General and Illness-Specific Predictors of Adaptation to Chronic Illnesses: Cognitive Appraisals and Illness-related Beliefs

Daniel Pankowski[1,2], Kinga Wytrychiewicz-Pankowska[1,2], Konrad Janowski[1], Ewa Pisula[2], and Andrzej Mariusz Fal[3,4]

[1] Faculty of Psychology, University of Economics and Human Sciences in Warsaw, Poland

[2] Faculty of Psychology, University of Warsaw, Warsaw, Poland

[3] Collegium Medicum Cardinal Wyszyński University, Warsaw, Poland

[4] Central Clinical Hospital, Ministry of Interior, Warsaw, Poland

ABSTRACT

The literature indicates that cognitive appraisals and illness-related beliefs are key cognitive factors that affect the outcome of psychological adaptation to chronic illness. The main aim of the current study was to identify which cognitive appraisals and illness-related beliefs are the best predictors of adaptation to living with chronic illness as well as which of these predictors are universal, and which are illness-specific. Data was collected online from 505 panel study participants who reported diagnoses of rheumatoid arthritis, asthma, hypothyroidism, diabetes, and hypertension. Adaptation indicators (i.e., depressive symptoms and level of acceptance of living with the illness) differed significantly across samples with different medical diagnoses. Additionally, illness-related cognitive appraisals, but not illness-related beliefs, had a statistically significant specific contribution to explaining the variance in adaptation indicators. The predictors of adaptation to living with chronic illness differ between the diagnoses and the adaptation indicators. The results can contribute to a better matching of therapeutic interventions as well as social campaigns aimed at people suffering from chronic illnesses.

KEYWORDS

cognitive appraisals
illness-related beliefs,
depressive symptoms,
acceptance of living with the disease
adaptation

INTRODUCTION

The prevalence of chronic illnesses is increasing worldwide. The World Health Organization predicts that this growth will continue in the coming years, especially for cardiovascular diseases, respiratory diseases, and diabetes (WHO, 2018). Improvements in the detection and treatment of historically fatal illnesses mean that patients now live with them for many years (Livneh & Martz, 2007). Therefore, it is currently more important than ever to understand how people cope with chronic illness and identify factors that contribute to better adaptation (Gatchel & Oordt, 2003).

Chronic illness is associated with many mental, physical, and social difficulties. It is highly stressful and usually associated with suffering and negative emotions, as well as with difficulties and limitations in everyday functioning (Hadi et al., 2019). Adaptation to living with chronic illness is a dynamic, multi-stage process that takes place over an extended period of time (Due-Christensen et al., 2018), and it depends on the objective situation and the individual's characteristics, including their subjective perceptions of the illness (Stanton et al., 2007). Poor psychological adaptation to illness is often manifested in depressive or anxiety symptoms or in low quality of life. These negative aspects are the indicators of adjustment most frequently used in the literature. However, recently it has been postulated that more attention should also be given to positive aspects of adaptation, since positive and negative affective states do not constitute opposite poles of one continuum (Wedderhoff et al., 2021) and different psychological mechanisms may be responsible for positive and negative adaptational outcomes (Curtis et al., 2005; Janowski et al., 2019). The presence of psychopathological symptoms does not exclude the possibility of positive states, such as engagement or positive accomplishment. As noted by Seligman (2008),

Corresponding author: Daniel Pankowski, Faculty of Psychology, University of Economics and Human Sciences in Warsaw, Warsaw, Poland; Faculty of Psychology, University of Warsaw, Warsaw, Poland. E-mail: d.pankowski87@gmail.com

the correlation coefficient between happiness and depression does not indicate absolute collinearity (–1), but is closer to –.35. Research data also show that positive mental states are of great clinical/prognostic importance, for example, high optimism produced a remarkably lower hazard ratio of 0.23 for cardiovascular disease-related death when controlling for most important clinical and sociodemographic factors (Giltay et al., 2004). In other words, if adaptational outcomes are conceptualized only as negative mental states, this may lead to conclusions biased towards pathology if the effects of possible positive indicators, which may co-occur with negative ones, are not taken into account. Acceptance is one such positive indicator of adaptation to chronic illness. It is understood as mental consent to experience the inevitable limitations and unpleasant feelings associated with the illness and, at the same time, focusing on goals and values which can be obtained despite it (Fletcher & Heyes, 2005; Janowski et al., 2012).

Cognitive factors are among the key variables affecting psychological adaptation to living with chronic illness (Walker et al., 2004). The crucial role of cognition in the process of adaptation to chronic illness has been confirmed across groups with different diseases, such as psoriasis (Augustin & Radtke, 2016), diabetes (Buchberger et al., 2016), and rheumatoid arthritis (Jackson et al., 2020). Since the term "cognitive factors" is very broad and they may be conceptualized and operationalized in many different ways, in our study, we focused on two concepts: cognitive appraisal (CA) of illness and cognitive illness representation.

Lazarus and Folkman's (1984a, 1984b) theory of stress and coping assumes that a person's relationship to their environment is subject to CA, which addresses elements of the situation that are relevant to the individual's well-being. The primary appraisals of a situation include threat, harm/loss, and challenge. In fact, it is these appraisals that render a given situation stressful. Based on this CA, further processes are generated, including secondary appraisal of one's coping resources, and coping strategies are implemented. This concept of CA was later adopted to models of adaptation to chronic illness, conceptualized as a specific instance of a stressful situation (Maes et al., 1996). In the context of illness-related stress, it is often emphasized that CA is of critical importance in determining both emotions experienced in relation to the illness and the choice of strategies used to cope with illness-related stress (Maes et al., 1996). Some authors have also indicated that the three categories of CA originally distinguished by Lazarus and Folkman (1984a, 1984b) do not cover the entire array of appraisals generated in response to chronic illness, extending illness-related appraisals to include categories such as profit, value, and obstacle (Janowski et al., 2009; Keltikangas-Järvinen, 1986; Schüssler, 1992). Although the importance of CA was originally attributed to its impact on the choice of coping strategies (Lazarus & Folkman, 1984a, 1984b), further research has shown that illness-related CAs may themselves be more significant than coping strategies in accounting for levels of adjustment achieved by people with chronic illnesses (Sharloo et al., 1998).

Cognitive illness representation is another important concept which has been postulated to exert considerable impact on how well people adapt to living with chronic illness (Hagger & Orbell, 2003; Rozema et al., 2009). On the most general level, what distinguishes CAs of illness from cognitive representations of illness is that the former is a cognitive process, while the latter is a cognitive structure. The common sense model (CSM) of illness elaborates on what illness representations consist of while providing a conceptual framework that explores the perceptual, behavioral, and cognitive processes that influence health behaviors and coping outcomes (Leventhal et al., 2016). Even though the constituent elements of cognitive illness representations are frequently labeled in the literature as "illness perceptions" (Weinman et al., 1996), illness representations should in fact be regarded as cognitive structures that consist of a set of illness-related beliefs (IRBs). In the CSM of illness, these IRBs are postulated to cover five key components (Leventhal et al., 1980; Weinman et al., 1996): (a) an identity component, (b) a causal component, (c) a time component, (d) a consequence component, and (e) a disease treatment/controllability component.

Although illness representation is most often operationalized as consisting of these five categories of IRBs (Leventhal et al., 1984, 1997), its actual structure is arguably much more complex and it seems that other important categories of IRBs could also be included in the structure of illness representation. For instance, the original CSM omits IRBs related to social perceptions of a given disease, which is crucial for many groups of patients (e.g., those with skin diseases; Kimball et al., 2005). It is clear that diseases differ in the degree of social stigma associated with them (Crandall & Moriarty, 1995), and even patients with the same disease may have different IRBs about how stigmatizing or embarrassing their disease is (Cook et al., 2016). Research also shows that the level and accuracy of a patient's knowledge of their disease can be relevant to adaptation. Therefore, the patients' IRBs about their expertise regarding their illness can have an impact on their health-related behavior, mood, and so forth (Lepore et al., 2003). A patient's IRBs about the severity of their condition as compared to other patients with the same disease may also influence adaptation outcomes (Helgeson & Taylor, 1993).

Irrespective of its exact structure, previous studies have clearly shown that cognitive illness representation plays a key role in the process of adaptation (Heijmans et al., 1999). It has been emphasized that the representation of illness can determine a patient's cognitive and emotional responses to the illness and its symptoms (Leventhal et al., 1984) and is related to mood, in particular to levels of depression (Purewal & Fisher, 2018) and anxiety (Cheng et al., 2003). Research has also shown that illness representation may also be crucial for other areas of functioning, such as health-related behaviors (Figueiras & Alves, 2007).

Identification of the cognitive factors which are responsible for differences in how well people adapt to chronic illness can help design more precise interventions targeting either universal or illness-specific cognitions to enhance patients' adaptation efforts. Interventions of this type can further contribute to favorable changes in health-related behaviors or better quality of life, among others (Leventhal et al., 1984; Petrie et al., 1996).

In the current study, we undertook to investigate the relative role of (a) illness-related appraisals and (b) IRBs (cognitive illness representations) in accounting for psychological adaptation to living with the most common chronic illnesses. Additionally, we wanted to investigate which illness-related appraisals and IRBs are (c) universal predictors of adaptation outcomes across different illness diagnostic categories and

(d) which are illness-specific. This study expands on previous research on the predictors of psychological adjustment to chronic illness by combining both CA and IRBs in one exploratory model, in contrast to previous studies that predominantly analyzed the role of these two cognitive concepts separately (e.g., Alhurani et al., 2019; Bassi et al., 2019). We have also broadened the concept of cognitive illness representation by including some new categories of beliefs in addition to the five categories of IRBs as conceptualized in the CSM. We also decided to include in our research model both positive and negative indicators of adaptation to living with chronic illness, with depressive symptoms being the negative aspect and acceptance of illness being the positive aspect of adaptation outcomes. Finally, the inclusion of samples with different medical diagnoses allowed us to distinguish between universal and illness-specific predictors of adaptation.

METHOD

Participants and Procedure

Recruitment for the study and data collection were conducted online between July and October 2020. Over this period, direct methods of interaction with participants for research purposes were impossible because of COVID-19-related restrictions.

Two independent methods of recruiting participants were used. The first was the Polish online panel study. The description of the study did not specify its purpose and eligible participants were qualified to the study if they gave an affirmative answer to one of the questions regarding a diagnosis of the chronic diseases which were the target of this study.

The second method of recruitment was an online survey created in Google Forms, which was advertised on various online forums and through foundations dedicated to supporting people with specific diseases (see the Acknowledgments section).

Participants were enrolled into the study if they reported being at least 18 years old and answered affirmatively regarding the medical diagnosis of one of the following diseases: rheumatoid arthritis (RA), asthma, hypothyroidism, diabetes (both types), hypertension, psoriasis, or systemic lupus erythematosus. Exclusion criteria were: reporting the diagnosis of cancer, neurological, and/or psychiatric diagnoses such as depression. Participants also listed comorbidities, but their variability was very large: the survey asked them to focus on a specific disease entity (the main diagnosis) and to respond with this particular disease in mind. Since the obtained sample sizes of participants with psoriasis and systemic lupus erythematosus were too small (n = 20 and n = 18, respectively), the data from these groups were not included in the analyses. The final study sample consisted of 505 participants: 64 people with rheumatoid arthritis, 87 people with asthma, 130 people with hypothyroidism, 101 people with diabetes (both types), and 123 people with hypertension.

Questionnaires

The following variables were controlled in the study (for brief descriptions, see Appendix A):

Sociodemographic variables:

- gender (male/female/other)
- age expressed in years
- relationship status (married/in informal relationship/single)

Clinical variables:

- time since diagnosis of the disease (in years)
- number of hospitalizations in the last 12 months

COGNITIVE APPRAISALS

Illness-Related Appraisals Scale–Revised (IRAS, Pankowski et al., 2021a): this self-report scale consists of 30 questions to which the respondents answer on a 5-point scale. The scale consists of the following subscales (ratings): loss (α = 0.93), harm (α = 0.95), benefit (α = 0.9), challenge (α = 0.9), value (α = 0.9), and threat (α = 0.94). Additionally, five questions were added regarding the importance that the respondent attaches to their own illness (importance). The reliability of the importance subscale was α = 0.79. For details about this scale, see Appendix B.

ILLNESS-RELATED BELIEFS

The Illness-Related Beliefs Questionnaire (IRBQ; Pankowski et al., 2021; Pankowski et al., 2021b) was used to assess the intensity of personal beliefs about key aspects of chronic disease. It consists of 13 IRBs covering five categories of beliefs previously described in the literature and several additional IRBs (such as those regarding self-knowledge, comparisons to other patients, social stigma, etc.). Each belief is expressed on a continuum ranging from one extreme to another. Respondents were asked to locate their own personal beliefs on this continuum using a 10-point response scale. The scores endorsed by the respondents for each belief are treated as separate scales and do not yield one cumulative total score. For details about this scale, see Appendix C.

INDICATORS OF ADAPTATION TO CHRONIC ILLNESS

The Acceptance of Life with the Disease Scale[1] (ALDS; Janowski et al., 2012) is a self-report questionnaire used to measure the degree of acceptance of one's life with a disease. It consists of 12 test items divided into three subscales: (a) satisfaction with life despite the disease (α = 0.9); (b) reconcilement with the disease (α = 0.89); and (c) self-distancing from the disease (α = 0.9). A total score can be calculated, which is the sum of the scores obtained for all items (α = 0.95).

Beck Depression Inventory-I (BDI-I); original version by Beck et al. (1961), Polish version by Parnowski and Jernajczyk (1977). The BDI-I is a self-report scale that assesses the presence of depressive symptoms. It contains 21 depressive symptoms, the severity of which is described by four statements each. Each statement is assigned a score from 0 to 3 points. Apart from the total score, two subscales can be calculated (cognitive-affective and somatic symptoms). For the purposes of descriptive statistics, the numbers and percentages of participants who did not exhibit clinically significant depressive symptoms (< 10 points), as well as those who exhibited mild (≥ 10 and < 20), moderate (≥ 20 and < 30), and severe (≥ 30) depressive symptoms were also calculated (Łopuszańska et al., 2013). The number of participants who presented suicidal thoughts (1 point on the item "I have thoughts of killing my-

self, but I would not carry them out") and tendencies (2 or 3 points on the items "I would like to kill myself"/"I would kill myself if I had the chance") were also taken into account. The Cronbach's α reliability coefficient of the BDI-I total score in our study was high,α = 0.93. The reliability coefficients of the cognitive-affective and somatic symptoms subscales were α = 0.92 and 0.82, respectively.

Statistical Analyses

First, the statistical significance of differences between groups of people distinguished based on chronic illness diagnoses was calculated in terms of IRBs, CA, severity of depressive symptoms, and level of acceptance of living with the disease using an analysis of covariance (ANCOVA), controlling for sociodemographic (sex, age, and relationship status) and clinical (time since diagnosis and number of hospitalizations in last 12 months) variables. Additionally, marginal means with Bonferroni correction were estimated to compare the results from participants with particular diagnoses in pairs. All further analyses were first performed for each medical diagnosis separately, and then together for all participants.

In the next step, partial correlations between the measured variables were computed, controlling for sociodemographic (sex, age, and relationship status) and clinical (time since diagnosis and number of hospitalizations in last 12 months) variables.

Due to the fact that somatic symptoms of depression assessed using the BDI-I somatic symptoms subscale may also be due to the symptoms of chronic illness (e.g., sleep problems in RA patients may be due to pain rather than depression), we decided to use only the BDI-I cognitive-affective subscale in further analyses.

Next, we determined the statistically significant specific contribution of cognitive variables to explaining the variance in adaptation indicators (cognitive-affective symptoms of depression and the ALDS total score). For this purpose, a hierarchical regression analysis was used in which subsequent variables were entered in the following blocks:

- sociodemographic variables (gender, age, and relationship status)
- clinical variables (time since diagnosis and number of hospitalizations within the last 12 months)
- CAs
- IRBs

Due to the fact that the results indicated a specific contribution to explaining the variance of only the variable entered in the last block, calculations were also performed using CA as the last variable.

The last step was to perform stepwise regression analysis to determine statistically significant predictors of adaptation to living with the disease. Adaptation indicators were placed as dependent variables, and all other variables were placed all together in one block.

Ethical Approval

This study was conducted according to the guidelines of the Declaration of Helsinki. Approval from the local Institutional Ethical Committee at the first author's institution was obtained for this study. Informed consent was obtained from all participants upon enrollment.

RESULTS

Descriptive Characteristics

The sample consisted of 332 female, 171 male, and 2 other gender participants. The mean age was 46.44 (*SD* = 15.64) years. Ages ranged from 19 to 85 years. A total of 301 (59.6%) participants were married, 102 (20.2%) were in an informal relationship, and 90 (17.8 %) were single (12 participants declared a different relationship status: 6 people were divorced, 2 were separated, and 4 were widows/widowers). For detailed descriptive statics for each study subgroup see Table 1.

For IRBs, the highest mean was observed for beliefs about the long duration of the disease, having a great deal of knowledge about the disease, and it having a significant impact on life. In turn, the participants assessed their illnesses mostly as a challenge or a threat. Detailed descriptive statistics are presented in Table 2.

The incidences of clinically significant depressive symptoms as well as suicidal thoughts and tendencies were assessed in the sample. The results indicated that over 10% of the studied sample declared severe intensity of depressive symptoms and 3.6% declared suicidal tendencies. For detailed results for the whole group and illness diagnoses, see Appendix D.

Differences Between Diagnoses and Correlations Between Variables

First, the cognitive variable scores and adaptation indicators were compared across the illness diagnoses while controlling for sociodemographic and clinical variables. The results indicated that people with different diagnoses differed statistically significantly both in cognitive factors and levels of adaptation to living with the disease. The effect sizes varied between the IRBs, from no effect to intermediate. For details, see Appendix E.

Both CAs and IRBs were correlated with adaptation indicators when controlling for sociodemographic and clinical variables. For a 0–1 order correlation matrix, see Appendix F.

Cognitive Factors and Adaptation to Illness: Regression Analyses

Next, hierarchical regression analyses were performed. As mentioned earlier, IRBs were introduced in the last block to the model to calculate their specific contribution to the variance of the dependent variables. The remaining variables were sociodemographic characteristics, clinical features, and CAs.

First, a hierarchical regression analysis was performed in which the dependent variable was the severity of depressive symptoms (see Table 3). When CAs were placed in the last block, the percentages of variance explained by CAs (above that explained by the remaining variables) were statistically significant for RA, hypothyroidism, diabetes, hypertension, as well as the total sample. R^2 change values ranged from 0.101 (diabetes) to 0.217 (RA). The IRBs explained a statistically significant part of the variance only in the case of analyses performed on the entire group of patients. In the remaining cases, the percentage of specific explained variance ranged from 9.7% (asthma) to 18.2% (RA).

TABLE 1.
Sociodemographic and Clinical Descriptive Characteristics of Subgroups with Different Diagnoses

Variables	RA (n = 64)	Asthma (n = 87)	Hypothyroidism (n = 130)	Diabetes (n = 101)	Hypertension (n = 123)	Statistics
	n(%)/ M(SD)	n(%)/ M(SD)	n(%)/ M(SD)	n(%)/ M(SD)	n(%)/ M(SD)	
Number (percent) of women	48 (75%)	55 (63,2%)	117 (90%)	45 (44.6%)	67 (54.5%)	χ^2 (4) = 63.717; p < .001
Age	48.16 (15.25)	41.15 (15.56)	40.05 (14.22)	51.04 (16.40)	52.25 (12.99)	F(4, 500) = 16.298; p < .001
Marital status (single)	20 (31.3%)	13 (14.9%)	24 (18.5%)	18 (17.8%)	15 (12.2%)	χ^2 (4) = 11.067; p < .05
Time since diagnosis (in years)	10.31 (8.82)	14.43 (13.42)	9.32 (8.38)	10.03 (9.27)	9.67 (7.29)	F(4, 500) = 4.576; p < .01
Number of hospitalizations in the last 12 months	0.083 (2.47)	0.39 (0.85)	0.31 (1.18)	0.52 (1.35)	0.37 (1.44)	F(4, 500) = 1.589; p >0.05

Note. RA = rheumatoid arthritis; % = percentage of the total sample.

TABLE 2.
Cognitive Factors and Adaptation Indicators: Descriptive Statistics for the Entire Sample

	Variables	*M*	*SD*	Range
Illness–related beliefs	Illness will last for a very long time	8.93	1.82	1–10
	Illness will have very significant impact on life	7.54	2.31	1–10
	Condition will worsen	6.70	2.30	1–10
	Symptoms very visible to others	4.32	2.78	1–10
	Cannot predict course	6.23	2.44	1–10
	I know a lot about my illness	7.94	1.94	1–10
	Things I have done caused me to become ill	3.86	2.89	1–10
	Things I do have no effect on my illness	4.46	2.77	1–10
	Medical staff cannot influence the course of my illness	5.03	2.67	1–10
	The treatment I get does not help me at all	4.67	2.41	1–10
	Others would regard me negatively due to the fact I have this illness	4.20	2.27	1–10
	My illness is embarrassing	2.95	2.63	1–10
	Compared to other people who have this illness, my symptoms are very severe	4.21	2.261	1–10
Cognitive appraisals	Loss	12.87	5.54	5–25
	Harm	11.30	5.69	5–25
	Benefit	8.06	3.98	5–25
	Challenge	14.28	5.35	5–25
	Value	12.05	4.90	5–25
	Threat	14.13	5.52	5–25
	Importance	15.45	4.42	5–25
BDI-I	Total score	13.38	11.20	0–53
	Cognitive–affective scale	8.08	7.41	0–32
	Somatic symptoms scale	5.30	4.41	0–23
Acceptance of life with the illness	Satisfaction with life despite the illness	15.95	3.08	8–20
	Reconcilement with the illness	17.30	2.60	8–20
	Self–distancing from the illness	15.88	3.11	8–20
	Total score	49.13	8.05	24–60

Note. BDI-I = Beck Depression Inventory–I

TABLE 3.
Percentage of Variance (R^2) in Depressive Symptoms Explained Specifically by Cognitive Appraisals and Illness-Related Beliefs

Diagnoses	R^2 change parameters for cognitive appraisals, when entered in the last block		R^2 change parameters for illness-related beliefs when entered in the last block	
	R^2 change	Significance	R^2 change	Significance
Rheumatoid arthritis	0.22	0.006	0.18	0.146
Asthma	0.07	0.239	0.13	0.160
Hypothyroidism	0.14	0.002	0.10	0.202
Diabetes	0.10	0.026	0.14	0.059
Hypertension	0.10	0.030	0.11	0.186
All	0.07	0.000	0.06	0.000

TABLE 4.
Acceptance of Life with the Disease: Hierarchical Regression Analysis

Diagnoses	R^2 change parameters for cognitive appraisals, when entered in the last block		R^2 change parameters for illness-related beliefs when entered in the last block	
	R^2 change	Significance	R^2 change	Significance
Rheumatoid arthritis	0.23	0.012	0.14	0.440
Asthma	0.12	0.011	0.13	0.094
Hypothyroidism	0.19	0.000	0.08	0.118
Diabetes	0.15	0.001	0.18	0.011
Hypertension	0.17	0.000	0.09	0.230
All	0.15	0.000	0.06	0.000

In the next hierarchical regression analysis, the ALDS total score was the dependent variable (see Table 4). Placing the CAs in the last block showed that this cognitive factor explained a statistically significant part of the variance for all diagnoses and the total sample. The specific contribution of CAs to explaining acceptance of life with chronic illness ranged from 12.2% (asthma) to 22.8% (RA). The IRBs explained a statistically significant part of the variance only for diabetes patients and the analyses performed for the total sample. The percentages of specific variance explained ranged from 8% (hypothyroidism) to 17.7% (diabetes). For details regarding the hierarchical regression analyses, see Appendix G.

Next, in order to identify statistically significant predictors of adaptation, a stepwise regression analysis was performed. Table 5 summarizes the results.

Table 5 shows that both cognitive factors were statistically significant predictors of the severity of depressive symptoms. In the case of different diagnoses, considerable variability can be noticed both in terms of which variables were predictors and in terms of their predictive value. Age also played a protective role against the severity of depressive symptoms (the higher the age, the less severe the depressive symptoms). Duration of illness was not a statistically significant predictor in any of the models. For acceptance of life with chronic illness, a large differentiation of predictors between the diagnoses (specific) and the total sample (general) was found. It is also worth noting that there were no sociodemographic or clinical variables in any of the models – cognitive variables were more important for acceptance of living with chronic illness. It is also worth noting that the suggested models explained a large percentage of variance in both the severity of depressive symptoms (from adjusted R^2 = 0.203 for hypertension to Adjusted R^2 = 0.505 for RA) and levels of acceptance of living with chronic illness (from adjusted R^2 = 0.376 for RA to adjusted R^2 = 0.561 for asthma). Detailed results of analyses are presented in Appendix H.

DISCUSSION

The current study focused on the role of cognitive factors in adaptation to five chronic illnesses: RA, asthma, hypothyroidism, diabetes, and hypertension. The collected data were analyzed both for the total sample and for each diagnosis separately. The study used two novel methods to assess the levels of individual illness appraisals and the intensity of individual IRBs, which turned out to have good psychometric properties.

Despite statistically significant differences between some of the analyzed variables, the actual effect sizes were relatively small. These data indicate that despite the slight differences in the cognitive variables, mean levels of adaptation indicators were similar across the analyzed samples.

The hierarchical regression analyses results may indicate that CAs play a much more important role in adaptation to chronic illness. It should also be noted that when IRBs were put third in the regression

TABLE 5.
Predictors of Adaptation to Living With Chronic Disease: Summary

	Variables	Rheumatoid arthritis		Asthma		Hypothyroidism		Diabetes		Hypertension		All	
		Depressive symptoms	Acceptance	Depressive symptoms	Acceptance	Depressive symptoms	Acceptance	Depressive symptoms	Acceptance	Depressive symptoms	Acceptance	Depressive symptoms	Acceptance
Sociodemographic variables	Age					↓		↓				↓	
	Being single									↑			
Clinical variables	Number of hospitalizations in the last 12 months	↑						↑				↑	
Cognitive appraisals	Loss		↓	↑	↓		↓			↑	↓	↑	↓
	Harm	↑					↓	↑					
	Benefit	↓											
	Value		↑			↓	↑		↑			↓	↑
	Threat	↓				↑			↓				↓
	Importance				↓	↑	↓		↓		↓	↑	↓
Illness-related beliefs	My illness will last for a very long time.								↑				↑
	My condition will worsen.							↑					
	The symptoms of my illness are very visible to others.					↑							
	I know a lot about my illness									↓	↑		
	Things I have done caused me to become ill.											↑	
	The things I do have no effect on the course of my illness.										↑		
	The treatment I get does not help me at all.	↑			↓		↓				↓	↑	↓
	In general, others would regard me negatively due to the fact I have this illness.			↑		↑						↑	↓
	I believe my illness is embarrassing.								↓				
	Compared to other people who have this illness, my symptoms are very severe.				↓				↓				↓

Note. ↑ Indicates an increase in the independent variable is accompanied by an increase in the dependent variable.
↓ Indicates an increase in the independent variable is accompanied by a decrease in the dependent variable

models (before CAs), they made a statistically significant contribution to explaining the variance of adaptation indicators in most cases (excluding RA). This may indicate that IRBs share a common variance with CAs, and that this proportion is different between the diagnoses (i.e., it is illness-specific). However, the percentage of variance explained by the IRBs over clinical and sociodemographic variables was shared with the variance of CAs, but the specific contribution of IRBs was not statistically significant when the appraisals were controlled for. It is also worth noting that CAs in the analyzed models made a statistically significant contribution to the scores, where they ranked third (above sociodemographic and clinical variables) and fourth (above IRBs), with the exception of participants with asthma. These results may confirm the validity of therapeutic interventions focusing on the modification of IRBs, which, in turn, may change the illness-related CAs due to the fact that they share common variance. These results may also suggest that IRBs may be one of the factors that shape CAs, but this claim requires further research and analysis.

In the last step, statistically significant predictors of depressive symptoms and the level of acceptance of living with chronic illness were assessed. The key observation is that the configuration of cognitive variables as predictors of psychological adaptation varied considerably across the diagnoses: different factors were responsible for the occurrence of depressive symptoms and the level of acceptance depending on disease diagnosis. The role of the variables in the models was also different. For example, the stepwise regression model accounted for about 50% of the variance of depressive symptoms in RA, while in hypertension, it was only about 20%.

When analyzing the predictors of the level of adaptation to life with chronic illness, it was noticed that:

(a) the predictors of acceptance of living with chronic illness (positive indicator) and the severity of depressive symptoms (negative indicator) were different on both the global and disease-specific levels; and

(b) the predictors of levels of adaptation to living with chronic illness differed between diagnoses and were not consistent with each other or with the general predictors (for the total sample; for results including interactions between predictors see, Pankowski et al., 2021a).

Regarding the first observation, it is worth mentioning that some factors (CAs such as loss and value and IRBs such as "treatment being ineffective" or "other people having a negative attitude towards the disease") both increased the severity of depressive symptoms and decreased the level of acceptance. The remaining predictors differed between the analyzed indicators. In the vast majority of cases, sociodemographic and clinical variables were not statistically significant predictors of acceptance, both in the case of individual diagnoses and the total sample. However, in the case of depressive symptoms, they played a significant role (e.g., age). It was also noticed that for acceptance, the number of modifiable cognitive predictors was greater than in the case of depressive symptoms, which may be important from the point of view of planning therapeutic interventions. Interestingly, for the entire group, one predictor of acceptance was the IRB related to the duration of the illness: the longer the participants believed the disease will last, the greater their acceptance level. This may be because they were more at peace with being ill.

On the other hand, the second observation clearly indicates that therapeutic interventions for chronically ill people should be tailored to specific diagnoses. Despite the lack of statistically significant differences in the severity of depressive symptoms and most acceptance scales, a very large differentiation can be observed in terms of the factors significant for the level of adaptation. Moreover, some factors that have protective properties for one illness may be a factor responsible for poorer adaptation in another (threat CAs in participants with RA, see Table 5). We also noticed that some variables predicted levels of adaptation for only one illness (see IRBs related to worsening of the condition or embarrassment in diabetes). However, other factors were responsible only for changes in the severity of depressive symptoms (e.g., age or number of hospitalizations), and other factors only for acceptance (e.g., the threat CAs or the IRB about the duration of the disease) for all participants. We assume that the differences in statistically significant predictors may also result from differences in the size of the subgroups. Predictors that were statistically significant in larger subgroups may have been significant in the total sample.

As mentioned above, the threat CAs were a protective factor in the case of exacerbation of depressive symptoms in the group of patients with RA. We noticed that the correlation between the depressive symptoms and threat CAs was positive ($r = .36$, $p < .01$), but after taking into account other variables (IRBs related to treatment efficacy and number of hospitalizations; the harm and profit CAs) this coefficient decreased and finally amounted to $r = –.281$, $p < .05$, suggesting that the above-mentioned variables were moderators of this relationship. Additionally, it can be assumed that people who perceive that a given situation may have negative consequences in the future may be inclined to become more involved in pro-health behaviors or more frequent medical check-ups, which may indirectly reduce the severity of depressive symptoms.

The analyses also showed that the extension of the five-factor model of cognitive representation of the illness with further IRBs is empirically justified. Despite the fact that the IRBs do not explain a statistically significant specific percentage of variance in concrete diagnoses, the stepwise regression analysis showed that they were statistically significant predictors of adaptation to living with chronic illness. This can be observed both on the global level, as well as, above all, in the case of individual diagnoses. For example, beliefs about embarrassment or visibility were important indicators of adaptation in the case of diabetes and hypothyroidism, while the subjective assessment of knowledge was an important indicator for hypertension. Moreover, the extension of the three-factor cognitive assessment of disease situation also proved important in terms of outcomes. The cognitive assessment of the illness situation had a statistically significant and specific contribution to explaining the variance of adaptation indicators and was a statistically significant predictor in both the vast majority of diagnoses and in the total sample. Surprisingly, the analyses showed, for example, that the perception of the illness in terms of a challenge was not a statistically significant predictor of adaptation, neither for individual diagnoses nor in general. Earlier reports indicated that this CA plays an important role

in the adaptation process, (e.g., in HIV; Pakenham & Rinaldis, 2001). The inclusion of further illness CAs such ase value or controlling the significance of the disease, turned out to be important both for the severity of depressive symptoms and the level of acceptance.

The results of this study can also be applied in practice. The regression analyses clearly showed that cognitive factors (CAs in particular) play a very important role in adaptation to chronic illness. The data clearly showed that both the predictors and their strength (understood as beta values) vary between the diagnoses. These results can be used in therapeutic work with chronically ill people and form the basis of interventions designed from the bottom-up. A better understanding of the factors responsible for adaptation will help tailor therapies to diagnoses. These results could also be used in various types of public health campaigns targeting people with specific diagnoses as well as those who are ill in general.

Limitations and Future Directions

The current study also has some limitations. Due to the cross-sectional nature of the collected data, it was not possible to establish cause-effect relationships or the effects of specific variables. Another limitation, especially in the case of the elderly, is the lack of control of cognitive impairment, for example, with the use of screening scales. Data on diabetes should also be interpreted with caution. The type of diabetes was not sufficiently controlled in the current study, which may differ from both clinical and psychological points of view. An additional limitation may be the lack of control of medical variables or of confirmation of the diagnoses by physicians due to the online nature of the study. Other studies have shown that the vast majority (over 99%) of diagnoses of breast cancer can be confirmed against real medical records in women who self-reported it (D'Aloisio et al., 2017). These limitations were partly due to the pandemic preventing in-person testing (in medical facilities) as well as the lack of comparability of medical parameters between diagnoses (e.g., C-reactive protein in RA vs. hormone levels in hypothyroidism). Such variables should be taken into account in more complex models developed for a given diagnosis/specific groups of patients. The study also used two new tools whose psychometric properties are currently in the final phase of analysis. However, over time, further data on these tools will be published on the OSF project pages, as soon as the relevant articles are accepted for publication.

These limitations also indicate directions for further research. Future analyses should include a repeated measurement after a period of at least one month. These variables can also be used to determine the effectiveness and extent of changes in cognitive functioning after cognitive-behavioral therapy or other therapies. These results can also form the basis of therapeutic/psychoeducational/public health interventions (including information campaigns) aimed at changing IRBs and CAs associated with a given disease. Further research should also focus on the development of models for other factors: medical, coping, and personal and social resources. The current results indicate that the studied variables have diverse roles, depending on the diagnosis, and taking into account other variables would allow for a better understanding of the characteristics of the adaptation process to living with a given disease. It may also be worth considering extending the number of adaptation indicators to include anxiety symptoms, quality of life, life satisfaction, and other variables.

CONCLUSIONS

- CAs make a greater contribution than IRBs to the variance of depressive symptoms and level of acceptance in people with various chronic illnesses
- Predictors of acceptance of living with chronic illness (positive indicator) and the severity of depressive symptoms (negative indicator) were different on both global and illness-specific levels
- The predictors of adaptation to living with chronic illness differed between diagnoses and were not consistent with each other or with the general predictors (for the total sample).
- The results contribute to a better understanding of the relationship between the key cognitive factors involved in the process of adaptation to chronic illness and indicate the need to adapt therapeutic processes to specific diagnoses
- In addition to the therapeutic goals, the results could also be used in campaigns and other activities targeting people with chronic conditions.

FOOTNOTES

[1] Despite the fact that illness is a broader concept, also referring to malaise (without a medical diagnosis), the term was used consistently throughout the text. ALDS refers to "disease" which does not affect the results of the study as the participants reported a medically confirmed diagnosis.

ACKNOWLEDGEMENTS

The authors would like to thank all the people who participated in the studies, Facebook forums helping people with hypothyroidism and Hashimoto's disease administrators and the following foundations and associations: *3majmy się razem*, *Unia Stowarzyszeń Chorych na Łuszczycę i ŁZS*, and *Polskie Stowarzyszenie Diabetyków*.

Author contributions: Daniel Pankowski: conceptualization, methodology, formal analysis, investigation, resources, data curation, writing - original draft, writing - review & editing, visualization, supervision, project administration, funding acquisition. Kinga Wytrychiewicz-Pankowska: writing - original draft, investigation, writing - review & editing, funding acquisition. Konrad Janowski: methodology, writing - review & editing Ewa Pisula: writing - review & editing, funding acquisition. Andrzej M. Fal: writing - review & editing, funding acquisition

Approval from the local Institutional Ethical Committee at the first author's University was obtained for this study. Informed consent was obtained from all participants upon enrollment.

Consent for publication was obtained along with the consent to participate in this study.

This work was supported by the University of Warsaw, from

funds awarded by the Ministry of Science and Higher Education in the form of a subsidy for the maintenance and development of research potential in 2020 (501-D125-01-1250000) and 2021 (501-D125-01-1250000 zlec*. 5011000221)., University of Economics and Human Sciences and Cardinal Wyszýnski University own funds.

The authors report no conflicts of interest.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author upon reasonable request.

REFERENCES

Alhurani, A. S., Dekker, R., Ahmad, M., Miller, J., Yousef, K. M., Abdulqader, B., ... & Moser, D. K. (2018). Stress, cognitive appraisal, coping, and event free survival in patients with heart failure. *Heart & Lung, 47*, 205–210. doi: 10.1016/j.hrtlng.2018.03.008

Augustin, M., & Radtke, M. A. (2016). Quality of life in psoriasis. In R. Warren, & A. Menter (Eds.), *Handbook of psoriasis and psoriatic arthritis* (pp. 101–116). Springer International Publishing.

Bassi, M., Grobberio, M., Negri, L., Cilia, S., Minacapelli, E., Niccolai, C., ... & Delle Fave, A. (2019). The contribution of illness beliefs, coping strategies, and social support to perceived physical health and fatigue in multiple sclerosis. *Journal of Clinical Psychology in Medical Settings*, *28*, 1-12. doi: 10.1007/s10880-019-09692-6

Beck, A. T., & Bredemeier, K. (2016). A unified model of depression: Integrating clinical, cognitive, biological, and evolutionary perspectives. *Clinical Psychological Science, 4*, 596–619. doi: 10.1177/2167702616628523

Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 4*, 561–571. doi: 10.1001/archpsyc.1961.01710120031004

Buchberger, B., Huppertz, H., Krabbe, L., Lux, B., Mattivi, J. T., & Siafarikas, A. (2016). Symptoms of depression and anxiety in youth with type 1 diabetes: A systematic review and metaanalysis. *Psychoneuroendocrinology, 70*, 70–84. doi: 10.1016/j.psyneuen.2016.04.019

Cassileth, B. R., Lusk, E. J., Strouse, T. B., Miller, D. S., Brown, L. L., Cross, P. A., & Tenaglia, A. N. (1984). Psychosocial status in chronic illness: A comparative analysis of six diagnostic groups. *New England Journal of Medicine, 311*, 506–511.

Cameron, L. D., Fleszar- Pavlović, S., & Khachikian, T. (2020). Changing behavior using the common sense model of self-regulation. In: M. S. Hagger, L. D. Cameron, K. Hamilton, N. Hankonen & T. Lintunen (Eds.), *The handbook of behavior change* (pp. 60–76). Cambridge University Press.

Cao-Lei, L., Dancause, K. N., Elgbeili, G., Laplante, D. P., Szyf, M., & King, S. (2018). DNA methylation mediates the effect of maternal cognitive appraisal of a disaster in pregnancy on the child's C-peptide secretion in adolescence: Project ice storm. *PloS One, 13*, e0192199. doi: 10.1371/journal.pone.0192199

Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology, 56*, 267–283. doi: 10.1037//0022 3514.56.2.267

Caspi, A., Sugden, K., Moffitt, T. E., Taylor, A., Craig, I. W., Harrington, H., . . . & Poulton, R. (2003). Influence of life stress on depression: Moderation by a polymorphism in the 5-HTT gene. *Science, 301*, 386–389. doi: 10.1126/science.1083968

Cheng, C., Chan, A. O. O., Hui, W. M., & Lam, S. K. (2003). Coping strategies, illness perception, anxiety and depression of patients with idiopathic constipation: a population-based study. *Alimentary Pharmacology & Therapeutics, 18*, 319–326. doi: 10.1046/j.1365-2036.2003.01663.x

Conway, C. C., Hammen, C., Espejo, E. P., Wray, N. R., Najman, J. M., & Brennan, P. A. (2012). Appraisals of stressful life events as a genetically-linked mechanism in the stress–depression relationship. *Cognitive Therapy and Research, 36*, 338–347. doi: 10.1007/s10608-011-9368-9

Cook, J. E., Germano, A. L., & Stadler, G. (2016). An exploratory investigation of social stigma and concealment in patients with multiple sclerosis. *International Journal of MS Care, 18*, 78–84. doi: 10.7224/1537-2073.2015-021

Crandall, C. S., & Moriarty, D. (1995). Physical illness stigma and social rejection. *British Journal of Social Psychology, 34*, 67–83. doi: 10.1111/j.2044-8309.1995.tb01049.x

Crowson, A. D., Colligan, R. C., Matteson, E. L., Davis, J. M., & Crowson, C. S. (2016). THU0037 personality traits in patients with rheumatoid arthritis: An unrecognized predictor of mortality. *Annals of the Rheumatic Diseases, 75*, 191. doi: 10.1136/annrheumdis-2016-eular.1481

Curtis, R., Groarke, A., Coughlan, R., & Gsel, A. (2005). Psychological stress as a predictor of psychological adjustment and health status in patients with rheumatoid arthritis. *Patient Education and Counseling, 59*, 192–198. doi: 10.1016/j.pec.2004.10.015

Due-Christensen, M., Zoffmann, V., Willaing, I., Hopkins, D., & Forbes, A. (2018). The process of adaptation following a new diagnosis of type 1 diabetes in adulthood: a meta-synthesis. *Qualitative Health Research, 28*, 245–258. doi: 10.1177/1049732317745100

D'Aloisio, A. A., Nichols, H. B., Hodgson, M. E., Deming-Halverson, S. L., & Sandler, D. P. (2017). Validity of self-reported breast cancer characteristics in a nationwide cohort of women with a family history of breast cancer. *BMC Cancer, 17*, 1–10. doi: 10.1186/s12885-017-3686-6

Figueiras, M. J., & Alves, N. C. (2007). Lay perceptions of serious illnesses: An adapted version of the Revised Illness Perception Questionnaire (IPQ-R) for healthy people. *Psychology and Health, 22*, 143–158. doi: 10.1080/14768320600774462

Fletcher, L., & Hayes, S. C. (2005). Acceptance and commitment therapy, relational frame theory, and functional analytic conceptualization of mindfulness. *Journal of Rational-Emotive and Cognitive Behavior Therapy, 23*, 315–336. doi: 10.1016/S0005-7894(04)80013-3

Gaab, J., Rohleder, N., Nater, U. M., & Ehlert, U. (2005). Psychological determinants of the cortisol stress response: The role of anticipatory cognitive appraisal. *Psychoneuroendocrinology, 30*, 599–610. doi:

10.1016/j.psyneuen.2005.02.001

Gåfvels, C., Hägerström, M., Rane, K., Wajngot, A., & Wändell, P. E. (2018). Coping strategies among patients newly diagnosed with diabetes or rheumatoid arthritis at baseline and after 24 months. *Journal of Health Psychology, 23*, 1273–1286. doi: 10.1177/1359105316648759

Gatchel, R. J., & Oordt, M. S. (2003). Coping with chronic illness. In: Gatchel, R. J., & Oordt, M. S. (Eds.), *Clinical health psychology and primary care: Practical advice and clinical guidance for successful collaboration* (pp. 213–233). American Psychological Association.

Giltay, E. J., Geleijnse, J., Zitman, M., Hoekstra, F. G., & Schouten, E. G. (2004). Dispositional optimism and all-cause and cardiovascular mortality in a prospec-tive cohort of elderly Dutch men and women. *Archives of General Psychiatry, 61*, 1126–1135. doi: 10.1001/archpsyc.61.11.1126

Hagger, M. S., & Orbell, S. (2003). A meta-analytic review of the common-sense model of illness representations. *Psychology and Health, 18*, 141–184. doi: 10.1080/08870440310008132 1

Helgeson, V. S., & Taylor, S. E. (1993). Social comparisons and adjustment among cardiac patients 1. *Journal of Applied Social Psychology, 23*, 1171–1195. doi: 10.1111/j.1559-1816.1993.tb01027.x

Heijmans, M. J. W. M., Ridder, D. D., & Bensing, J. (1999). Dissimilarity in patients' and spouses' representations of chronic illness: Exploration of relations to patient adaptation. *Psychology & Health, 14*, 451–466. doi: 10.1080/08870449908407340

Hermsen, L. A., van der Wouden, J. C., Leone, S. S., Smalbrugge, M., van der Horst, H. E., & Dekker, J. (2016). The longitudinal association of cognitive appraisals and coping strategies with physical functioning in older adults with joint pain and comorbidity: A cohort study. *BMC Geriatrics, 16*, 1–8. doi: 10.1186/s12877-016-0204-7

Hadi, M. A., McHugh, G. A., & Closs, S. J. (2019). Impact of chronic pain on patients' quality of life: a comparative mixed-methods study. *Journal of Patient Experience, 6*, 133–141. doi: 10.1177/2374373518786013

Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist, 44*, 513–524.

Jackson, T., Xu, T., & Jia, X. (2020). Arthritis self-efficacy beliefs and functioning among osteoarthritis and rheumatoid arthritis patients: A meta-analytic review. *Rheumatology, 59*, 948–958. doi: 10.1093/rheumatology/kez219

Janowski, K., Steuden, S., Kuryłowicz, J., & Nieśpiałowska-Steuden, M. (2009). The Disease-Related Appraisals Scale: A tool to measure subjective perception of the disease situation. In: K. Janowski, & S. Steuden (Eds.). *Biopsychosocial aspects of health and disease. Vol. 1* (pp. 108–125). CPPP Scientific Press.

Janowski, K., Steuden, S., Pietrzak, A., Krasowska, D., Kaczmarek, Ł., Gradus, I., & Chodorowska, G. (2012). Social support and adaptation to the disease in men and women with psoriasis. *Archives of Dermatological Research, 304*, 421–432. doi: 10.1007/s00403-012-1235-3

Janowski, K., Tatala, M., Jedynak, T., & Wałachowska, K. (2019). Social support and psychosocial functioning in women after mastectomy. *Palliative and Supportive Care, 18*, 1–8. doi: 10.1017/S1478951519000774

Jin, Y.-P., Di Legge, S., Østbye, T., Feightner, J. W., Saposnik, G., & Hachinski, V. (2010). Is stroke history reliably reported byelderly with cognitive impairment? A community-based study. *Neuroepidemiology, 35*, 215–220.doi: 10.1159/000315484

Keltikangas-Järvinen L. (1986). Psychological meaning of illness and coping with disease. *Psychotherapy and Psychosomatics, 45*, 84–90. doi: 10.1159/000287932

Kendler, K. S., Kuhn, J. W., Vittum, J., Prescott, C. A., & Riley, B. (2005). The interaction of stressful life events and a serotonin transporter polymorphism in the prediction of episodes of major depression: A replication. *Archives of General Psychiatry, 62*, 529–535. doi: 10.1001/archpsyc.62.5.529

Kimball, A. B., Jacobson, C., Weiss, S., Vreeland, M. G., & Wu, Y. (2005). The psychosocial burden of psoriasis. *American Journal of Clinical Dermatology, 6*, 383–392. doi: 10.2165/00128071-200506060-00005

Lazarus, R. S., & Folkman, S. (1984a). Coping and adaptation. In: W. Gentry (Ed.), *The handbook of behavioral medicine* (pp. 282–325). Guilford.

Lazarus, R. S., & Folkman, S. (1984b). *Stress, appraisal and coping*. Springer-Verlag.

Lemogne, C., Gorwood, P., Boni, C., Pessiglione, M., Lehéricy, S., & Fossati, P. (2011). Cognitive appraisal and life stress moderate the effects of the 5-HTTLPR polymorphism on amygdala reactivity. *Human Brain Mapping, 32*, 1856–1867. doi: 10.1002/hbm.21150

Lepore, S. J., Helgeson, V. S., Eton, D. T., & Schulz, R. (2003). Improving quality of life in men with prostate cancer: A randomized controlled trial of group education interventions. *Health Psychology, 22*, 443–452.

Leventhal, H., Benyamini, Y., Brownlee, S., Diefenbach, M., Leventhal, E. A., & Patrick-Miller, L. (1997). Illness representation: Theoretical foundations. In: J. Weinman, & K. Petrie (Eds.), *Perceptions of health and illness* (pp. 19–45). Harwood Publishers.

Leventhal, H., Meyer, D., & Nerenz, D. (1980). The common sense representation of illness danger. In S. Rachman (Ed.), *Contributions to medical psychology* (pp. 17–30). Pergamon Press.

Leventhal, H., Nerenz, D. R., & Steele, D. J. (1984). Illness representations and coping with health threats. In: A. Baum, S. E. Taylor, & J. E. Singer (Eds.), *Handbook of psychology and health: Social psychological aspects of health, Vol. 4.* (pp. 219–252). Earlbaum.

Leventhal, H., Phillips, L. A., & Burns, E. (2016). The Common-Sense Model of Self-Regulation (CSM): A dynamic framework for understanding illness self-management. *Journal of Behavioral Medicine, 39*, 935–946. doi: 10.1007/s10865-016-9782-2

Livneh, H., & Martz, E. (2007). An introduction to coping theory and research. In: H. Livneh, & E. Martz (Eds.) *Coping with chronic illness and disability* (pp. 3–27). Springer.

Łopuszańska, M., Szklarska, A., & Jankowska, E. A. (2013). Impression of depressive symptoms using the Polish version of the Beck Depression Inventory in healthy men, residents of Wrocław. *Psychiatria Polska, 47*, 1001–1009.

Maes, S., Leventhal, H., & de Ridder, D. T. (1996). Coping with chronic

diseases. In: M. Zeidner, & N. S. Endler (Eds.), *Handbook of coping: Theory, research, applications* (pp. 221–251). John Wiley.

Pakenham, K. I., & Rinaldis, M. (2001). The role of illness, resources, appraisal, and coping strategies in adjustment to HIV/AIDS: The direct and buffering effects. *Journal of Behavioral Medicine, 24*, 259–279. doi: 10.1023/A:1010718823753

Pankowski, D., Wytrychiewicz-Pankowska, K., & Janowski, K. (2021a). *Illness-Related Appraisal Scale.* Retrieved from https://osf.io/byaxs/

Pankowski, D., Wytrychiewicz, K., & Janowski, K. (2021b). *Illness-Related Beliefs Scale.* Retrieved from https://osf.io/JCP2U/

Pankowski, D., Wytrychiewicz, K., Janowski, K., Pisula, E., & Walicka, M. (2021). The role of illness-related beliefs in depressive, anxiety, and anger symptoms: An on-line survey in women with hypothyroidism. *Frontiers in Psychiatry, 12:* 614361. DOI: 10.3389/fpsyt.2021.614361

Parnowski, T., & Jernajczyk, W. (1977). Inwentarz Depresji Becka w ocenie nastroju osób zdrowych i chorych na choroby afektywne [Measuring the mood of healthy persons and persons suffering from affective disorders with the Beck Depression Inventory]. *Psychiatria Polska, 11*, 417–421.

Petrie, K. J., Weinman, J., Sharpe, N., & Buckley, J. (1996). Role of patients' view of their illness in predicting return to work and functioning after myocardial infarction: longitudinal study. *British Medical Journal, 312*, 1191–1194. doi: 10.1136/bmj.312.7040.1191

Purewal, R., & Fisher, P. L. (2018). The contribution of illness perceptions and metacognitive beliefs to anxiety and depression in adults with diabetes. *Diabetes Research and Clinical Practice, 136*, 16–22. doi: 10.1016/j.diabres.2017.11.029

Rozema, H., Völlink, T., & Lechner, L. (2009). The role of illness representations in coping and health of patients treated for breast cancer. *Psycho-Oncology: Journal of the Psychological, Social and Behavioral Dimensions of Cancer, 18*, 849–857.

Scharloo M., Kaptein A. A., Weinman J., Hazes J. M., Willems L. N. A., Bergman W., & Rooijmans H. G. M. (1998). Illness perceptions, coping and functioning in patients with rheumatoid arthritis, chronic obstructive pulmonary disease and psoriasis. *Journal of Psychosomatic Research, 44*, 573–585. doi: 10.1016/S0022-3999(97)00254-7

Schüssler G. (1992). Coping strategies and individual meanings of illness. *Social Science and Medicine, 34*, 427–432. doi: 10.1016/0277-9536(92)90303-8

Seligman, M. E. (2008). Positive health. *Applied Psychology, 57*, 3–18. doi: 10.1111/j.1464-0597.2008.00351.x

Stanton, A. L., Revenson, T. A., & Tennen, H. (2007). Health psychology: Psychological adjustment to chronic disease. *Annual Review Psychology, 58*, 565–592. doi: 10.1146/annurev.psych.58.110405.085615

Walker, J. G., Jackson, H. J., & Littlejohn, G. O. (2004). Models of adjustment to chronic illness: Using the example of rheumatoid arthritis. *Clinical Psychology Review, 24*, 461–488. doi: 10.1016/j.cpr.2004.03.001

Wedderhoff, N., Gnambs, T., Wedderhoff, O., Burgard, T., & Bošnjak, M. (2021). On the structure of affect: A meta-analytic investigation of the dimensionality and the cross-national applicability of the Positive and Negative Affect Schedule (PANAS). *Zeitschrift Für Psychologie, 229*, 24–37. doi: 10.1027/2151-2604/a000434

Weinman, J., Petrie, K. J., Moss-Morris, R., & Horne, R. (1996). The illness perception questionnaire: A new method for assessing the cognitive representation of illness. *Psychology and Health, 11*, 431–445. doi: 10.1080/08870449608400270

World Health Organization (2018). T*he global burden of chronic diseases*. Retrieved from http://www.who.int/nutrition/topics/2_background/en/

RECEIVED 26.09.2021 | ACCEPTED 28.04.2022

APPENDIX A

Brief Description of the Analyzed Variables

Variables	Questionnaires	Brief description
Sociodemographic	Sex	Declaration of the test person's gender as male / female / other
	Age	Participant's age expressed in years
	Relationship status	Participant's declared relationship status as: married / in informal relationship / single
Clinical	Duration of the disease	Declared time since diagnosis of the disease expressed in years
	Number of hospitalizations in the last 12 months	The declared number of hospitalizations in the last 12 months before participation in the study
Cognitive factors	Ilness-Related Beliefs (IRBs)	Beliefs concerning selected clinical and social aspects of the disease
	Cognitive Appraisals (CAs)	Subjective appraisals of the disease
Adaptation indicators	Acceptance of living with the disease (ALDS)	Acceptance level of possible difficulties resulting from the diagnosis and living with a given chronic disease
	Severity of depressive symptoms (BDI)	Due to the fact that many depressive symptoms may overlap with symptoms of chronic diseases, most analyzes have focused on the cognitive-affective aspects of depression

APPENDIX B

Illness-Related Appraisals Scale. Revised Version.

A disease may have different meanings for each person, therefore people think differently about their illnesses. The purpose of this questionnaire is to find out how important your illness is to you and how you feel about your illness. Below are examples of the different ways of thinking about your disease. Read each one carefully and indicate how often you thought about your illness in this way over the last four weeks.

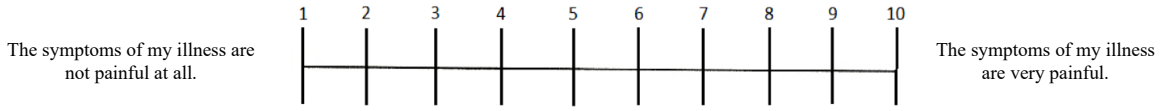
	During the last four weeks, how often have you thought that….	I hardly thought so at all	I rarely thought that	Sometimes I thought so	I've often thought so	I thought so almost all the time
1.	this disease has taken away something that was precious to you?					
2.	this disease is an injustice that has happened to you?					
3.	this disease has had some benefits for you?					
4.	this disease is a difficulty in life that you have to deal with?					
5.	thanks to this disease, you can sometimes obtain material benefit (e.g. a disability pension or material assistance)?					
6.	this disease has helped you change for the better?					
7.	it is not fair that this has happened to you?					
8.	thanks to this disease, you can get something beneficial for yourself from other people?					
9.	this disease is an adversity you have to face?					
10.	thanks to this disease, you now appreciate each moment more?					
11.	this disease sometimes benefits you?					
12.	this disease is an opponent that you have to fight?					
13.	this disease can still do you a lot more harm?					
14.	this disease helped you better understand what is really important in life?					
15.	this disease has irreversibly robbed you of something important?					
16.	this disease will bring you many more dangers?					
17.	this disease took away your previous way of life?					
18.	this disease is a misfortune that fell on you for no reason?					
19.	this disease is a test in life that you have to deal with?					
20.	this illness can be a convenient excuse for you in certain situations (e.g., to avoid performing certain duties)?					
21.	this disease helped you discover the true value of life?					
22.	this disease could yet cost you much in life?					
23.	this disease is a difficult life situation that you have to deal with?					
24.	this disease can cause a lot of harm in the future?					
25.	this disease made you value life more?					
26.	this disease is a twist of fate that you did not deserve?					
27.	through this disease you have lost the possibility of realizing plans you had for your life?					
28.	your future is threatened by this disease?					
29.	this disease means you can no longer live as before?					
30.	this disease is a misfortune that happened to you?					

Please indicate to what extent you agree with the following statements.	Your illness:
1.	disrupts your psychological balance
2.	disrupts your life balance
3.	is a small thing for you
4.	has little meaning to you
5.	painfully impedes your life

APPENDIX C

Illness-Related Belief Questionnaire. Version P-13.

Instructions: On the other side of this sheet, you will find 13 pairs of statements concerning **your** illness. Each pair presents two opposing statements about a certain part of the illness, for example:

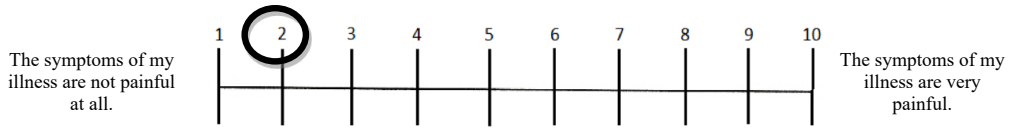


The numbers between these statements indicate how much you agree with the statement on the left or on the right:

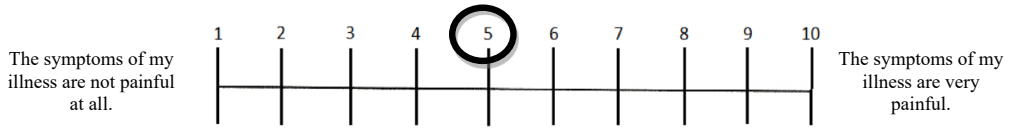
closer to 1: you agree more with the statement on the left
closer to 10: you agree more with the statement on the right

Please read each pair of statements on the other side of the sheet carefully.
For each pair, draw a circle around the number that best corresponds to the belief you agree with.

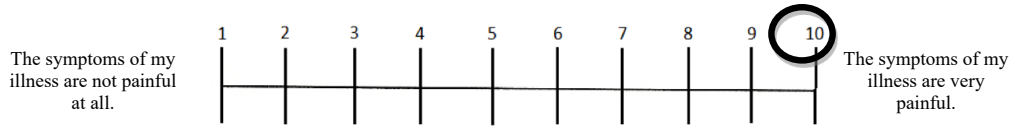
Examples:



In this example, the answer means that the symptoms of your illness are not very painful.



Here, the answer means that the symptoms of your illness are moderately painful.



In the last example, the answer means that the symptoms of your illness are very painful.

My illness will last for a short time.	1 2 3 4 5 6 7 8 9 10	My illness will last for a very long time.
This illness will not have a significant impact on my life.	1 2 3 4 5 6 7 8 9 10	This illness will have a very significant impact on my life.
My condition will improve.	1 2 3 4 5 6 7 8 9 10	My condition will worsen.
The symptoms of my illness are not visible to others.	1 2 3 4 5 6 7 8 9 10	The symptoms of my illness are very visible to others.
I am able to fully predict the course of my illness.	1 2 3 4 5 6 7 8 9 10	I cannot predict the course of my illness at all.
I know a lot about my illness.	1 2 3 4 5 6 7 8 9 10	I know almost nothing about my illness.
I had no control over becoming ill or not.	1 2 3 4 5 6 7 8 9 10	Things I have done caused me to become ill.
The things I do can influence the course of my illness.	1 2 3 4 5 6 7 8 9 10	The things I do have no effect on the course of my illness.
The medical staff can influence the course of my illness.	1 2 3 4 5 6 7 8 9 10	The medical staff cannot influence the course of my illness.
The treatment I get is very effective.	1 2 3 4 5 6 7 8 9 10	The treatment I get does not help me at all.
In general, others would regard me positively as a person who has this illness.	1 2 3 4 5 6 7 8 9 10	In general, others would regard me negatively due to the fact I have this illness.
I believe my illness is not embarrassing.	1 2 3 4 5 6 7 8 9 10	I believe my illness is embarrassing.
Compared to other people who have this illness, my symptoms are very mild.	1 2 3 4 5 6 7 8 9 10	Compared to other people who have this illness, my symptoms are very severe.

APPENDIX D

Frequencies of Clinically Important Depressive Symptoms and Suicidal Ideations and Tendencies

The incidence of clinically significant depressive symptoms was understood as moderate/severe depressive symptoms according to BDI-I cut-off scores. In the total sample, they had a prevalence of 27.5%; they were highest in the group of participants with hypothyroidism. (32.3%) and the lowest in participants with hypertension (19.5%). The frequencies of suicidal thoughts and ideations were also analyzed, amounting to 13.1% (ideation) and 3.6% (tendencies) in the total sample. The highest incidence of suicidal ideation was found in participants with hypothyroidism (17.7%), and the lowest in participants with asthma (9.2%). The highest percentage of participants with suicidal tendencies was observed for asthma (9.2%) and the lowest for hypertension and RA (1.6%). The results of other studies focusing on determining the frequency of depressive symptoms show a very wide range due to differences in the clinical groups studied, the tools used (e.g., ranging from 4.27% to even 75% for systemic lupus erythematosus; Macedo et al., 2018; Solaro et al., 2018), the method used to determine the presence of clinically significant symptoms, and the specific cut-off points. Older analyses (Katon & Schulberg, 1992) estimate the prevalence of major depression as 5–10% in primary care clinics and 6–14% in inpatient wards. It is worth remembering that some depressive symptoms assessed with BDI-I may overlap with symptoms of the chronic illnesses analyzed in the current study.

References

Katon, W., & Schulberg, H. (1992). Epidemiology of depression in primary care. *General Hospital Psychiatry, 14*, 237–247. doi: 10.1016/0163-8343(92)90094-Q

Macedo, E. A., Appenzeller, S., & Costallat, L. T. L. (2018). Depression in systemic lupus erythematosus: gender differences in the performance of the Beck Depression Inventory (BDI), Center for Epidemiologic Studies Depression Scale (CES-D), and Hospital Anxiety and Depression Scale (HADS). *Lupus, 27*, 179–189. doi: 10.1177/0961203317713142

Solaro, C., Gamberini, G., & Masuccio, F. G. (2018). Depression in multiple sclerosis: epidemiology, aetiology, diagnosis and treatment. *CNS Drugs, 32*, 117–133. doi: 10.1007/s40263-018-0489-5

Depressive symptoms:				
	No clinically significant depressive symptoms *n*(%)	Mild depressive symptoms severity *n*(%)	Moderate depressive symptoms severity *n*(%)	Severe depressive symptoms *n*(%)
General	241 (47.7)	125 (24.8)	84 (16.6)	55 (10.9)
Rheumatoic arthritis	26 (40.6)	19 (29.7)	15 (23.4)	4 (6.3)
Asthma	43 (49.4)	18 (20.7)	14 (16.1)	12 (13.8)
Hypothyroidism	51 (39.2)	37 (28.5)	24 (18.5)	18 (13.8)
Diabetes	53 (52.5)	20 (19.8)	18 (17.8)	10 (9.9)
Hypertension	68 (55.3)	31 (25.2)	13 (10.6)	11 (8.9)

Suicidal ideations/tendencies:			
	None *n*(%)	Suicidal ideation *n*(%)	Suicidal tendencies *n*(%)
General	421 (83.4)	66 (13.1)	18 (3.6)
Rheumatoic arthritis	53 (82.8)	10 (15.6)	1 (1.6)
Asthma	71 (81.6)	8 (9.2)	8 (9.2)
Hypothyroidism	103 (79.2)	23 (17.7)	4 (3.1)
Diabetes	86 (85.1)	12 (11.9)	3 (3.0)
Hypertension	108 (87.8)	13 (10.6)	2 (1.6)

APPENDIX E

Differences in Cognitive Variables and Adaptation Indicators: ANCOVA

The data presented in the table above show that participants with the analyzed chronic illnesses differed statistically significantly both in the examined cognitive factors and in their levels of adaptation to living with chronic illness. Effect sizes varied from no effect to intermediate between the illness-related beliefs (IRBs).

Applying the marginal means test with Bonferroni correction to the IRBs showed that there was a statistically significant difference between participants with rheumatoid arthritis (RA) and asthma in terms of the consequences of the illness on their life. It was also noticed that participants with RA differed statistically significantly from participants with hypothyroidism and hypertension in terms of beliefs about deteriorating health. Further differences concerned the visibility of the symptoms. Participants with hypertension differed statistically significantly in this belief from those with RA, asthma, and diabetes. Participants with RA also differed from those with hypothyroidism in this regard. Additionally, statistically significant differences were observed between perceived availability to predict the course of the illness between participants with RA, asthma, and hypertension. Participants with diabetes also differed in their beliefs about the impact on the illness from those with RA and hypothyroidism. Also, those with hypothyroidism differed from those with hypertension on this IRB. A statistically significant difference was observed between participants with diabetes and hypertension in terms of the IRB regarding the influence of medical personnel on the course of the illness. On the other hand, participants with RA differed statistically significantly from those with asthma, hypothyroidism, and hypertension in the IRB regarding treatment effectiveness. Participants with hypertension also differed from those with diabetes in this regard. The last difference in IRBs between the analyzed diagnoses was between participants with RA and hypertension in terms of subjective assessments of the severity of symptoms compared to other people. In terms of cognitive appraisals, a statistically significant difference was noticed between participants with RA and those with asthma, hypothyroidism, and hypertension in terms of loss, challenge, threat, and significance. Also, participants with diabetes and hypertension differed significantly in terms of loss, benefit, and challenge. There were no statistically significant differences between the groups in terms of the severity of depressive symptoms. In turn, in the case of the Adaptation of Living with Disease Scale self-distancing from the disease subscale, differences were noticed between participants with RA and with asthma, hypothyroidism, and hypertension as well as between those with diabetes and with hypertension. Participants with RA differed statistically significantly from those with hypertension in terms of acceptance of living with the illness global score.

Variables	Rheumatic arthritis		Asthma		Hypothyroidism		Diabetes		Hypertension		F =	p =	Effect sizes	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	1.641	.163	η^2	*d*
Illness will last for a very long time	9.06	1.89	8.72	1.88	9.16	1.74	8.67	2.04	8.98	1.63			0.013	0.230
Illness will have very significant impact on life	8.23	2.36	6.97	2.50	7.45	2.30	7.74	2.36	7.54	2.02	3.265	0.012	0.026	0.327
Condition will worsen	7.67	2.56	6.57	2.30	6.32	2.28	6.94	2.39	6.50	1.98	3.647	0.006	0.029	0.346
Symptoms very visible to others	5.56	2.91	4.97	2.72	3.94	2.66	4.57	2.77	3.41	2.56	7.659	0.000	0.058	0.496
Cannot predict course	7.22	2.65	5.74	2.25	6.25	2.47	6.38	2.39	5.93	2.32	3.254	0.012	0.026	0.327
I know a lot about my illness	8.34	1.92	7.93	2.02	7.96	1.98	7.80	1.93	7.84	1.85	1.159	0.328	0.009	0.191
Things I have done caused me to become ill	3.14	2.83	3.43	2.80	3.08	2.79	4.96	2.87	4.46	2.75	5.378	0.000	0.042	0.419
Things I do have no effect on my illness	5.00	3.10	5.05	2.77	4.34	2.83	4.14	2.66	4.16	2.53	2.894	0.022	0.023	0.307
Medical staff cannot influence the course of my illness	4.84	2.75	5.00	2.72	5.26	2.77	5.58	2.50	4.46	2.52	2.924	0.021	0.023	0.307
The treatment I get does not help me at all	5.61	2.69	4.56	2.19	4.45	2.38	5.21	2.48	4.05	2.17	6.217	0.000	0.048	0.449
Others would regard me negatively due to the fact I have this illness	4.44	2.56	4.29	2.37	4.06	2.33	4.35	2.28	4.04	1.96	0.358	0.839	0.003	0.110
My illness is embarrassing	3.53	3.12	3.17	2.67	2.77	2.55	3.21	2.68	2.47	2.30	1.737	0.141	0.014	0.238
Compared to other people who have this illness, my symptoms are very severe	4.92	2.61	4.34	2.34	4.16	2.18	4.35	2.32	3.67	1.93	3.144	0.014	0.025	0.320
Illness-Related Attributions Scale: Loss	15.36	5.68	12.75	5.39	12.41	5.55	13.71	5.16	11.44	5.42	5.827	0.000	0.045	0.434
IRAS: Harm	12.84	6.37	11.30	5.67	11.07	5.66	12.10	5.76	10.07	5.05	3.056	0.017	0.024	0.314
IRAS: Advantage	8.09	4.40	8.86	4.38	7.48	3.62	9.02	4.36	7.28	3.20	3.154	0.014	0.025	0.320
IRAS: Challenge	16.97	5.41	13.55	5.32	13.85	4.93	15.40	4.99	12.93	5.47	7.816	0.000	0.059	0.501
IRAS: Value	13.34	5.43	11.76	5.16	11.19	4.76	12.92	4.36	11.79	4.80	2.099	0.080	0.017	0.263
IRAS: Danger	16.45	5.91	13.72	5.33	13.20	5.53	15.29	5.24	13.24	5.20	5.615	0.000	0.043	0.424
IRAS: Importance	17.58	4.22	15.28	4.22	15.58	4.69	15.61	4.03	14.20	4.26	5.506	0.000	0.043	0.424
Beck Depression Inventory-I Total score	13.91	9.26	14.03	12.53	15.19	11.90	12.56	11.44	11.41	9.92	0.476	0.753	0.004	0.127
BDI-I Cognitive-affective scale	7.56	5.90	8.70	8.11	9.55	7.89	7.46	7.51	6.89	6.78	0.694	0.596	0.006	0.155
BDI-I Somatic symptoms scale	6.34	4.17	5.33	4.99	5.65	4.66	5.11	4.46	4.53	3.66	1.103	0.355	0.009	0.191
Satisfaction with life despite the illness	15.17	2.50	16.10	3.34	15.67	3.33	15.79	3.13	16.67	2.72	2.082	0.082	0.017	0.263
Reconcilement with the illness	16.69	2.22	17.34	2.70	17.32	2.72	16.94	2.94	17.87	2.15	2.835	0.024	0.022	0.300
Self-distancing from the illness	14.39	2.91	16.10	3.13	15.98	3.19	15.42	3.24	16.79	2.65	6.275	0.000	0.048	0.449
Total score	46.25	6.76	49.55	8.36	48.96	8.53	48.15	8.60	51.33	6.84	3.968	0.004	0.031	0.358

2022 • volume 18(2) • 85-105

http://www.ac-psych.org

APPENDIX F

Partial Correlations Matrix

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	0.39***	0.33***	-0.03	0.17***	0.43***	-0.11*	-0.04	0.03	0.03	-0.10*	-0.17***	0.02	0.03	0.00	-0.25***	0.10*	-0.07	0.16***	0.08	0.07	0.04	0.11*	-0.04	0.13**	-0.05	0.01
2		0.47***	0.28***	0.36***	0.29***	0.14**	0.05	0.12**	0.24***	0.08	0.09*	0.23***	0.44***	0.30***	0.04	0.36***	0.30***	0.51***	0.34***	0.26***	0.21***	0.30***	-0.27***	-0.17***	-0.31***	-0.28***
3			0.34***	0.33***	0.11*	0.08	0.17***	0.16***	0.39***	0.22***	0.15***	0.28***	0.39***	0.24***	0.11*	0.28***	0.17***	0.47***	0.19***	0.27***	0.22***	0.31***	-0.28***	-0.22***	-0.28***	-0.29***
4				0.31***	-0.02	0.30***	0.21***	0.14**	0.38***	0.32***	0.37***	0.47***	0.46***	0.40***	0.33***	0.34***	0.30***	0.39***	0.28***	0.31***	0.28***	0.31***	-0.31***	-0.33***	-0.34***	-0.36***
5					-0.01	0.05	0.18***	0.16***	0.29***	0.12**	0.15***	0.21***	0.37***	0.27***	0.14**	0.28***	0.23***	0.41***	0.26***	0.18***	0.15***	0.22***	-0.22***	-0.18***	-0.26***	-0.24***
6						-0.05	-0.05	0.04	-0.10*	-0.12**	-0.22***	0.00	0.08	0.02	-0.15***	0.14**	0.09*	0.09	0.09*	-0.05	-0.08	0.01	0.01	0.16***	-0.03	0.04
7							0.05	0.15***	0.24***	0.29***	0.32***	0.20***	0.20***	0.16***	0.34***	0.15***	0.27***	0.16***	0.05	0.22***	0.22***	0.20***	-0.13**	-0.18***	-0.07	-0.13**
8								0.30***	0.33***	0.25***	0.23***	0.28***	0.10*	0.15***	0.29***	0.04	0.08	0.08	0.01	0.08	0.06	0.11*	-0.04	-0.15***	-0.08	-0.10*
9									0.39***	0.29***	0.21***	0.24***	0.14**	0.13**	0.23***	0.08	0.12**	0.11*	0.09*	0.12**	0.12**	0.11*	-0.15***	-0.16***	-0.12**	-0.16***
10										0.42***	0.41***	0.51***	0.41***	0.33***	0.27***	0.27***	0.18***	0.39***	0.27***	0.33***	0.31***	0.32***	-0.41***	-0.43***	-0.37***	-0.44***
11											0.54***	0.42***	0.27***	0.26***	0.26***	0.14**	0.14**	0.19***	0.07	0.25***	0.26***	0.20***	-0.28***	-0.33***	-0.26***	-0.31***
12												0.40***	0.25***	0.31***	0.37***	0.15***	0.20***	0.18***	0.07	0.20***	0.21***	0.14**	-0.22***	-0.32***	-0.22***	-0.27***
13													0.42***	0.42***	0.33***	0.33***	0.23***	0.37***	0.25***	0.31***	0.27***	0.34***	-0.34***	-0.40***	-0.38***	-0.41***
14														0.73***	0.37***	0.73***	0.58***	0.83***	0.50***	0.43***	0.38***	0.44***	-0.52***	-0.49***	-0.54***	-0.57***
15															0.42***	0.66***	0.49***	0.68***	0.33***	0.35***	0.32***	0.36***	-0.40***	-0.43***	-0.44***	-0.47***
16																0.28***	0.50***	0.28***	0.01	0.13**	0.13**	0.11*	-0.13**	-0.24***	-0.11*	-0.17***
17																	0.64***	0.76***	0.45***	0.29***	0.24***	0.33***	-0.34***	-0.32***	-0.46***	-0.41***
18																		0.55***	0.26***	0.11*	0.08	0.15**	-0.12**	-0.21***	-0.26***	-0.21***
19																			0.47***	0.38***	0.32***	0.41***	-0.47***	-0.44***	-0.57***	-0.54***
20																				0.30***	0.26***	0.34***	-0.42***	-0.35***	-0.48***	-0.46***
21																					0.97***	0.91***	-0.69***	-0.57***	-0.51***	-0.65***
22																						0.78***	-0.67***	-0.54***	-0.45***	-0.60***
23																							-0.64***	-0.54***	-0.53***	-0.63***
24																								0.75***	0.77***	0.92***
25																									0.74***	0.90***
26																										0.92***

Note. *$p < .05$; **$p < .01$; ***$p < .001$; 1 = Illness will last for a very long time; 2 = Illness will have very significant impact on life; 3 = Condition will worsen; 4 = Symptoms very visible to others; 5 = Cannot predict course; 6 = I know a lot about my illness; 7 = Things I have done caused me to become ill; 8 = Things I do have no effect on my illness; 9 = Medical staff cannot influence the course of my illness; 10 = The treatment I get does not help me at all; 11 = Others would regard me negatively due to the fact I have this illness; 12 = My illness is embarrassing; 13 = Compared to other people who have this illness, my symptoms are very severe; 14 = IRAS (Illness-related Appraisals Scale) loss; 15 = IRAS harm; 16 = IRAS advantage; 17 = IRAS challenge; 18 = IRAS value; 19 = IRAS danger; 20 = IRAS importance; 21 = BDI-I (Beck Depression Inventory-I) total score; 22 = BDI-I cognitive-affective scale; 23 = BDI-I somatic symptoms Scale; 24 = ALDS (Acceptance of Life with Disease Scale) satisfaction with life despite the illness; 25 = ALDS reconcilement with the illness; 26 = ALDS self-distancing from the illness; 27 = ALDS total score

APPENDIX G

Hierarchical Regressions: Acceptance

Dependent variables	Blocks of independent variables	*R*	R^2	Adjusted R^2	R^2 change	F change	Significance of *F* change
Acceptance: RA	Sociodemographic	0.08	0.01	-0.04	0.01	0.14	0.94
	Clinical	0.53	0.28	0.21	0.27	7.28	0.00
	IRBs	0.64	0.40	0.15	0.12	0.70	0.75
	CAs	0.78	0.60	0.33	0.20	2.65	0.03
Acceptance: Asthma	Sociodemographic	0.14	0.02	-0.02	0.02	0.55	0.65
	Clinical	0.53	0.28	0.22	0.26	9.48	0.00
	IRBs	0.73	0.53	0.39	0.25	2.70	0.00
	CAs	0.80	0.64	0.49	0.12	2.84	0.01
Acceptance: Hypothyroidism	Sociodemographic	0.16	0.02	0.00	0.02	1.06	0.37
	Clinical	0.33	0.11	0.07	0.08	3.87	0.01
	IRBs	0.63	0.39	0.29	0.28	3.93	0.00
	CAs	0.76	0.58	0.48	0.19	6.73	0.00
Acceptance: Diabetes	Sociodemographic	0.31	0.10	0.07	0.10	3.40	0.02
	Clinical	0.51	0.26	0.21	0.16	6.87	0.00
	IRBs	0.65	0.43	0.29	0.17	1.85	0.05
	CAs	0.76	0.57	0.43	0.15	3.66	0.00
Acceptance: Hypertension	Sociodemographic	0.22	0.05	0.03	0.05	2.06	0.11
	Clinical	0.46	0.21	0.17	0.16	7.67	0.00
	IRBs	0.60	0.36	0.25	0.16	1.97	0.03
	CAs	0.70	0.49	0.35	0.13	3.37	0.00

Hierarchical Regressions: Depressive Symptoms

Dependent variables	Blocks of independent variables	*R*	R^2	Adjusted R^2	R^2 change	F change	Significance of *F* change
Depressive symptoms: RA	Sociodemographic	0.14	0.02	-0.03	0.02	0.38	0.768
	Clinical	0.58	0.33	0.26	0.31	8.86	0.000
	IRBs	0.66	0.44	0.20	0.11	0.66	0.785
	CAs	0.81	0.66	0.42	0.22	3.40	0.007
Depressive symptoms: Asthma	Sociodemographic	0.13	0.02	-0.02	0.02	0.46	0.709
	Clinical	0.61	0.37	0.32	0.35	15.06	0.000
	IRBs	0.74	0.54	0.41	0.17	1.90	0.046
	CAs	0.78	0.61	0.44	0.07	1.42	0.214
Depressive symptoms: Hypothyroidism	Sociodemographic	0.27	0.07	0.05	0.07	3.35	0.021
	Clinical	0.37	0.14	0.09	0.06	3.00	0.033
	IRBs	0.53	0.28	0.16	0.15	1.74	0.062
	CAs	0.65	0.42	0.28	0.14	3.54	0.002
Depressive symptoms: Diabetes	Sociodemographic	0.38	0.15	0.12	0.15	5.49	0.002
	Clinical	0.55	0.30	0.26	0.16	6.96	0.000
	IRBs	0.68	0.46	0.33	0.16	1.81	0.056
	CAs	0.75	0.56	0.40	0.10	2.42	0.028
Depressive symptoms: Hypertension	Sociodemographic	0.31	0.10	0.08	0.10	4.34	0.006
	Clinical	0.44	0.20	0.15	0.10	4.68	0.004
	IRBs	0.58	0.33	0.21	0.14	1.61	0.094
	CAs	0.64	0.41	0.25	0.08	1.84	0.088

Note. RA = rheumatoic arthritis; IRB = illness-related beliefs; CA = cognitive appraisal.

APPENDIX H

Predictors of Adaptation

Rheumatic arthritis	
Increasing depressive symptoms	Lowering depressive symptoms
• Higher number of hospitalizations • Appraising illness as harm • Strong IRB that treatment does not help at all	Appraising Illness as benefit Appraising Illness as threat
Increasing acceptance	Lowering acceptance
• Appraising Illness as value	• Appraising Illness as loss
Asthma	
Increasing depressive symptoms	Lowering acceptance
• Appraising illness as loss • Strong IRB that others would regard participant negatively due to the fact he/she has this illness	• Appraising illness as loss • Appraising the illness of a major importance • Strong IRB that treatment does not help at all • Strong IRB that compared to other people who have this illness, his/her symptoms are very severe.
Hyperthyroidism	
Increasing depressive symptoms	Lowering depressive symptoms
• Appraising illness as threat • Appraising the illness of a major importance • Strong IRB that symptoms of illness are very visible to others • Strong IRB that others would regard participant negatively due to the fact he/she has this illness	• Higher age • Appraising Illness as value
Increasing Acceptance	Lowering Acceptance
• Appraising illness as value	• Appraising illness as loss • Appraising illness as harm • Appraising the illness of a major importance • Strong IRB that treatment does not help at all
Diabetes	
Increasing depressive symptoms	Lowering depressive symptoms
• Higher number of hospitalizations • Appraising illness as harm • Strong IRB that condition will worsen	• Higher age
Increasing Acceptance	Lowering Acceptance
• Appraising illness as value • Strong IRB that illness will last for a very long time.	• Appraising illness as threat • Appraising the illness of a major importance • Strong IRB that illness is embarrassing. • Strong IRB that compared to other people who have this illness, his/her symptoms are very severe.
Hypertension	
Increasing depressive symptoms	Lowering depressive symptoms
• Being single • Appraising illness as loss	• Strong IRB that he/she knows a lot about the illness
Increasing Acceptance	Lowering Acceptance
• Strong IRB that he/she knows a lot about the illness • Strong IRB that the things that patient is doing have no effect on the course of illness	• Appraising illness as loss • Appraising the illness of a major importance • Strong IRB that treatment does not help at all

Note. IRB = illness-related beliefs.