefore, it may not be representative of the whole population of psychiatric



patients. Moreover, this sample included no inpatients or patients with acute exacerbations who may need hospitalization for treatment management. In the future, as our studies move from stable outpatients to patients in different stages of illness, we think that this short questionnaire may be particularly helpful for briefly exploring patient beliefs and attitudes toward their prescribed medications. Additionally, we will need to incorporate brief measures of lack of insight, since this variable may be particularly important in explaining non-adherence in psychotic patients in the early stages of illness.<sup>36</sup>

The second limitation concerns the cross-sectional design of the study, which makes it necessary to be cautious in interpreting the relationships among the variables studied and try to avoid conclusions about the direction of causality. Finally, although the self-report method is the most effective measuring strategy for perceptions and cognitions, it may be subject to response styles that could have biased the observed relationships. The limitation of the self-report method applies not only to the brief measure with 17 items but also to the long version with 42 items.

## Conclusion

The Patient's Health Belief Questionnaire on Psychiatric Treatment was designed to meet the need for a brief, easy-to-use questionnaire for assessing psychiatric patients' adherence to prescribed treatment. This first study suggests that the questionnaire may adequately integrate the concepts of attitudes toward psychiatric medication, locus of health control, and psychological reactance. Future studies need to verify and further extend the preliminary findings of this study that the questionnaire appears to have construct and predictive validity.

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