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

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Research

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Abstract

Background

The literature indicates that cognitive appraisals and illness-related beliefs are the key cognitive factors that affect the outcomes of psychological adaptation to chronic illnesses. The main aim of the study was to identify which cognitive appraisals and illness-related beliefs are the best predictors of adaptation to living with chronic illnesses as well as which of these predictors are universal and which are illness-specific.

Methods

This study analyzed data collected online from 505 participants who reported diagnoses of rheumatoid arthritis, asthma, hypothyroidism, diabetes, and hypertension.

Results

Adaptation indicators (i.e., depressive symptoms and level of acceptance of living with the disease) differed significantly across samples with different medical diagnoses. Additionally, illness-related cognitive appraisals but not illness-related beliefs made a statistically significant specific contribution to explaining the variance in adaptation indices.

Conclusions

The predictors of adaptation to living with the disease differ between the diagnoses and the adjustment indicators. The results can contribute to a better matching of therapeutic interventions as well as social campaigns aimed at the ill people.

Statement Of Contribution

What is already known on this subject?

- Cognitive factors play a very important role in the process of adaptation to chronic disease.
- Theoretical models and data from empirical research show that cognitive assessments and beliefs related to chronic disease are important elements in the process of adapting to living with the disease.

What does this study add?

- Identifies that different cognitive factors are responsible for the degree of adaptation in different diseases.
- Cognitive appraisals make a greater contribution than illness-related beliefs to the variance of depressive symptoms and level of acceptance in people with various medical conditions.

Introduction

The prevalence of chronic diseases 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 diseases mean that patients now live with

these diseases for many years (Livneh & Martz, 2007). Therefore, it is currently more important than ever that we understand how people cope with chronic diseases and identify factors that contribute to better adaptation (Gatchel & Oordt, 2003).

Chronic disease is associated with many mental, physical, and social difficulties. It is highly stressful and usually associated with suffering, negative emotions, as well as with difficulties and limitations in everyday functioning (Hwu, 1995). Adaptation to living with chronic disease is a dynamic, multi-stage process that happens over an extended period of time (Lewis, 1998) and depends on the objective conditions of the situation and the individual's characteristics, including their subjective perceptions of the illness (Stanton, Revenson, & Tennen, 2007). Poor psychological adaptation to a disease most often manifests 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 (Janowski et al., 2019; Curtis et al., 2005). Acceptance is one such positive indicator of adaptation to chronic illness and is understood as mental consent to experience the inevitable limitations and unpleasant feelings associated with illness and, at the same time, focusing on goals and values which can be obtained despite the disease (Fletcher & Heyes, 2005; Janowski et al., 2012).

Cognitive factors are among the key variables affecting the outcomes of 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 (Smith & Wallston, 1992). Since the term "cognitive factors" is very broad and they may be conceptualized and operationalized in many different ways, in our study, we would like to focus on two concepts: cognitive appraisal (CA) of illness and cognitive illness representation.

Lazarus and Folkman's (1984) 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, and 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, Leventhal, & de Ridder, 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, Leventhal, & de Ridder, 1996). Some authors have also indicated that the three categories of CA originally distinguished by Lazarus and Folkman (1984) do not cover the entire array of appraisals generated in response to chronic illnesses, extending illness-related appraisals to include categories such as profit, value, and obstacle (Janowski et al., 2009, Schüssler, 1992, Keltikangas-Järvinen, 1986). Although the importance of CA was originally attributed to its impact on the choice of coping strategies (Lazarus & Folkman, 1984), 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 CA of illness from cognitive representation of illness is that the former is a cognitive *process*, while the latter is a cognitive *structure*. The 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 behavior and coping outcomes (Leventhal et al., 2016). Even though the constitutive 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 of a disease (Leventhal et al., 1980; Weinman et al., 1996): 1) an identity component; 2) a causal component; 3) a time component; 4) a consequence component; and 5) 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 patient's IRBs about their expertise regarding their illness can have an impact on their health-related behavior, mood, etc. (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 to chronic disease (Heijmans et al., 1999). It has been emphasized that the representation of illness can determine a patient's cognitive and emotional responses to the disease and its symptoms (Leventhal et al., 1984) and is related to mood – in particular to levels of depression (Murphy et al., 1999) 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 behavior (Figueiras & Alves, 2007).

In the current study, we undertook to investigate the relative role of illness-related appraisals and 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 universal predictors of adaptation outcomes across different illness diagnostic categories and 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). In this study we have also broadened the concept of cognitive illness representation by including some new 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 adaptational outcomes. Finally, the inclusion of samples with different medical diagnoses allowed us to distinguish between universal and illness-specific predictors of adaptation.

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

Methods

Participants and procedure

Recruitment to the study and data collection were conducted on-line 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 on-line panel ARIADNA. 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 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 on-line forums and through foundations dedicated to supporting people with specific diseases (see: Acknowledgments).

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. 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 of participants 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:

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 Appraisal

Illness-Related Appraisals Scale - Revised (Pankowski, Wytrychiewicz-Pankowska, & Janowski; 2021): this self-report scale consists of 30 questions to which the respondent answers on a 5-point scale. This tool consists of the following scales (ratings): Loss ($\alpha = 0.93$), Harm ($\alpha = 0.95$), Benefit ($\alpha = 0.9$), Challenge ($\alpha = 0.9$), Value ($\alpha = 0.9$), and Threat ($\alpha = 0.94$). Additionally, 5 questions were added regarding the importance that the respondent attaches to their own illness (Importance scale). The reliability of the Importance scale was $\alpha = 0.79$. For details about this scale, see Appendix 1.

Illness-Related Beliefs

The Illness-Related Beliefs Questionnaire (IRBQ; Pankowski, Wytrychiewicz-Pankowska, & Janowski; 2021, Pankowski et al., 2021) was used to assess the intensity of a patient's personal beliefs about key aspects of their 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 belief on this continuum using a 1–10 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 2.

Indicators of Adaptation to Chronic Illness

The Acceptance of Life with the Disease Scale (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: (1) Satisfaction with Life Despite the Disease ($\alpha = 0.9$); (2) Reconciliation with the Disease ($\alpha = 0.89$); and (3) Self-distancing from the Disease ($\alpha = 0.9$). A global score can be calculated, which is the sum of the scores obtained for all items ($\alpha = 0.95$).

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 severities of which are described by four statements. Each statement is assigned a score from 0 to 3 points. Apart from the global score, two subscales can be calculated (Cognitive-Affective and Somatic Symptoms). For the purposes of descriptive statistics, the numbers and percentages of people who did not exhibit clinically significant depressive symptoms (<10 points), as well as mild (≥ 10 and <20), moderate (≥ 20 and <30), and severe (≥ 30) depressive symptoms were also calculated (Łopuszańska et al., 2013). The number of people who presented suicidal thoughts (1 point on question "I") and tendencies (2 or 3 points on question "I") were also taken into account. The Cronbach's alpha reliability coefficient of the BDI global score in our study was high ($\alpha = 0.93$); the reliability coefficients of the Cognitive-Affective and Somatic Symptoms scales were $\alpha = 0.92$ and 0.82 , respectively.

Statistical Analyses

First, the statistical significance of differences between groups of people distinguished based on chronic illness was calculated in terms of IRBs, CA, severity of depressive symptoms, and level of acceptance of living with the disease using ANCOVA, controlling for sociodemographic (sex, age, relationship status) and clinical (time since diagnosis, 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 respondents.

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

Due to the fact that somatic symptoms of depression assessed using the BDI-I Somatic Symptoms scale 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), it was decided to use only the BDI-I Cognitive-Affective symptoms scale in further analyses.

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

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

- CA;

- IRBs.

Due to the fact that the result indicates 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 University was obtained for this study. Informed consent was obtained from all participants upon enrollment.

Results

Descriptive Characteristics

The study 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 precise 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 having a significant impact on life. In turn, the participants assessed their illness mostly as a challenge or a threat. Precise 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 indicate that over 10% of the studied sample declared severe intensity of depressive symptoms and 3.6% suicidal tendencies. For precise results for the whole group and illness diagnoses, see Appendix 3.

Differences between groups distinguished based on diagnosis and correlations between variables

First, the results of cognitive variables and indicators of adaptation were compared across illness diagnoses, while controlling for sociodemographic and clinical variables. The results indicate that people with selected diagnoses differed statistically significantly both in selected cognitive factors and levels of adaptation to living with the disease. Effect sizes varied between IRBs from no effect to intermediate. For details see Appendix 4.

Both CA and IRBs were correlated with adaptation indicators when controlling for sociodemographic and clinical variables. For 0–1 order correlation matrix, see Appendix 5.

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 the specific contribution of this group to the variance of the dependent variables. The remaining

variables were sociodemographic characteristics, clinical features, and CA.

First, a hierarchical regression analysis was performed in which the dependent variable was the severity of depressive symptoms (see Table 3). When CA was placed in the last block, the percentages of variance explained by CA (above that explained by the remaining variables) were statistically significant for RA, hypothyroidism, diabetes, hypertension, as well as the whole group. R^2 change values ranged from 0.101 (diabetes) to 0.217 (RA). 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).

In the next hierarchical regression analysis, the acceptance of life with disease global score was the dependent variable (Table 4). Placing the CA in the last block showed that this cognitive factor explained a statistically significant part of the variance in the case of all diagnoses and the entire group. The specific contribution of CA to explaining acceptance of life with disease ranged from 12.2% (asthma) to 22.8% (RA). IRBs explained a statistically significant part of the variance only for diabetes patients and analyses performed on the entire group of patients. The percentages of specific variance explained ranged from 8% (hypothyroidism) to 17.7% (diabetes).

Next, in order to identify statistically significant predictors of adaptation, a stepwise regression analysis was performed. Below is a table summarizing the results (Table 5).

The table above 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. It was also noticed that age played a protective role against the severity of depressive symptoms and the duration of illness was not a statistically significant predictor in any of the models. In the case of acceptance, a large differentiation between diagnoses (specific) and in the whole group (general) of predictors was found. It is also worth noting that there were no sociodemographic or clinical variables in any of the models – cognitive variables turned out to be more important for acceptance of living with the disease. 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 the disease (from Adjusted $R^2 = 0.376$ for RA to Adjusted $R^2 = 0.561$ for Asthma).

Discussion

This study focused on the role of cognitive factors in adaptation to five chronic diseases: rheumatoid arthritis, asthma, hypothyroidism, diabetes, and hypertension. The collected data were analyzed both for the whole studied sample and for each disease diagnosis separately. The study used two novel methods to assess the levels of individual appraisals of the disease 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 analysed samples.

Hierarchical regression analyses results may indicate that CA plays a much more important role in adaptation to chronic disease. It should also be noted that when IRBs were put third in the regression models (before CA), 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 CA, and that this proportion is different between diagnoses (i.e., it is disease-specific). However, the percentage of variance explained by the IRBs over clinical and sociodemographic variables was shared with the variance of CA, but the specific contribution of IRBs was not

statistically significant when the appraisals are controlled for. It is also worth noting that CA in the analyzed models made a statistically significant contribution to the scores, where it ranks third (above sociodemographic and clinical variables) and fourth (above IRBs), with the exception being people diagnosed with asthma. These results may confirm the validity of therapeutic interventions focusing on the modification of IRBs, which, in turn, may change the CA of the disease, due to the fact that they share common variance. These results may also suggest that IRBs may be one of the factors that shape CA, 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 the disease were assessed. The key observation is that the configuration of cognitive variables as predictors of psychological adaptation varied considerably across disease 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 a chronic disease, it was noticed that:

- 1) predictors of acceptance of living with the disease (positive indicator) and the severity of depressive symptoms (negative indicator) were different on both global and disease-specific levels; and
- 2) the predictors of levels of adaptation to living with a chronic disease differed between diagnoses and were not consistent with each other or with general predictors (for the whole group).

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 indices: in the vast majority of cases, sociodemographic and clinical variables were not statistically significant predictors of levels of acceptance, both in the case of individual disease diagnoses and the entire group, but 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 level was the IRB related to the duration of the disease: the longer people 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 diseases. 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 to the disease. Moreover, some factors that have protective properties for one disease may be a factor responsible for poorer adaptation in another (CA as a Threat in people with RA; see results in Table 5). We also noticed that some variables predicted levels of adaptation for only one disease (see IRBs related to worsening of 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 CA 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 therefore significant in the whole group.

As mentioned above, the Threat CA was 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 was positive ($r = 0.36$; $p < 0.01$), 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 $r = -0.281$; ($p < 0.05$), 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, say, 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 5-factor model of cognitive representation of the disease with further IRBs is empirically justified. Despite the fact that IRBs do not explain a statistically significant specific percentage of variance in concrete diagnoses, stepwise regression analysis showed that they were statistically significant predictors of adaptation to living with the disease. This can be observed both in the general approach, 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 3-factor cognitive assessment of disease situation also proved important in terms of outcomes. The cognitive assessment of the disease situation both had a statistically significant and specific contribution to explaining the variance of adaptation indices and was a statistically significant predictor in both the vast majority of diagnoses and the whole group. Surprisingly, the analyses showed, for example, that the perception of a disease in terms of a Challenge was not a statically significant predictor of the degree of adaptation – neither for individual diagnoses nor in general. Earlier reports indicated that this assessment plays an important role in the adaptation process, (e.g., in HIV; Pakenham & Rinaldis, 2001). The inclusion of further CA of the disease, such as the 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 to practice. The regression analyses clearly showed that cognitive factors (in particular, CA) play a very important role in adaptation to a chronic disease. The data clearly showed that both the predictors and their strength (understood as beta values) vary between disease diagnoses. These results can both be used in therapeutic work with chronically ill people and form the basis of interventions designed from scratch. 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 further directions

The presented research also has some limitations. Due to the cross-sectional nature of the collected data, it was not possible to establish cause-effect relationships/effects of specific variables. An additional limitation may be the lack of control of medical variables or confirmation of 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-patient 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 group 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 or other therapy. These results can also form the basis of

therapeutic/psychoeducational/public health interventions (including information campaigns) aimed at changing IRBs and appraisals 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 results of the conducted research indicate that the studied variables have diverse roles, depending on the disease, 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

- Cognitive appraisals make a greater contribution than illness-related beliefs to the variance of depressive symptoms and level of acceptance in people with various medical conditions
- Predictors of acceptance of living with the disease (positive indicator) and the severity of depressive symptoms (negative indicator) were different on both global and disease-specific levels
- The predictors of levels of adaptation to living with a chronic disease differed between diagnoses and were not consistent with each other or with general predictors (for the whole group).
- The results contribute to a better understanding of the relationship between the key cognitive factors involved in the process of adaptation to the disease 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.

List Of Abbreviations

WHO - The World Health Organization

CA - cognitive appraisal

CSM - common sense model

IRBs - illness-related beliefs

RA - rheumatoid arthritis

IRBQ - The Illness-Related Beliefs Questionnaire

ALDS - The Acceptance of Life with the Disease Scale

BDI-I - Beck Depression Inventory – I

Declarations

Ethical Approval and Consent to participate

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

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

Availability of supporting data

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

Competing interests

None

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Authors' 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. Fał:** writing - review & editing, funding acquisition

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References

1. Alhurani AS, Dekker R, Ahmad M, Miller J, Yousef KM, Abdulqader B, ... Moser DK. Stress, cognitive appraisal, coping, and event free survival in patients with heart failure. *Heart Lung*. 2018;47(3):205–10.
2. Augustin M, Radtke MA. Quality of life in psoriasis. In: *Handbook of Psoriasis and Psoriatic Arthritis*. Springer International Publishing; 2016. pp. 101–16.
3. 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*, 1–12.
4. Beck AT, Bredemeier K. A unified model of depression: integrating clinical, cognitive, biological, and evolutionary perspectives. *Clinical Psychological Science*. 2016;4(4):596–619.
5. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry*. 1961;4(6):561–71.
6. Buchberger B, Huppertz H, Krabbe L, Lux B, Mattivi JT, Siafarikas A. Symptoms of depression and anxiety in youth with type 1 diabetes: a systematic review and metaanalysis. *Psychoneuroendocrinology*. 2016;70:70–84.
7. Cassileth BR, Lusk EJ, Strouse TB, Miller DS, Brown LL, Cross PA, Tenaglia AN. Psychosocial status in chronic illness: A comparative analysis of six diagnostic groups. *N Engl J Med*. 1984;311(8):506–11.
8. Cameron LD, Fleszar- Pavlović S, Khachikian T. Changing behavior using the common sense model of self-regulation. In: Hagger MS, Cameron LD, Hamilton K, Hankonen N, Lintunen T, editors. *The handbook of behavior change*. Cambridge University Press; 2020. pp. 60–76. <https://doi.org/10.1017/97811086773180.005>.
9. Cao-Lei L, Dancause KN, Elgbeili G, Laplante DP, Szyf M, King S. 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.

10. Carver CS, Scheier MF, Weintraub JK. (1989). Assessing coping strategies: A theoretically based approach. *J Pers Soc Psychol*, 56 (2), 267–83. <https://doi.org/10.1037//0022-3514.56.2.267>.
11. Caspi A, Sugden K, Moffitt TE, Taylor A, Craig IW, Harrington H, . . . Poulton R. Influence of life stress on depression: Moderation by a polymorphism in the 5-HTT gene. *Science*. 2003;301:386–9.
12. Cheng C, Chan AOO, Hui WM, Lam SK. Coping strategies, illness perception, anxiety and depression of patients with idiopathic constipation: a population-based study. *Aliment Pharmacol Ther*. 2003;18(3):319–26.
13. Conway CC, Hammen C, Espejo EP, Wray NR, Najman JM, Brennan PA. Appraisals of stressful life events as a genetically-linked mechanism in the stress– depression relationship. *Cognitive Therapy Research*. 2012;36:338–47.
14. Crandall CS, Moriarty D. Physical illness stigma and social rejection. *British Journal of Social Psychology*. 1995;34(1):67–83.
15. Crowson AD, Colligan RC, Matteson EL, Davis JM, Crowson CS. THU0037 Personality Traits in Patients with Rheumatoid Arthritis: An Unrecognized Predictor of Mortality. *Ann Rheum Dis*. 2016;75:191.
16. Curtis R, Groarke A, Coughlan R, Gsel A. Psychological stress as a predictor of psychological adjustment and health status in patients with rheumatoid arthritis. *Patient Educ Couns*. 2005;59(2):192–8. <https://doi.org/10.1016/j.pec.2004.10.015>.
17. D'Aloisio AA, Nichols HB, Hodgson ME, Deming-Halverson SL, Sandler DP. Validity of self-reported breast cancer characteristics in a nationwide cohort of women with a family history of breast cancer. *BMC Cancer*. 2017;17(1):1–10.
18. Figueiras MJ, Alves NC. Lay perceptions of serious illnesses: An adapted version of the Revised Illness Perception Questionnaire (IPQ-R) for healthy people. *Psychology Health*. 2007;22(2):143–58.
19. Fletcher L, Hayes SC. Acceptance and commitment therapy, relational frame theory, and functional analytic conceptualization of mindfulness. *Journal of Rational-Emotive Cognitive Behavior Therapy*. 2005;23:315–36.
20. Gaab J, Rohleder N, Nater UM, Ehlert U. Psychological determinants of the cortisol stress response: The role of anticipatory cognitive appraisal. *Psychoneuroendocrinology*. 2005;30:599–610.
21. Gåfvels C, Hägerström M, Rane K, Wajngot A, Wändell PE. Coping strategies among patients newly diagnosed with diabetes or rheumatoid arthritis at baseline and after 24 months. *Journal of Health Psychology*. 2018;23(10):1273–86.
22. Gatchel RJ, Oordt MS. Coping with chronic illness. In: Gatchel RJ, Oordt MS, editors. *Clinical Health Psychology and Primary Care: Practical Advice and Clinical Guidance for Successful Collaboration*. Washington, DC: American Psychological Association; 2003. pp. 213–33.
23. Hagger MS, Orbell S. A meta-analytic review of the common-sense model of illness representations. *Psychology health*. 2003;18(2):141–84.
24. Helgeson VS, Taylor SE. Social Comparisons and Adjustment Among Cardiac Patients 1. *J Appl Soc Psychol*. 1993;23(15):1171–95.
25. Heijmans MJWM, Ridder DD, Bensing J. Dissimilarity in patients' and spouses' representations of chronic illness: Exploration of relations to patient adaptation. *Psychol Health*. 1999;14(3):451–66.
26. Hermsen LA, van der Wouden JC, Leone SS, Smalbrugge M, van der Horst HE, Dekker J. The longitudinal association of cognitive appraisals and coping strategies with physical functioning in older adults with joint pain and comorbidity: a cohort study. *BMC Geriatr*. 2016;16(1):1–8.
27. Hobfoll SE. Conservation of resources: A new attempt at conceptualizing stress. *Am Psychol*. 1989;44(3):513.

28. Hwu YJ. The impact of chronic illness on patients. *Rehabilitation Nursing*. 1995;20(4):221–5.
29. Janowski K, Steuden S, Kuryłowicz J, Nieśpiałowska-Steuden M. The Disease-Related Appraisals Scale: a tool to measure subjective perception of the disease situation. In: Janowski K, Steuden S, editors. *Biopsychosocial aspects of health and disease*. Vol 1. Lublin: CPPP Scientific Press; 2009. pp. 108–25.
30. Janowski K, Steuden S, Pietrzak A, Krasowska D, Kaczmarek Ł, Gradus I, Chodorowska G. Social support and adaptation to the disease in men and women with psoriasis. *Arch Dermatol Res*. 2012;304(6):421–32.
31. Janowski K, Tatala M, Jedynak T, Wałachowska K. (2019). Social support and psychosocial functioning in women after mastectomy. *Palliative Supportive Care*, 1–8. <https://doi.org/10.1017/S1478951519000774>.
32. Jin Y-P, Di Legge S, Østbye T, Feightner JW, Saposnik G, Hachinski V. Is stroke history reliably reported by elderly with cognitive impairment? A community-based study. *Neuroepidemiology*. 2010;35(3):215–20. <https://doi.org/10.1159/000315484>.
33. Keltikangas-Järvinen L. Psychological meaning of illness and coping with disease. *Psychother Psychosom*. 1986;45:84–90.
34. Kendler KS, Kuhn JW, Vittum J, Prescott CA, Riley B. The interaction of stressful life events and a serotonin transporter polymorphism in the prediction of episodes of major depression: A replication. *Arch Gen Psychiatry*. 2005;62:529–35.
35. Kimball AB, Jacobson C, Weiss S, Vreeland MG, Wu Y. The psychosocial burden of psoriasis. *American journal of clinical dermatology*. 2005;6(6):383–92.
36. Lazarus RS, Folkman S. (1984). *Coping and adaptation. The handbook of behavioral medicine*, 282–325.
37. Lazarus RS, Folkman S. *Stress, appraisal and coping*. New York: Springer-Verlag; 1984.
38. Lemogne C, Gorwood P, Boni C, Pessiglione M, Lehericy S, Fossati P. Cognitive appraisal and life stress moderate the effects of the 5-HTTLPR polymorphism on amygdala reactivity. *Hum Brain Mapp*. 2011;32(11):1856–67.
39. Lepore SJ, Helgeson VS, Eton DT, Schulz R. Improving quality of life in men with prostate cancer: a randomized controlled trial of group education interventions. *Health Psychol*. 2003;22(5):443.
40. Leventhal H, Benyamini Y, Brownlee S, Diefenbach M, Leventhal EA, Patrick-Miller L. Illness Representation: Theoretical foundations. In: Weinman JPK, editor. *Perceptions of Health and Illness*. London: Harwood Publishers; 1997. pp. 19–45.
41. Leventhal H, Meyer D, Nerenz D. The common sense representation of illness danger. *Contributions to medical psychology*. 1980;2:7–30.
42. Leventhal H, Nerenz DR, Steele DJ. Illness representations and coping with health threats. In: Baum A, Taylor SE, Singer JE, editors. *Handbook of psychology and health: social psychological aspects of health*, Vol 4. Hillsdale: Earlbaum; 1984. pp. 219–52.
43. Leventhal H, Phillips LA, Burns E. The Common-Sense Model of Self-Regulation (CSM): a dynamic framework for understanding illness self-management. *J Behav Med*. 2016;39(6):935–46. doi:10.1007/s10865-016-9782-2.
44. Lewis KS. Emotional adjustment to a chronic illness. *Lippincott's Primary Care Practice*. 1998;2(1):38–51.
45. Livneh H, Martz E. An introduction to coping theory and research. In: Livneh H, Martz E, editors. *Coping with Chronic Illness and Disability*. Boston: Springer; 2007. pp. 3–27.
46. Łopuszańska M, Szklarska A, Jankowska EA. Impression of depressive symptoms using the Polish version of the Beck Depression Inventory in healthy men, residents of Wrocław. *Psychiatr Pol*. 2013;47(6):1001–9.
47. Maes S, Leventhal H, de Ridder DT. Coping with chronic diseases. In: Zeidner E, editor. *Handbook of coping: Theory, research, applications*. Oxford: John Wiley; 1996. pp. 221–51.

48. Murphy H, Dickens C, Creed F, Bernstein R. Depression, illness perception and coping in rheumatoid arthritis. *J Psychosom Res.* 1999;46(2):155–64.
49. Pakenham KI, Rinaldis M. The role of illness, resources, appraisal, and coping strategies in adjustment to HIV/AIDS: The direct and buffering effects. *J Behav Med.* 2001;24(3):259–79.
50. Pankowski D, Wytrychiewicz K, Janowski K. (2021). Illness-Related Beliefs Scale. DOI 10.17605 / OSF.IO / JCP2U.
51. Pankowski D, Wytrychiewicz K, Janowski K, Pisula E, Walicka M. The Role of Illness-Related Beliefs in Depressive, Anxiety, and Anger Symptoms: An On-line Survey in Women with Hypothyroidism. *Frontiers in Psychiatry.* 2021. DOI:10.3389/fpsy.2021.614361.
52. Parnowski T, Jernajczyk W. 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. *Psychiatr Pol.* 1977;11(4):417–21.
53. Petrie KJ, Weinman J, Sharpe N, Buckley J. Role of patients' view of their illness in predicting return to work and functioning after myocardial infarction: longitudinal study. *BMJ.* 1996;312:1191–4.
54. Rozema H, Völlink T, Lechner L. The role of illness representations in coping and health of patients treated for breast cancer. *Psycho-Oncology: Journal of the Psychological Social Behavioral Dimensions of Cancer.* 2009;18(8):849–57.
55. Scharloo M, Kaptein AA, Weinman J, Hazes JM, Willems LNA, Bergman W, Rooijmans HGM. Illness perceptions, coping and functioning in patients with rheumatoid arthritis, chronic obstructive pulmonary disease and psoriasis. *Journal of Psychosomatic Research.* 1998;44:573–85.
56. Schüssler G. Coping strategies and individual meanings of illness. *Soc Sci Med.* 1992;34:427–32.
57. Smith CA, Wallston KA. Adaptation in patients with chronic rheumatoid arthritis: application of a general model. *Health Psychol.* 1992;11(3):151–62.
58. Stanton AL, Revenson TA, Tennen H. Health psychology: psychological adjustment to chronic disease. *Annual Review Psychology.* 2007;58:565–92.
59. Walker JG, Jackson HJ, Littlejohn GO. Models of adjustment to chronic illness: Using the example of rheumatoid arthritis. *Clin Psychol Rev.* 2004;24(4):461–88.
60. Wedderhoff N, Gnambs T, Wedderhoff O, Burgard T, Bošnjak M. 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.* 2021;229(1):24–37. <https://doi.org/10.1027/2151-2604/a000434>.
61. Weinman J, Petrie KJ, Moss-Morris R, Horne R. The illness perception questionnaire: a new method for assessing the cognitive representation of illness. *Psychology health.* 1996;11(3):431–45.
62. World Health Organization (WHO). (2018) The global burden of chronic diseases. Available at: http://www.who.int/nutrition/topics/2_background/en/.

Tables

Table 1. Sociodemographic and clinical descriptive characteristics of subgroups with different diagnoses

Variables	RA (<i>n</i> =64)	Asthma (<i>n</i> =87)	Hypothyroidism (<i>n</i> =130)	Diabetes (<i>n</i> =101)	Hypertension (<i>n</i> =123)	Statistics
	<i>n</i> (%)/ M(SD)	<i>n</i> (%)/ M(SD)	<i>n</i> (%)/ M(SD)	<i>n</i> (%)/ M(SD)	<i>n</i> (%)/ M(SD)	
Number (percent) of Women	48 (75%)	55 (63,2%)	117 (90%)	45 (44.6%)	67 (54.5%)	Chi2(4)=63.717; <i>p</i> <0.001
Age	48.16 (15.25)	41.15 (15.56)	40.05 (14.22)	51.04 (16.40)	52.25 (12.99)	<i>F</i> (4.500)=16.298; <i>p</i> <0.001
Marital status (single)	20 (31.3%)	13 (14.9%)	24 (18.5%)	18 (17.8%)	15 (12.2%)	Chi2(4)=11.067; <i>p</i> <0.05
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)	<i>F</i> (4.500)=4.576; <i>p</i> <0.01
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)	<i>F</i> (4.500)=1.589; <i>p</i> >0.05

RA – Rheumatoid Arthritis; % – percentage of whole group; M – Mean; SD – Standard Deviation

Table 2. Cognitive factors and adaptation indicators: descriptive statistics for 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
	Advantage	8.06	3.98	5–25
	Challenge	14.28	5.35	5–25
	Value	12.05	4.90	5–25
	Danger	14.13	5.52	5–25
	Importance	15.45	4.42	5–25
BDI-I	Global 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 Disease	Satisfaction with Life Despite the Disease	15.95	3.08	8–20
	Reconciliation with the Disease	17.30	2.60	8–20
	Self–distancing from the Disease	15.88	3.11	8–20
	Global Score	49.13	8.05	24–60

BDI-I – Beck Depression Inventory – I

Table 3. Percentage of variance (R^2) in depressive symptoms explained specifically by cognitive appraisals and IRBs

Diagnoses	R^2 change parameters for cognitive appraisals, when cognitive appraisals were entered in the last block		R^2 change parameters for IRBs, when IRBs were entered in the last block	
	R^2 change	Significance	R^2 change	Significance
RA	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 cognitive appraisals were entered in the last block		R^2 change parameters for IRBs, when IRBs were entered in the last block	
	R^2 change	Significance	R^2 change	Significance
RA	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

Due to technical limitations, Table 5 is only available as a download in the Supplemental Files section.

Supplementary Files

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