The relationship between illness perceptions and quality of life in colorectal cancer patients

Word count: 5972

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Thesis Submitted for the Degree of B.Sc.

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January, 2017

Abstract

Introduction: This study examines the relationship between illness perceptions and quality of life in colorectal cancer patients and gender differences in illness perceptions and the relationship to quality of life.

Methods: The data collection was done using the Patient Reported Outcomes Following Initial Treatment and Long-Term Evaluation of Survivorship registry (PROFILES). The study population consists of Dutch colorectal cancer survivors/patients. The data of 2625 patients were used in this study. Illness perception was measured using the Brief Illness Perception on Questionnaire (BIPQ).Quality of life in this study was assessed using the Dutch version of the cancer specific quality of life questionnaire the European organization for research and treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC-QLQ-C30).

Results: All items of the BIPQ were significantly associated with a worse quality of life. In general, women had worse illness perceptions compared to men. There were only significant gender differences for the belief of how long the illness will continue, the amount of concern about the illness and how much the patient beliefs that the illness will affect him/her emotionally. The relationship between illness perceptions and quality of life was significantly stronger for men than women in two items of the BIPQ, e.g. the belief of the helpfulness of the treatment and the understanding of the disease. One item of the BIPQ was more strongly related to quality of life for women, e.g. the belief of the feeling of amount of control over the disease.

Conclusion: Findings of this study can be used to develop more tailored clinical interventions concerning the illness perceptions and quality of life of colorectal cancer patients.

Key words: illness perceptions, quality of life, colorectal cancer, BIPQ, EORTC-QLQ-C30, gender differences

Introduction

Colorectal cancer, which is a cancer that starts in the colon or rectum, is the second most common cancer in the Netherlands (Kankerinbeeld, 2016). Every individual has a risk of almost 5% to develop colorectal cancer during their lifetime (Siegel, Miller & Jemal, 2016). There is a small gender difference in colorectal cancer prevalence: the percentage for men is 4,9% and for women 4,4% (Siegel, Miller & Jemal, 2016). Colorectal cancer death rates have been decreasing since 2003, due to improving treatment and earlier detection (Jemalm Ward & Thun, 2010).

Cancer is a devastating disease, which can have a huge impact on a patient's life. Due to both the increasing prevalence of cancer and improved survival rates, more and more patients are living with the (long-term) effects of cancer and its treatment. Therefore, it is important to keep taking care of the patient after treatment has finished. First, to try to prevent the recurrence of cancer, and second to minimize the negative effect of the disease on the patient's life.

The focus of today's treatment of cancer is not only on the quantitative aspect, e.g. living longer, but it is also shifting towards quality of life. Quality of life can be considered as the general wellbeing of an individual. It includes multiple dimensions, but according to Nussbaum & Sen (1993) it should at least contain physical, emotional and social functioning. In general, the quality of life of a patient population is less than the general population (Arndt, Merx, Stegmaier, et al., 2004). A possible determinant of quality of life in a cancer patient is illness perception. Illness perception, the focus of this study, can be understood as the way patients perceive and respond to their illness. It can also be described as beliefs patients construct about the characteristics of their illness (Leventhal et al., 1984). These beliefs can be divided into eight dimensions, namely: 1) consequences, expected and actual consequences of the illness on the life of the patient, 2) timeline, duration of the illness, 3) personal control, the amount of control that the patients feels that he/she has over the illness, 4) treatment control, the helpfulness of the treatment in controlling or curing the illness, 5) identity, the experienced complaints or symptoms attributed to the illness, 6) illness concern, worries about the illness, 7) coherence, the amount of understanding of the illness by the patient, and 8) emotional representation, how much the patient is emotionally affected by the illness (Broadbent, Ellis, Thomas, et al., 2009).

Several studies have examined the relationship between illness perceptions and quality of life (QoL) in several diseases. For example, in one study of coronary artery disease (CAD) patients illness perceptions explained a significant amount of variance in quality of life (including global health status), whilst controlling for the severity and the history of the disease (Aalto, Aro, et al., 2009). Another study showed that illness perception was one of the determinants of quality of life in differentiated epithelial cell thyroid cancer patients (Hirsch, Ginat, Levy, 2009). Illness perceptions were also associated with QoL in a sample of head and neck cancer patients (Scharloo, Baatenburg de Jong & Langeveld, et al., 2005). The authors of this article concluded from their findings, that improving illness perceptions may help patients to cope better. Indeed, a study (Broadbent, Ellis, Thomas, et al., 2009) among patients who experienced a myocardial infarction showed, that improving illness perceptions led to better health-related outcomes such as more reported exercise and less general complaints. To my knowledge, no previous study has examined the relationship between quality of life and illness perceptions in colorectal cancer patients.

There are some studies that have focused on gender differences in the relationship between illness perceptions and quality of life. However, the results regarding the gender differences are inconsistent. For example, a study on illness perceptions in cardiovascular disease patient’s found that women had a significantly greater illness perception, (, i.e., they reported more symptoms and complaints (Steca, Greco & D'Addario, 2012)). However, the study by Aalto, Aro, et al., (2006) found no gender-related differences in illness perception, nor did they find any gender-associated differences for the relationship between illness perception and quality of life. A meta-analysis of CAD patients of 18 years and older showed inconsistent findings for gender differences in illness perception (Al-Smadi, Ashour et al., 2016). These studies clearly show that there are mixed findings on gender differences in illness perception among different diseases. To my knowledge, no previous study has examined gender differences in illness perceptions in colorectal cancer patients.

Examining the relationship between illness perception and QoL could help to identify potential targets for interventions aimed at improving quality of life. Also, focusing on gender differences may help to explain which patient (i.e., gender) is more vulnerable for having a worse illness perception and a worse quality of life, or both. However, findings on the relationship between illness perceptions and QoL in cancer are scarce. Furthermore, most studies are relatively small, not population-based, and only focus on the short-term effects of cancer on psychological outcomes. Therefore, the aim of this study is to generalize the findings of other studies that focus on the relationship between illness perceptions and quality of life, to this specific patient population: Dutch colorectal cancer survivors/patients two to eleven years after diagnosis. We expect that a worse illness perception is related to a worse quality of life. This study also examines 1) gender differences in illness perception and 2) the influence of gender on the relationship between illness perceptions and quality of life. Building on previous research, we expect no significant gender differences in illness perceptions. We hypothesize that there is a stronger relationship between quality of life and illness perceptions in women compared to men.

Method

Study population

This study population consists of Dutch colorectal cancer survivors/patients diagnosed between 2000 and 2009 in the southern region of the Netherlands, as registered within the Eindhoven Cancer Registry (ECR) of the Comprehensive Cancer Centre Netherlands (Winkels, van Lee, Beijer, et al., 2016). In the area in which the data were collected, there are 18 hospitals and 2.3 million inhabitants. There were two exclusion criteria: having cognitive impairment or an unknown address. All patients that filled in the survey signed an informed consent.

Data collection

There were three moments of data collection. In December 2010, the first data (the data used in this study) were collected, in December 2011 the second and in December 2012 the third. All colorectal cancer survivors received a letter of one of the specialists they were attending or had attended. Patients received a username and password, so patients who wanted to do the survey online could do this. A reminder to fill in the survey was sent after 2 months. The data collection itself was done using the Patient Reported Outcomes Following Initial Treatment and Long-Term Evaluation of Survivorship registry (PROFILES). The data collection and study population is described in detail in a different paper (Van de Poll-Franse, Horevoorts, Van Eenbergen, et al., 2011).

Socio-demographic and clinical data

Survivors' socio-demographic data (e.g., age, sex, marital status, and educational level) was collected using the questionnaire, while clinical information (i.e TNM stage, tumor differentiation grade, type of treatment (i.e., surgery, chemotherapy, and radiotherapy)) was available from the ECR. Comorbidity at the time of the study was assessed with the adapted Self-administered Comorbidity Questionnaire (Sangha, Stucki, Liang, et al., 2003).

Illness perception

In this study, illness perception was measured using the Brief Illness Perception on Questionnaire (BIPQ). It is a nine item instrument that measures the cognitive and emotional representation of the illness, in our study colorectal cancer. A Dutch-translation of the BIPQ adapted for use among cancer patients was used for our study. The BIPQ has 3 categories: 1) cognitive illness representations, 2) emotional representations and 3) illness comprehensibility. Cognitive illness representations has five scales and is assessed using the following questions: (i) How much does your illness affect your life? (*consequences*); (ii) How long do you think your illness will continue? (*timeline*); (iii) How much control do you feel you have over your illness? (*personal control*); (iv) How much do you think your treatment can help your illness? (*treatment control*); (v) How much do you experience symptoms from your illness? (*identity*). Emotional representation contains two scales and assessed using the following questions: (vi) How concerned are you about your illness? (*concern*) and (vii) How much does your illness affect you emotionally? (*emotional representation*). Illness comprehensibility contains one scale and is assessed using the following question: (viii) How well do you understand your illness?

(*coherence*). Every item is continuous and linear one a zero to a ten point scale. For answer scales personal control, treatment control, and coherence; a lower score means a worse illness perception, while for the remaining five answer scales a higher score means a worse illness perception.

Quality of life

In this study, quality of life was assessed using the Dutch version of the cancer specific quality of life questionnaire of the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC-QLQ-C30) (Aaronson, Ahmedzai & Bergman, et al., 1993). The EORTC-QLQ-C30 has fifteen scales: five function scales, one global health status (QoL), three symptom scales and six single items. This study only uses the scale that assesses global health status or quality of life. The items belonging to these scales are scored on a seven-point Likert-scale with one being very poor and seven being excellent. The score on the test is transformed into a score on a scale of 0 to 100. A higher score is interpreted as better quality of life. The questions that assesses global health status or quality of life are the following: (i) How would you rate your overall quality of life during the past week and (ii) How would you rate your overall health during the past week?.

Statistical analyses

First of all differences in socio-demographic and clinical characteristics between man and women were examined using chi-square analyses. To examine the relationship between illness perception and QoL, we conducted eight multiple regression analyses. Confounding variables were: SES, partner status, tumor stage, education level, comorbidity, time since diagnosis, and age. For the second research question, in which we examined gender differences in illness perception and QoL, we conducted nine separate ANCOVA's with gender as the independent variable and 1) illness perception and 2) QoL as the dependent variable. For illness perceptions, we conducted eight ANCOVA's, one for each question of the BIPQ. Confounding variables for which we controlled the analyses were: SES, partner status, tumor stage, education level, comorbidity, time since diagnosis, and age. For illness perceptions clinically relevant differences were based on Norman's rule of thumb, whereby a difference of more than 0.5 SD indicates a clinically relevant difference (Norman, Sloan, Wyrwich, 2003). The guidelines by Cocks (Cocks, King, Velikova, et al., 2011) were used to determine whether the difference between men and women on QoL were clinically relevant. For the third research question, we used multiple regression analyses. Gender was added as an interaction with illness perception to examine whether or not the relationship between illness perceptions and quality of life was different between men and woman. A *p* value <0.05 was regarded as statistically significant an all analyses were performed using SPSS 22 (IBM SPSS Statistics for Windows, Version 22.0 Armonk, NY: IBM corps USA).

Results

Socio-demographic and clinical characteristics

For this study 3585 colorectal patients were selected. Of these 3585 participants, 2625 (73.3%) responded, 619 (17.3%) didn't respond and 341 (9.5%) participants had an address that was unidentifiable. So in sum, the study contained 1910 male participants (53.3%) and 1675 female participants (46.7%) and that is the data we will use. Most respondents had a medium (1442) or high (1191) social economic status. Most respondents were between 55 and 75 years old.

Sociodemographic and clinical characteristics of cancer survivors stratified by gender are presented in Table 1.

Relationship between illness perceptions and quality of life

The scores on the BIPQ show that in general, participants score less than half of the maximum score of 10 on items 1, 2, 4, 5 and 8. Higher scores on these items indicate that the patient is more affected by the disease, thinks it will last longer, that the patient experiences more symptoms, is more concerned about the illness, and feels that the illness affects their emotions more, respectively. Also participants had a mean score of more than 8 on items 3, 4 and 7 (Table 2). Higher scores on items 3, 4 and 7 indicate that patients feel they have more control over their disease, have more trust in the helpfulness of the treatment and feel that they have a better understanding of the disease, respectively. Patients felt that they had a relatively high control over their disease, a lot of trust in the helpfulness of the treatment and a good understanding of the disease.

All BIPQ items were significantly related to quality of life. Thinking that the disease would last longer (ß=-.26, $p<0.001$) and affect their life (ß=-.43, $p<0.001$) and emotions more (ß=-.36, $p<0.001$) was significantly related to a lower quality of life. Also, experiencing more symptoms (ß=-.40, $p<0.001$) and being more concerned about the illness (ß=-.33, $p<0.001$) was associated with a lower of quality of life. However, feeling more in control of the disease (ß=1.29, $p<0.001$) having a better understanding of the illness (ß=.11, $p<0.001$) and thinking treatment would be helpful (ß=.17, $p<0.001$) was associated with a higher quality of life. Using

Norman's rule of thumb (Norman, Sloan & Wyrwich, 2003), none of the significant effects are clinically relevant, e.g. none of the differences are greater than half a standard deviation.

Gender differences in illness perception

Scores on illness perception for men vs. women are presented in Table 2. Men reported worse illness perceptions for the items 2 and 7. For the rest of the items women reported worse illness perceptions. There were no significant differences between men vs. women on the belief of how the disease will affect the patient's life (3.9 vs. 4, p=0,97), belief on the amount of control of the disease (8.3 vs. 8.3, p=0,77), belief of the helpfulness of the treatment (8.4 vs 8.4, p=0.76) and belief of the amount of understanding of the disease (8.4 vs. 8.4, p=0.40). The amount of experienced symptoms also showed no gender difference (3.3 vs. 3.6, p=0.08). However, there were significant gender differences for the other three items. Specifically, women reported having more concern about their illness (3.8 vs 4.3, p<0.001), and how believing that their illness will affect them more emotionally (3.2 vs. 3.7, p<0.001) compared to men. However, men did have a higher score on *timeline*, compared to women (4.8 vs. 4.6, p<0.001), indicating that they felt that their illness would continue for a longer period of time. Using the guidelines by Cocks, none of the differences between men and women were clinically relevant (Cocks, King, Velikova, et al., 2011).

Gender differences in the relationship between illness perceptions and quality of life

In our final analyses, we examined gender differences in the relationship between illness perceptions and quality of life. Only three of the seven items of the BIPQ showed a significant difference for gender in the relationship between illness perceptions and quality of life. The significant differences we found were for the feeling of amount of control over the disease (ß=0.43, *p*<0.001), belief of the helpfulness of the treatment (ß=0.39, *p*<0.001) and belief of the amount of understanding of the disease (ß=0.40, *p*<0.001). The feeling of amount of control over the disease was more strongly related to quality of life for women (ß=1.41, *p*<0.001) compared to men (ß=1.20, *p*<0.001), while the belief of the helpfulness of the treatment was more strongly related to quality of life for men (ß=2.71, *p*<0.001) compared to women (ß=1.63, *p*<0.001). Finally, the understanding of the disease was also more strongly related to quality of life for men (ß=1.46, *p*<0.001) compared to women (ß=1.24, *p*<0.001).

Discussion

The first main finding of this study is that worse illness perceptions are related to a worse quality of life among colorectal cancer survivors 2-11 years after diagnosis. This is in line with research in different patient groups, such as coronary heart disease patients (Aalto, Aro, et al., 2009), differentiated epithelial cell thyroid cancer patients (Hirsch, Ginat, Levy, 2009) and head and neck cancer patients (Scharloo, Baatenburg de Jong & Langeveld, et al., 2005). Illness perceptions were previously found to be related to a worse HRQoL (Scharloo, Baatenburg de Jong & Langeveld, 2010) in head and neck cancer patients, poor adjustment to cancer in head and neck cancer patients Llewellyn, McGurk & Weinman, 2007), depression in patients undergoing cardiac surgery (Juergens, Seekatz & Moosdorf, et al., 2010), treatment adherence in patients with hypertension (Chen, Tsai, & Chou, 2011), and even the perceived benefits of surgery in patients undergoing cardiac surgery (Juergens, Seekatz & Moosdorf, et al., 2010). As more and more patients are surviving colorectal cancer, it seems very important to keep looking after the patient after treatment has finished, as the long-term psychological consequences of cancer are relatively unknown. Previous studies have found that reconstructing illness perceptions by providing tailored information may give the patients a better understanding of the disease (Hirsch, Ginat, Levy, 2009) and more will to get better (Scharloo, Baatenburg de Jong & Langeveld, et al., 2005). Worse illness perceptions could be changed by giving tailored information, which in turn could lead to a greater sense of control over the disease by the patient (Kaptein, Yamaoka & Snoei, 2011). More research into this area is needed to fully understand the effects of illness perceptions on a patient. Future research should also examine whether illness perceptions are not only related to QoL, but to recurrence of cancer and survival as well. The results of this study show that up to 11 years after diagnosis, illness perceptions have a significant effect on quality of life. Therefore, it seems crucial to improve patients' illness perceptions in order to improve quality of life. According to Husson et al., (2015) providing appropriate information which is tailored to the needs of the patients, may help them to get a better illness perception that could positively influence their (long-term) adjustment to cancer. Maladaptive illness perceptions could also be changed by providing information that is tailored to patients' needs, possibly in combination with individualized behavioral intervention**.** Using the same data set as this study Thong et al., (2016) found that maladaptive illness perceptions were associated with higher mortality. Previous research already found that negative illness perceptions can be used to predict long-term mortality in cardiac patients **(**Crawshaw, et al., 2015**).** Future research should examine further whether or not illness perception has an impact not only on HRQoL, but also on the outcome of the disease, in this case colorectal cancer.

The second hypothesis wasn't fully confirmed or disconfirmed. In line with the meta-analysis of the relationship between illness perceptions in CAD patients, we had mixed findings (Al-Smadi, Ashour et al., 2016). We found significant gender differences for only three of the seven items of the BIPQ. In contrast to the study by Steca, Greco & D'Addario (2012), that found that women had greater illness perceptions, we found that men have more concern about their illness and belief that their illness will affect them more emotionally in comparison to women. These findings can help to develop better tailored clinical interventions for problems related to illness perceptions, e.g. focus on those aspects of illness perceptions of women that are most vulnerable and strongly related to quality of life. Interventions tailored to men could for example focus more on elements of illness perceptions that have been found to be more affecting men in comparison to women. The same could be done by clinical interventions focusing on women. For example, when giving information to change illness perceptions, the information could be tailored to men or women (Husson et al., 2015).

The answers to both research question one and two show us that measuring illness perceptions using the total score of for example a test like the BIPQ can lead to different information than focusing on the different aspects of illness perceptions. It is possible, as this study shows, that some specific aspects of illness perceptions show significant differences over groups, which could disappear when only using a total score. Possibly, valuable information gets lost.

The findings of our third research questions disconfirms our hypothesis: the relationship between illness perceptions and quality of life is stronger for females patients compared to male patients. In contrast to the study by Aalto, Aro, et al., (2006) on the gender-related differences in the relationship between illness perceptions and quality of life, we did have some significant findings. However, only for three of the seven items of the BIPQ, a significant effect of gender was visible on the relationship between illness perceptions and quality of life. Two of these three significant findings showed that the relationship was stronger for men compared to women. This study shows that if there are gender differences in the relationship between illness perceptions and quality of life, it’s probably that the relationship is stronger for males than for females or that it depends on the type of illness perceptions if men or women have a stronger relationship between illness perceptions and quality of life. These findings also show that information should be tailored to the specific patient. Future research could examine if there are differences between men and women in the relationship between illness perceptions and cancer recurrence and survival.

This present study has some limitations that need to be acknowledged. First, it contains only patients from one specific area, which could make it more difficult to generalize the finding to other patients from the Netherlands. Second, this study uses cross-section data, therefor it is not possible to draw any causal conclusion on the direction of the relationship between illness perceptions and quality of life. It could also be that there is a third unexamined variable, which underlies and causes the relationship. This should be kept in mind when for example setting up clinical interventions that have as their goal to improve quality of life by improving illness perceptions. Another limitation of this study is that the some of the patient are still in treatment, this could have affected our data and findings unknowingly. Moreover, illness perceptions probably change during the course of the disease, which would be interesting to examine in a longitudinal study. Further research is needed to replicate the findings of our study.

This study also has some strengths. First of all, it is a longitudinal study, which is relatively rare. This makes it possible to examine relationships over a long period of time. Finding significant effects in longitudinal studies gives more probability to the fact that the effects of for example treatments will be visible over a longer period of time. Second, the study group is relatively big, we used data of 2625 patients. This adds to the probability of our findings, e.g. to the chance that the effects weren’t found by chance.

In conclusion, we found that worse illness perceptions are related to a worse quality of life. This could mean that improving a patient’s illness perception may lead to a better quality of life. There are only a few specific gender differences in illness perceptions, which means that it could be helpful for clinical interventions to focus on these specific illness perceptions in relation to gender. And last, the effect of gender on the relationship between illness perceptions and quality of life is mixed with men having a stronger relationship between illness perceptions and quality of life for two of the items of the BIPQ (the belief of the helpfulness of the treatment and the understanding of the disease) and women having a stronger relationship between quality of life for one of the items (the feeling of amount of control over the disease) of the BIPQ.

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Table 1. Socio-demographic and clinical characteristics

	Male count	Male Row N%	Female count	Female Row N%	Chi Square	Sig.
Colon cancer	1118	50,2%	1110	49,8%	22,70	<0,001
Rectal cancer	792	54,8%	565	41,6%	22,70	<0,001
Stage 1	577	56,2%	450	43,8%	15,30	0,004
Stage 2	677	56,2%	450	43,8%	15,30	0,004
Stage 3	508	52,4%	461	47,6%	15,30	0,004
Stage 4	104	63,8%	59	36,2%	15,30	0,004
Unknown	44	63,8%	45	50,6%	15,30	0,004
Time since diagnose until 5	811	57,0%	611	43,0%	13,35	<0,001
Time since	640	52,8%	572	47,2%	0,17	0,69

diagnose from 5						
No comorbid conditions	373	60,7%	241	39,3%	12,46	0,002
1 comorbid condition	396	55,9%	313	44,1%	12,46	0,002
2 or more comorbid conditions	587	52,0%	542	48,0%	12,46	0,002
SES low	369	46,1%	431	53,9%	22,18	<0,001
SES medium	789	46,1%	431	53,9%	22,18	<0,001
SES high	671	56,3%	520	43,7%	22,18	<0,001
Living in care institutions	31	51,7%	29	48,3%	22,18	<0,001
Married	1202	60,6%	782	39,4%	95,29	<0,001
Not married	230	37,2%	389	62,8%	78,11	<0,001
Paid Job	267	65,4%	141	34,6%	20,65	<0,001
No paid job	1156	53,2%	1015	46,8%	20,65	<0,001
Time until 60	677	56,4%	523	43,6%	7,14	0,01
Time 60-70	722	55,7%	574	44,3%	4,824	0,03
Time above 70	511	46,9%	578	53,1%	25,37	<0,001
Low education	237	45,6%	283	54,4%	70,64	<0,001
Medium	839	53,5%	729	46,5%	70,64	<0,001

education						
High education	359	70,7%	149	29,3%	70,64	<0,001
Well differentiated	148	51,2%	141	48,8%	70,64	<0,001
Tumor moderately differentiated	1196	54,7%	991	45,3%	19,61	<0,001
Tumor poorly differentiated	184	43,6%	238	56,4%	19,61	<0,001
Tumor differentiation unknown	382	55,6%	305	44,4%	19,61	<0,001
Surgery only	933	51,8%	868	48,2%	12,41	0,05
Surgery and radiotherapy	408	54,8%	337	45,2%	12,41	0,05
Surgery and chemotherapy	373	52,4%	339	47,6%	12,41	0,05
Surgery, radiotherapy and chemotherapy	163	58,8%	114	41,2%	12,41	0,05
Chemotherapy only	19	50,0%	3	50,0%	12,41	0,05

Radiotherapy and chemotherapy only	5	55,6%	4	44,4%	12,41	0,05

Table 2: the relationship between illness perceptions and quality of life

BIPQ	Beta BIPQ	Sig	Adjusted R square	CI Lower bound	CI Upper bound
How much does your illness affect your life?	-,43	<,001	0,26	-3,42	-2,91
How long do you think your illness will continue?	-,26	<,001	0,15	-1,60	-1,19
How much control do you feel you have over your illness?	,10	<,001	0,10	0,82	1,77
How much do you think your treatment can help your illness?	,17	<,001	0,12	1,73	2,71
How much do you experience symptoms from your illness?	-,40	<,001	0,24	-3,22	-2,69

How concerned are you about your illness?	-,33	<,001	0,19	-2,64	-2,12
How well do you feel you understand your illness?	,11	<,001	0,10	,85	1,81
How much does your illness affect you emotionally? (e.g. does it make you angry, scared, upset or depressed?	-,36	<,001	0,21	-2,90	-2,37

Table 3. Means of illness perceptions

	Mean	Std. Deviation
How much does your illness affect your life?	3,94	2,58
How long do you think your illness will continue?	4,69	3,50
How much control do you feel you have over your illness?	8,26	1,521
How much do you think your treatment can help your illness?	8,39	1,48
How much do you experience symptoms from your illness?	3,44	2,59
How concerned are you about your illness?	4,01	2,67
How well do you feel you understand your illness?	8,39	1,51
How much does your illness affect you emotionally? (e.g. does it make you angry, scared, upset or depressed?	3,44	2,56

Table 4: differences in illness perceptions between males and females

BIPQ	**Mean males**	**Mean females**	**SD males**	**SD females**	***P* value**
How much does your illness affect your life?	3,89	4,00	2,63	2,52	0,97
How long do you think your illness will continue?	4,78	4,57	3,55	3,43	0,001
How much control do you feel you have over your illness?	8,27	8,26	1,51	1,54	0,77
How much do you think your treatment can help your illness?	8,41	8,36	1,46	1,51	0,76
How much do you experience symptoms from your illness?	3,31	3,61	2,59	2,57	0,08

How concerned are you about your illness?	3,80	4,29	2,64	2,69	0,001
How well do you feel you understand your illness?	8,38	8,41	1,51	1,52	0,40
How much does your illness affect you emotionally? (e.g. does it make you angry, scared, upset or depressed?	3,24	3,69	2,50	2,62	0,001

Table 5: Gender differences in the relationship between quality of life and illness perceptions

	Male Beta	Sig.	Female Beta	Sig.
How much control do you feel you have over your illness?	1.41	<0,001	1.20	<0.001
How much do you think your treatment can help your illness?	2.71	<0,001	1.63	<0.001
How well do you feel you understand your illness?	1.46	<0,001	1.24	<0,001