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Illness representations as mediators of the relationship between
dispositional optimism and depression in patients with chronic tinnitus:

A cross-sectional study

Dr. Manja Vollmann

Department of Health Psychology, University of Hagen, Germany

Dr. Margreet Scharloo

Leiden University Medical Center, The Netherlands

Dr. Berthold Langguth

Department of Psychiatry and Psychotherapy, University of Regensburg, Germany

Dipl.-Psych. Natallia Kalkouskaya

Vocational School of Childcare Reichenau, Germany

Dr. Christel Salewski

Department of Health Psychology, University of Hagen, Germany

Corresponding author:

Dr. Manja Vollmann, University of Hagen, Department of Health Psychology, D-58084

Hagen, Germany; Email: manja.vollmann@gmail.com

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Abstract

Objective: Both dispositional optimism and illness representations are related to psychological health in chronic patients. In a group of chronic tinnitus sufferers, the interplay between these two variables was examined. Specifically, it was tested to what extent the relationship between dispositional optimism and depression is mediated by more positive illness representations.

Method: The study had a cross-sectional design. 118 patients diagnosed with chronic tinnitus completed questionnaires assessing optimism (LOT-R), illness representations (IPQ-R), and depression (HADS).

Results: Correlation analyses showed that optimism was associated with more positive illness representations and lower levels of depression. Simple mediation analyses revealed that the relationship between optimism and depression was partially mediated by the illness representation dimensions consequences, treatment control, coherence, emotional representations, and internal causes. A multiple mediation analysis indicated that the total mediation effect of illness representations is particularly due to the dimension consequences.

Conclusion: Optimism influences depression in tinnitus patients both directly and indirectly. The indirect effect indicates that optimism is associated with more positive tinnitus-specific illness representations which, in turn, are related to less depression. These findings contribute to a better understanding of the interplay between generalized expectancies, illness-specific perceptions and psychological adjustment to medical conditions.

Keywords: tinnitus; optimism; illness representations; depression; common sense model (CSM) of self-regulation

Illness representations as mediators of the relationship between dispositional optimism and depression in patients with chronic tinnitus: A cross-sectional study

In the context of their model of behavioral self-regulation, Scheier and Carver (1985) conceptualized optimism as a dispositional personality trait that reflects the extent to which people hold generalized favorable expectancies for their future. Optimists generally expect good rather than bad things to happen to them, while pessimists expect the reverse. Numerous studies have impressively demonstrated that optimism is positively associated with indicators of psychological and physical health, such as lower levels of depression and anxiety, higher satisfaction with life, better immune functions, and less physical symptoms. Optimism has been found to promote psychological adjustment and physical functioning especially when confronted with stressful situations such as entering college, having a baby, facing acute or chronic illness, and undergoing medical interventions (for an overview, see Rasmussen, Scheier, & Greenhouse, 2009; Scheier, Carver, & Bridges, 2001).

It has been argued that the beneficial effects of optimism on health outcomes are mediated by cognitive and behavioral processes as well as social and socioeconomic resources (Carver, Scheier, & Segerstrom, 2010; Peterson & Bossio, 2001). The proposed cognitive pathway is based on the assumption that optimism is not an isolated expectancy but rather part of a complex cognitive system. Thus, it is plausible that generalized positive outcome expectancies influence other cognitions such as situation-specific perceptions, evaluations and beliefs. These, in turn, can impact psychological and physical health in numerous ways. Empirical findings indicate that more positive perceptions and evaluations of situations indeed mediate the relationship between optimism and health outcomes. For example, optimists perceive potential stressors and difficult situations as less stressful, and as more controllable and manageable than pessimists, which again has favorable effects mainly on psychological health (e.g., Chang, 1998; Endrighi, Hamer, & Steptoe, 2011; Ferguson & Goodwin, 2010).

In the context of medical conditions, perceptions and evaluations of specific illnesses are called illness representations. According to the Common Sense Model (CSM) of self-regulation of health and illness (Leventhal, Brissette, & Leventhal, 2003), individuals' cognitive representations of an illness play an important role in illness adjustment and health outcomes. Within the CSM, cognitive representations include beliefs about the disease label and the symptoms associated with the illness, beliefs about the causes of the illness, beliefs about the consequences of the illness, beliefs about to what extent the illness can be controlled or cured by own behavior or medical treatment, and beliefs about the course of the illness and the duration of illness symptoms. Two additional dimensions refer to emotional responses generated by the illness and the overall sense of understanding the illness (Moss-Morris et al., 2002).

Leventhal and colleagues postulate that illness representations do not occur in a vacuum, but rather are modulated by various factors such as personality traits, the personal history, and the social and cultural context (Diefenbach & Leventhal, 1996; Leventhal et al., 1997). As regards personality traits, dispositional optimism has been found to be associated with more positive illness representations. More specifically, optimists perceive medical conditions as less severe in terms of symptoms and consequences, as more controllable through own behavior and medical treatment, as being rather non-chronic, as more understandable, and as less emotionally burdensome than pessimists (Fournier, de Ridder, & Bensing, 2002; Karademas, Frokkai, Tsotra, & Papazachariou, 2013; Karademas, 2012; Karademas, Kynigopoulou, Aghathangelou, & Anestis, 2011; Llewellyn, McGurk, & Weinman, 2007; Pinto, McIntyre, Ferrero, Almeida, & Araújo-Soares, 2013).

Combining these two lines of research would implicate that the relationship between dispositional optimism and psychological health in patients with a chronic illness is partially mediated by illness-specific perceptions and beliefs. Theoretical considerations based on the cognitive pathway and the CSM as well as empirical findings of studies that have focused on

situation-specific perceptions as mediators of the health promoting effects of optimism on the one hand and the association between optimism and illness representations on the other hand would support this mediation model which is presented in Figure 1. To our knowledge, there is only one study that has explicitly investigated the mediating effect of illness representations on the relationship between optimism and health outcomes. In a group of cardiac patients', Karademas et al. (2013) found that almost all illness representation dimensions -when considered separately- mediate the positive effects of optimism on emotional well-being and physical functioning, especially in low and medium levels of optimism. However, it remains unclear to what extent the set of all illness representation dimensions together mediates the relationship between optimism and health outcomes, and what the unique mediating effect of each illness representation dimension is when controlling for all other dimensions. To answer these questions, further research is needed.

Another context which appears adequate to examine the proposed mediation model is chronic tinnitus. Tinnitus is defined as the perception of an internal sound in the absence of an external stimulus (Lockwood, Salvi, & Burkard, 2002) and is a widespread phenomenon in the general population (Shargorodsky et al., 2010). Chronic tinnitus is associated with a number of psychological health problems, such as irritability, anxiety, insomnia, and depression (Langguth, 2011). Especially, the latter is very common in tinnitus sufferers. Patients with chronic tinnitus experience considerable more depressive symptoms and have a substantial higher prevalence of major depression than the general population (Holmes & Padgham, 2011; Langguth, Landgrebe, Kleinjung, Sand, & Hajak, 2011). The subjectively perceived burden of tinnitus is only to a small extent explained by loudness, pitch, or other objective characteristics of the tinnitus (Hiller & Goebel, 2006). Previous research has shown that both dispositional optimism and illness representations have an influence on the psychological health status of tinnitus sufferers (Andersson, 1996; Reynolds, Gardner, & Lee, 2004).

The aim of the present study was to investigate in a group of patients diagnosed with chronic tinnitus to what extent the relationship between dispositional optimism and depression as an indicator of psychological health is mediated by tinnitus-specific illness representations. We expected optimism to be negatively associated with depression and illness representations to partially mediate this association. Partial mediation instead of full mediation was expected as previous research has shown that the positive health effects of optimism are not only due to cognitive processes but also to behavioral processes as well as social and socioeconomic resources (Carver et al., 2010; Peterson & Bossio, 2001).

Method

Participants and procedure

Participants were recruited from the Tinnitus Center of the University of Regensburg (Germany). A total of 200 patients diagnosed with chronic tinnitus were invited to participate in a research project about views on tinnitus. They were provided with information on the study and received a booklet containing the questionnaires. A total of 118 patients returned the completed booklet by mail using pre-stamped addressed envelopes (response rate: 59%). The study was approved by the Ethical Committee of the University of Regensburg and informed consent was obtained from all participants. Separate data and analyses from the same sample were reported in an earlier manuscript (Vollmann, Kalkouskaya, Langguth, & Scharloo, 2012).

Measures

Dispositional optimism. Dispositional optimism was measured by using the German version of the Life Orientation Test-Revised (LOT-R; Glaesmer, Hoyer, Klotsche, & Herzberg, 2008). The LOT-R consists of six items with half of the items framed in an optimistic and pessimistic manner, respectively. Responses were given on a 5-point scale from 1 'strongly disagree' to 5 'strongly agree'. Items were recoded as appropriate and averaged so that higher scores indicate greater optimism. Cronbach's alpha was .79.

Illness representations. The German version of the Illness Perceptions Questionnaire-Revised (IPQ-R; Gaab, Latanzia-Bunschoten, Sprott, & Ehlert, 2008) was used to assess the participants' cognitive and emotional representations of tinnitus. Following the recommendation of Moss-Morris et al. (2002) to adapt the IPQ-R to specific illnesses, for the present study, the word 'illness' was replaced with the word 'tinnitus' throughout the questionnaire.

Part one of the IPQ-R measures *illness identity* that refers to symptoms perceived to be part of the illness. For 14 common illness symptoms from the IPQ-R and one additional tinnitus specific symptom (cf., Reynolds et al., 2004), participants indicated whether they have experienced the symptom in the course of their tinnitus (no/yes), and if yes, whether they believe the symptom to be specifically related to their tinnitus (no/yes). The sum of symptoms attributed to tinnitus forms the illness identity subscale.

Part two of the IPQ-R comprises 7 subscales assessing *chronic timeline* (5 items), *cyclical timeline* (4 items), *consequences* (5 items), *personal control* (4 items), *treatment control* (4 items), *coherence* (5 items), and *emotional representations* (5 items). Responses were given on a 5-point rating scale from 1 'strongly disagree' to 5 'strongly agree'. Items were recoded as appropriate and averaged so that higher scores on these scales reflect more negative illness perceptions, i.e., stronger beliefs in a long duration and more variability in the symptoms of tinnitus, a greater perceived impact of tinnitus on life, weaker beliefs in the effectiveness of controlling tinnitus by own behavior and by medical treatment, a lower extent of understanding tinnitus, and stronger emotional responses to tinnitus. This concordant coding of all illness representation dimensions is rather unusual, but contextually reasonable and also necessary for the planned statistical analyses. Cronbach's alphas of the subscales were .65 to .91, except for the scale cyclical timeline which had a Cronbach's alpha of .51 and was therefore excluded from further analyses.

Part three of the IPQ-R measures *causal attributions*. Participants were asked to rate 21

potential causes of their tinnitus (18 common illness causes from the IPQ-R and 3 tinnitus specific causes (cf., Reynolds et al., 2004)) on a 5-point rating scale from 1 'strongly disagree' to 5 'strongly agree'. As recommended by the authors of the IPQ-R, the factor structure of the causal attributions was examined by means of a principal component analysis with VARIMAX-rotation. Causes that were endorsed by less than 20% of the participants were excluded from this analysis. The scree plot of the principal component analysis with the remaining 13 items suggested a 2-factor-solution and items with a loading greater than .50 were interpreted to represent a particular factor. The two factors can be labeled as *internal causes* (7 items) and *external causes* (5 items). The items of each factor were averaged so that higher scores indicate stronger beliefs in internal and external causes. Cronbach's alphas of the two scales were .86 and .62.

Depression. Depression was measured with the German version of the Hospital Anxiety and Depression Scale (HADS; Herrmann-Lingen, Buss, & Snaith, 1995). The depression subscale of the HADS contains 7 items that were answered on 4-point rating scales, e.g., from 0 'not at all' to 3 'very often'. Items were recoded as appropriate and averaged so that a higher score reflects a higher level of depression. Cronbach's alpha was .89.

Statistics

All statistical analyses were performed with SPSS 21. Bivariate associations between the study variables were analyzed by means of correlation analyses. Illness representation dimensions that were significantly correlated with both optimism and depression were considered as potential mediators. In a first step, simple mediation analyses were calculated in order to investigate the mediating effect of each illness representation dimension when considered independently from all other illness representation dimensions. This procedure allows comparing our results with previous findings which emerged from simple mediation analyses (i.e., Karademas et al., 2013). In a second step, a multiple mediation analysis was calculated in order to estimate the overall indirect effect and the specific (unique) indirect

effects of optimism on depression through all illness representation dimensions. This procedure better reflects the proposed theoretical model (see Figure 1). Simple and multiple mediation analyses were conducted by using the SPSS macro provided by Preacher and Hayes (2008) with standardized variables in order to obtain standardized coefficients. Age, gender and whether patients have received some kind of tinnitus treatment were entered as control variables. The significance of the indirect effects was tested by means of bootstrap analyses with 5000 bootstrap samples.

Results

Sample characteristics

The sample consisted of 27 women and 91 men with a mean age of 55.64 years ($SD=11.31$). The majority of the participants had received some kind of tinnitus treatment in the past (94.8%). Most participants were employed (57%) or retired (36%), while only a few received illness benefits (2%) or were unemployed/homemakers (3%). The mean sum score of the HADS depression scale ($M=6.6$, $SD=4.52$, range 0-21) was below the cut-off point for mild depression, although 28 participants (23.7%) reported mild levels of depression (HADS score: 8-10) and 21 participants (13.6%) reported moderate to severe levels of depression (HADS score: 11-21).

Bivariate associations between optimism, illness representations, and depression

The results of the correlation analyses are presented in Table 1. First, higher levels of optimism were significantly related to lower levels of depression. Second, optimism was significantly correlated with several illness representation dimensions. Higher levels of optimism were associated with less symptoms attributed to tinnitus, the perception of the timeline of tinnitus as rather non-chronic, less serious perceived consequences, stronger beliefs in treatment control, a higher coherence, weaker emotional responses, and weaker beliefs in internal causes. Third, more negative illness representations were linked to higher levels of depression. In particular, more perceived symptoms attributed to tinnitus, a lower

coherence, stronger emotional responses, stronger beliefs in internal causes, as well as stronger perceptions of a chronic timeline, serious consequences, low personal control and low treatment control were related to higher depression.

Indirect effects of optimism on depression through illness representations

Simple mediation analyses revealed that, when considered separately, almost all illness representation dimensions partially mediate the relationship between optimism and depression (see Table 2). In particular, the indirect effects of optimism on depression through the dimensions consequences, $-.16$, BCa 95% CI $(-.2792, -.0792)$, treatment control, $-.03$, BCa 95% CI $(-.0957, -.0007)$, coherence, $-.04$, BCa 95% CI $(-.1143, -.0017)$, emotional representations, $-.15$, BCa 95% CI $(-.2590, -.0731)$, and internal causes, BCa $-.06$, 95% CI $(-.1420, -.0163)$, reached significance as indicated by the bootstrap approach. In all simple mediation analyses, there was a strong direct effect of optimism on depression, between $-.43$ and $-.57$, $ps < .001$ (see Table 2, column 5).

The multiple mediation analysis (see Table 3) revealed a significant total indirect effect, $-.22$, BCa 95% CI $(-.3638, -.0965)$, indicating that, taken as a set, illness representations mediate the effect of optimism on depression. An examination of the specific (unique) indirect effects of the illness representation dimensions showed that, controlling for all other illness representation dimensions, only the dimension consequences, $-.11$, BCa 95% CI $(-.2091, -.0377)$, is a significant mediator. All other illness representation dimensions did not contribute to the indirect effect above and beyond consequences. In addition, there was a strong direct effect of optimism on depression, $-.35$, $p < .001$.

Discussion

This cross-sectional study investigated in a group of patients with chronic tinnitus to what extent the relationship between dispositional optimism and depression is mediated by tinnitus-specific illness representations.

The present findings confirm previous research showing that both dispositional optimism

and positive illness representations are associated with less depression in tinnitus patients (Andersson, 1996; Reynolds et al., 2004). However, compared to the results of Reynolds and colleagues (2004) who only found the illness representation dimensions identity and consequences to be significantly related to depression, in our study all dimensions except for external causes showed a significant relationship with depression severity in the expected direction. This might be due to the larger sample size and the use of the IPQ-R instead of the IPQ which results in more statistical power and a more valid measurement of illness representations. Certainly, further research is needed to consolidate our results.

Our findings also replicate past studies indicating that dispositional optimism goes together with more positive illness representations in patients with medical conditions (Karademas, 2012; Karademas et al., 2011, 2013; Llewellyn et al., 2007; Pinto et al., 2013), and extend these studies by demonstrating that this relationship also holds true for patients with chronic tinnitus. In particular, optimists compared to pessimists perceive their tinnitus as being associated with less symptoms, as having a rather non-chronic timeline, as causing less serious consequences, as being more controllable through medical treatment, as more understandable, as causing less emotional impairment and as being rather not caused by internal causes such as stress, own behavior, and mental attitude.

Most important, our results show that the relationship between dispositional optimism and depression is partially due to more positive illness representations. Specifically, optimism is associated with more favorable perceptions of tinnitus which, in turn, are related to lower levels of depression. This finding is in line with previous research in cardiac patients which also found illness representations to partially mediate the relationship between optimism and subjective health outcomes (Karademas et al., 2013). This finding is also consistent with the proposed cognitive pathway that implies that the health promoting effects of optimism are mediated by (situation-)specific cognitions (Carver et al., 2010; Peterson & Bossio, 2001) and is a preliminary confirmation of the assumption of the CSM that illness representations are

influenced by personality traits and are predictors of health outcomes (Diefenbach & Leventhal, 1996; Leventhal et al., 1997).

Among the illness representations, the dimension consequences that is concerned with the perception of illness severity is of special importance as it turned out to be the only independent mediator of the relationship between dispositional optimism and depression. This result suggests that optimism particularly leads to the perception of tinnitus as causing less serious consequences which, in turn, leads to lower levels of depression. Thus, optimists compared to pessimists experience less depression because they perceive their tinnitus as less severe and consequently as less stressful. This is consistent with studies showing that perceived stress mediates the relationship between optimism and health outcomes (Chang, Rand, & Strunk, 2000; Gustafsson & Skoog, 2012).

Interestingly, the two illness representation dimensions focusing on control beliefs, i.e., treatment control and personal control, were of low importance. For both dimensions, no mediating effect could be found. The dimension personal control was not even significantly correlated with dispositional optimism. Previous studies in different patient groups yielded mixed results regarding this relationship (Karademas, 2012; Karademas et al., 2011, 2013; Llewellyn et al., 2007; Pinto et al., 2013). Possibly, the relationship between dispositional optimism and personal control differs dependent on the extent to what effective self-care behavior is actually available. Tinnitus is a condition that can rarely be improved by patients' behavior (Holmes & Padgham, 2011). In uncontrollable situations, dispositional optimism has been found to be predominantly related to acceptance and positive interpretation (Scheier, Weintraub, & Carver, 1986; Solberg Nes & Segerstrom, 2006). In line with this finding, optimists probably accept that they cannot do anything about their tinnitus, but at the same time evaluate their condition as less severe.

As expected, beside the indirect effect via illness representations, dispositional optimism had a strong direct effect on depression. This indicates that the relationship between optimism

and lower levels of depression may also be mediated by other processes than the perceptions of and the beliefs about tinnitus. Previous research has identified a number of mechanisms through which optimism promotes psychological health, such as using effective coping strategies, engaging in health-promoting behaviors, avoiding health risks, following medical advice, and adjusting personal goals to changed circumstances (for an overview, see Scheier et al., 2001). The extent to which the positive health effects of optimism in patients with chronic tinnitus are due to these adaptive self-regulatory processes should be investigated in longitudinal studies.

Some limitations of the present study need to be acknowledged. First, due to the cross-sectional design, the direction of causality in the associations between dispositional optimism, illness representations, and depression could not be determined. Other mediation models are theoretically less plausible, but still possible, for example, that less depression leads to more positive illness representations which, in turn, lead to higher optimism. The results of an additional multiple mediation analysis, however, did not support this alternative model. The total effect of depression on optimism, $-.65, p < .001$, was not reduced when controlling for illness representations. None of the illness representation dimensions had a significant direct effect on depression and, consequently, all specific (unique) indirect effects as well as the total indirect effect of all illness representation dimensions were non-significant. Longitudinal studies should further clarify this issue. Second, in the present study, coping has been disregarded, although it appears to be an important factor influencing psychological health in tinnitus patients (Andersson, Kaldö, Strömberg, & Ström, 2004) and is found to be closely related to both optimism and illness representations (Hagger & Orbell, 2003; Solberg Nes & Segerstrom, 2006). Further research would profit from including coping as a further mediator as proposed in the CSM (Leventhal et al., 2003) in order to get a better insight in the interplay between optimism, illness representations, coping, and psychological health in tinnitus patients. Third, this study predominantly focused on cognitive illness representations as

mediators of the relationship between optimism and depression. However, emotional representations may also play an important role within this mediation model and it would be interesting to further examine the specific effects of the different aspects of emotional representations such as depression, anxiety, and anger. Despite these limitations, the present study contributes to a better understanding of the interplay between generalized expectancies, illness-specific perceptions and psychological adjustment to a chronic medical condition. The findings suggest that positive illness representations play a mediating role in the health promoting effects of dispositional optimism. Specifically, beside a direct relationship, dispositional optimism is also indirectly related to better psychological health through positive illness representations.

Although this paper primarily focusses on providing empirical evidence for the theoretical assumptions of the cognitive pathway and the CSM, our results have also direct consequences for treatment research, since they provide hypotheses for the identification of response predictors and for the relevance of specific treatment elements. If confirmed by future longitudinal studies, the observed interplay between dispositional optimism and illness representations will have an important impact on the development of tailored interventions that take both the personality and the illness representations of tinnitus patients into account. In detail, the results regarding the association between illness representations and depression suggest that patients with chronic tinnitus may benefit from interventions that aim at modifying negative perceptions of and dysfunctional beliefs about tinnitus. As the experience and perception of severe consequences turned out to be particularly detrimental to psychological health, interventions should also focus on improving patients' abilities to deal with and accommodate to the tinnitus consequences. Modifying negative thinking and improving coping abilities are already included in existing effective psychological tinnitus interventions (Holmes & Padgham, 2009; Martinez-Devesa, Waddell, Perera, & Theodoulou, 2007). However, both illness representations and the use of appropriate coping strategies are

related to dispositional optimism. Thus, the level of optimism might modulate the effectiveness of psychological tinnitus interventions and it remains to be elucidated whether the level of optimism can be positively influenced either by specific interventions or by the way how physicians interact with tinnitus patients.

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Table 1: Means, standard deviations and intercorrelations of the study variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Optimism	-	-	-	-	-	-	-	-	-	-	-
2. Identity	-.19*	-	-	-	-	-	-	-	-	-	-
3. Chronic timeline	-.21*	.07	-	-	-	-	-	-	-	-	-
4. Consequences	-.40***	.46***	.09	-	-	-	-	-	-	-	-
5. Personal control ^f	-.14	-.11	.24*	.10	-	-	-	-	-	-	-
6. Treatment control ^f	-.22*	.04	.58***	.17	.41***	-	-	-	-	-	-
7. Coherence ^f	-.19*	.05	.13	.20*	.29**	.22*	-	-	-	-	-
8. Emotional representations	-.38***	.38***	.13	.60***	.02	.16	.31**	-	-	-	-
9. Internal causes	-.30**	.31**	-.11	.45***	-.24*	-.06	-.07	.43***	-	-	-
10. External causes	-.03	.08	-.05	.28**	-.18*	.03	.05	.14	.28**	-	-
11. Depression	-.62***	.41***	.23*	.61***	.23*	.28**	.30**	.53***	.35***	.03	-
<i>M</i>	3.50	3.36	4.54	2.81	3.34	3.79	3.59	3.39	2.92	2.53	0.95
<i>SD</i>	0.69	2.46	0.52	0.97	0.69	0.84	0.97	1.12	0.98	0.91	0.65

Note. ^f These scales were coded so that higher scores reflect more negative illness representations.

*** $p < .001$, ** $p < .01$, * $p < .05$.

Table 2: Results of the simple mediation analyses

Mediator	Bootstrap analyses (5000 bootstrap samples)						
	IV – M	M – DV (direct effect)	IV – DV (total effect)	IV – DV (direct effect)	Indirect effect ^a	BCa 95% CI Lower	BCa 95% CI Upper
Identity	-.18	.34***	-.59***	-.53***	-.06	-.1640	.0202
Chronic timeline	-.18	.09	-.58***	-.57***	-.02	-.0599	.0042
Consequences	-.38***	.43***	-.59***	-.43***	-.16	-.2792	-.0792
Treatment control ^f	-.23*	.14	-.58***	-.55***	-.03	-.0957	-.0007
Coherence ^f	-.19*	.20*	-.59***	-.55***	-.04	-.1143	-.0017
Emotional representations	-.40***	.38***	-.59***	-.44***	-.15	-.2590	-.0731
Internal causes	-.33**	.19*	-.59***	-.53***	-.06	-.1420	-.0163

Note. Simple mediation analyses were calculated with optimism as independent variable (IV), the respective illness representation dimension as mediator (M), and depression as dependent variable (DV) while controlling for age, gender and received tinnitus treatment.

^f These scales were coded so that higher scores reflect more negative illness representations; ^a Indirect effects are significant at $p < .05$ (two tailed) when zero is not included in the 95% confidence interval; BCa=bias corrected and accelerated; CI=confidence interval.

*** $p < .001$, ** $p < .01$, * $p < .05$.

Table 3: Results of the multiple mediation analysis

Mediator	Bootstrap analyses (5000 bootstrap samples)		
	Indirect effect ^a	Lower BCa 95% CI	Upper BCa 95% CI
Identity	-.04	-.1227	.0077
Chronic timeline	-.01	-.0449	.0095
Consequences	-.11	-.2091	-.0377
Treatment control ^f	-.01	-.0490	.0181
Coherence ^f	-.01	-.0636	.0048
Emotional representations	-.05	-.1410	.0198
Internal causes	.00	-.0549	.0481
All mediators	-.22	-.3638	-.0965

Note. The multiple mediation analysis was calculated with optimism as independent variable, the illness representation dimensions as mediators, and depression as dependent variable while controlling for age, gender and received tinnitus treatment.

^f These scales were coded so that higher scores reflect more negative illness representations; ^a Indirect effects are significant at $p < .05$ (two tailed) when zero is not included in the 95% confidence interval; BCa=bias corrected and accelerated; CI=confidence interval.

The total effect of optimism on depression was $-.58, p < .001$; the direct effect of optimism on depression was $-.35, p < .001$.

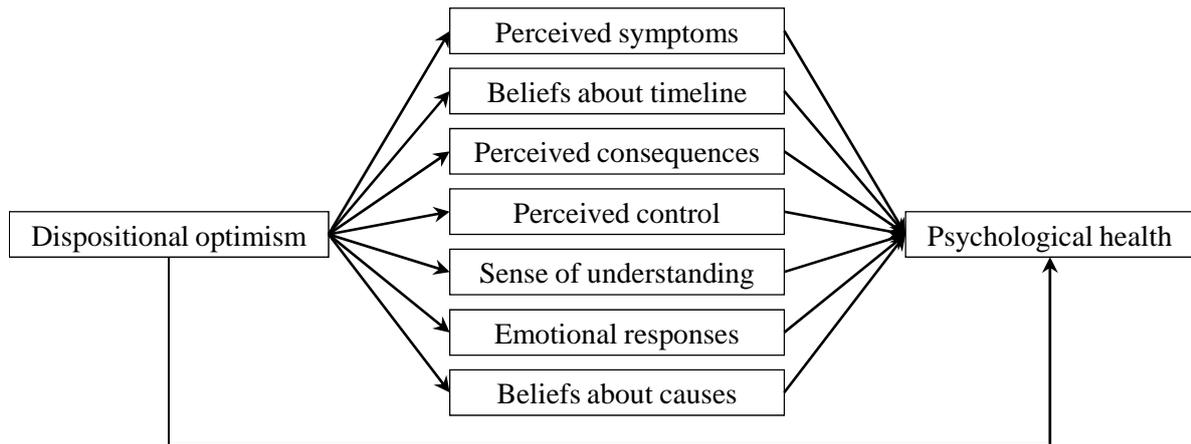


Figure 1: Theoretical model in which illness representations partially mediate the relationship between dispositional optimism and psychological health.