Current Psychology (2021) 40:944–952
https://doi.org/10.1007/s12144-018-0008-3

Quality of life in cancer as a function of temperament, coping and posttraumatic stress disorder

Agnieszka Laskowska[1]

Published online: 4 October 2018
© The Author(s) 2018

Abstract
The research presented in this paper explores the relationship between three blocks of explaining variables, ie. temperamental traits, stress coping PTSD and the explained variable which is quality of life in a sample of patients diagnosed with cancer. One hundred and twenty nine participants aged 24–81 years, 69 females diagnosed with breast cancer and 60 males diagnosed with lung cancer completed Formal Characteristics of Behaviour – Temperament Inventory (FCB-TI), Coping Inventory for Stressful Situations (CISS), PTSD Inventory (PTSD-C) and Quality of life SF-36 questionnaire. Higher level of emotional reactivity was associated with lower emotional quality of life. Higher level of emotion oriented-coping and higher level of avoidant-distracted coping was associated with higher level of intrusion/arousal and avoidance/numbing, ie. dimensions of PTSD symptoms. There were no statistically significant associations between temperamental traits and stress coping strategies nor between PTSD symptoms level and quality of life. Emotion-oriented coping and avoidant-distracted coping are ineffective in dealing with stress in the situation of patients diagnosed with cancer, because it leads to higher level of PTSD symptoms. The significance of temperamental traits for quality of life in the situation of the patients is marginal. Control of specific factors concerned with current health and treatment status is needed the future research.

Keywords Malignant neoplasm · Cancer · Quality of life · Temperamental traits · Stress coping styles · PTSD

Introduction

Cancer is still one of the leading cause of mortality, but advances in medicine made it possible to treat it or to prolong life of people diagnosed with this disease (Heymach et al. 2018). For many people it is a chronic disease treated for many years and as such it leads to new issues such as stress related to one's health condition and possible failure in treatment, necessity for adjustment to illness, emotional and cognitive, psychological effects of disease and treatment and changes in family system and social environment of chronically ill people (Ahmad et al. 2017; Rzeszutek et al. 2015a, b).

The research presented in this paper explores relationship between quality of life of people diagnosed with cancer and psychological factors such as temperamental traits, stress coping and PTSD symptoms. The acquired results are than compared to the results from the sample of patients after myocardial infarction.

Cancer is potentially a life-threatening illness. In consequence, receiving the diagnosis of cancer is a very stressful event (Sellick and Edwardson 2007). Patients usually stereotypically think that prognosis is poor and even successful treatment does not prevent recurrence of the disease (Sheridan and Radmacher 1992). The experience may be considered as traumatic an event and afterwards may result in PTSD symptoms (Arnaboldi et al. 2014). PTSD symptoms were also found in the research considering other diseases (Moye and Rouse 2014; Rzeszutek et al. 2015a, b; Rzeszutek et al. 2016).

Treatment is usually long-term and painful and it leads to remission and not to complete recovery. Side-effects are difficult to bear. Mutilation and/or is disablement is possible. There are cases in which separation with family is inevitable. Life opportunities are limited for shorter or longer period of time. There is also risk of stigmatisation (Lehto 2017). Many patients report chronic distress or delayed distress especially during the first 12 month following diagnosis (Gil et al. 2012; Myers et al. 2013; Zebrack et al. 2014). Quality of life is lower than in the general population (Derogatis et al. 1983). Prevalence of psychiatric disorders is higher (Gopalan 2013).

✉ Agnieszka Laskowska
alaskowska@psych.uw.edu.pl

[1] Wydział Psychologii Uniwersytet Warszawski, Ul. Stawki 5/7, 00-183 Warszawa, Poland

Perceived life threat was found to be a factor that induced both PTSD symptoms and increased distress. It was more strongly related to psychological distress than actual cancer stage (Laubmeier and Zakowski 2004). However there is also possibility for post-traumatic growth (PTG) and cancer-specific stress was found to be positively related with PTG (Groarke et al. 2017; Occhipinti et al. 2015).

Better quality of life and lack of posttraumatic symptoms reflect adaptation to the new situation of living with demands and restrictions resulting from one's health condition and treatment and as evidence of adaptive psychological dealing with the reduction of one's abilities and sense of safety.

Based on the definition of World Health Organization (1995) quality of life includes one's evaluation of physical health, emotional state, independence and relations with social environment. Chronic disease changes the way of functioning in all these areas and the ability to adjust to the new situation may depend on many factors. Temperamental traits and stress coping strategies may be some of them.

Regulative Theory of Temperament (RTT) of Strelau (1996) concentrates on formal aspects of behaviour comprising energetic and temporal characteristics composed of such traits as: sensory sensitivity, emotional reactivity, endurance and activity (energetic aspect), briskness and perseveration (temporal combustion). Sensory sensitivity characterises one's capableness to observe weak sensory stimuli. Emotional reactivity is a tendency to respond with intensity to stimuli which induces emotions. Endurance is an ability to withstand in long-lasting or exhausting conditions. Activity is an inclination to engage in behaviours taking place in intensely stimulating conditions. Briskness is an ability for quick reacting and shifting from one behaviour to another. Perseverance is a tendency to repeat emotional states in reaction to stimuli even if the stimuli is no longer present. Functional significance of temperamental characteristics as postulated by the RTT was subject of numerous research projects. In many studies, conducted among others on victims of disasters and catastrophes it came out that such traits as emotional reactivity, perseveration and activity are significant moderators of psychological consequences (e.g. PTSD) of experienced trauma (Strelau 2008). Research also suggest that low emotional reactivity may act a specific protector against cancer trauma symptoms in adults (Oniszczenko and Laskowska 2014).

Temperamental traits may act as moderators of life events' impact increasing or decreasing their stimulating value (Strelau 2006). They may also affect coping strategies applied to stressful situation.

Patients diagnosed with cancer are to deal with various sources of stress, the illness itself, lack of control over the illness, feel of guilt (especially if they have smoked cigarettes), depression, mood swings, fear of dying, sleep disorders, undergoing surgery, uncertain prognosis, side-effects of chemotherapy, changes in personal, family and professional life.

The way of coping with stress affects quality of life more than the stress itself (Ogińska-Bulik and Juczyński 2010). People differ in their coping strategies applying more task-oriented, emotion-oriented or avoidant approach (Endler and Parker 1990). Coping styles that may be considered ineffective in usual functioning may be beneficial in specific conditions.

Patients diagnosed with cancer feel better when they seek social support (Karademas et al. 2007; Deb and Deka 2015; Haugland et al. 2016). Approach coping was found to be positively related to positive health behaviour changes and avoidant coping to negative behaviour changes (Park et al. 2008). On the other hand it was also found that avoidant repressive coping may actually be beneficial in terms of immunity to acute stress disorder in oncological patients (Pedersen and Zachariae 2010), but this area needs more research.

Current Study

This paper combines four different components of dealing with cancer such as the trauma of being diagnosed with life threatening-illness and being subject to aggressive treatment inducing intensive side-effects. The components are: temperament, coping styles, PTSD symptoms and quality of life. These are assumed to be four subsequent stages in a model of psychological processes. According to this model temperamental traits affect stress coping which can differ in terms of effectiveness considering patients situation. Adaptability of stress coping can result in PTSD symptoms or with adequate dealing with the trauma. Quality of life changes accordingly to one's ability to dealing with the new situation. The consecutive stages of the process are: temperamental traits – stress coping – PTSD symptoms – quality of life (see Fig. 1). There are three blocks of explaining variables, ie. temperamental traits – stress coping – PTSD symptoms and quality of life, which is the explained variable. Stress coping and PTSD symptoms were also assumed to be partial mediators of the relationship between temperamental traits and quality of life.

Temperamental traits that can affect coping and all subsequent stages of the process directly or indirectly are subject only to slow changes in time. In the extent in which they determine coping they limit flexibility of dealing with stress in the process of struggling with illness.

The same approach was applied to results acquired from the sample of patients after myocardial infarction (Laskowska 2018).

There were four hypotheses formulated:

H1. There is direct relationship between temperamental traits and stress coping.
H2. There is relationship between temperamental traits and PTSD symptoms, which is partially mediated by stress coping.

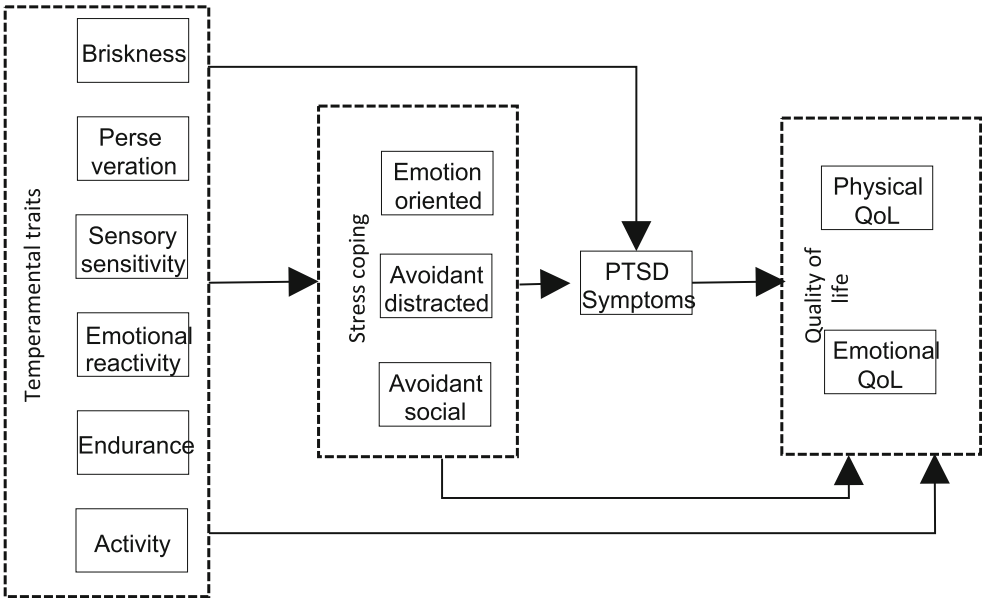

Fig. 1 Assumed model considering relationships between temperamental traits, stress coping styles, PTSD symptoms and quality of life

H3. There is relationship between temperamental traits and quality of life, which is partially mediated by stress coping and PTSD symptoms.
H4. There is relationship between stress coping and quality of life, which is partially mediated by the level of PTSD symptoms.

Methods

Participants

One hundred and twenty nine participants who were diagnosed with cancer were recruited for the study, 69 females diagnosed with breast cancer and 60 males diagnosed with lung cancer aged 24–81 years (M = 51.77; SD = 11.73). These two types of diagnosis were chosen because according to National Cancer Registry in Poland breast cancer is the most frequent malignancy in the population of women, while lung cancer is the most frequent malignancy in the population of men. Patients in terminal stage under palliative were not included in the sample. Participation took place when they were hospitalized. It was voluntary and anonymous and participants were not remunerated. The research project was accepted by the local Research Ethics Committee at the Faculty of Psychology, University of Warsaw.

Ninety five participants (73.6%) had children. Table 1 presents the frequency distribution for place of residence, educational level, marital status and duration of illness. The most frequent place of residence was city with number of inhabitants from 1.000 to 100 thousands. The most frequent level of education was secondary. Most participants were married. In most cases illness lasted from one year to two years.

Assessment

Temperament traits were assessed with the Formal Characteristics of Behaviour – Temperament Inventory, FCB-TI (Strelau and Zawadzki 1995). This questionnaire measures six temperament traits: briskness, perseveration, sensory sensitivity, emotional reactivity, endurance and

Table 1 Frequency distribution – place of residence, educational level and marital status and duration of illness

Place of residence	*n*	%
City with number of inhabitants over 100 thous.	48	37.2
City with number of inhabitants from 1.000 to 100 thous.	67	51.9
Small town with number of inhabitants less than 1.000	12	9.3
Missing data	2	1.6
Level of education	*n*	%
Higher completed	34	26.4
Higher professional	15	11.6
Post-secondary	16	12.4
Secondary	49	38.0
Occupational	14	10.9
Missing data	1	0.8
Marital status	*n*	%
Married	95	73.6
Informal relationship	15	11.6
Single	19	14.7
Duration of illness	*n*	%
Less than one year	61	47.3
1–2 years	41	31.8
Longer than 2 years	22	17.1
Missing data	5	3.9

n, number of participants; %, percentage of the sample

activity. It has 120 items, 20 items per scale (each scale can yield a total score of 0 to 20). Respondents respond Yes or No to each item. The FCB-TI has good psychometric parameters. Cronbach α vary from .72 to .86 depending on the scale.

Coping styles were assessed with the Polish version (Strelau et al. 2005) of the Coping Inventory for Stressful Situations originally constructed by Endler and Parker (1990). The inventory has 48 diagnostic items and measures three types of coping: emotion-oriented, task oriented, and avoidant. The avoidant style has two dimensions: distraction and social diversion. Cronbach α for the Polish version range from .71 to.92.

Intensity of PTSD symptoms was measured with PTSD Inventory (PTSD-C) constructed by Strelau et al. (2002). The questionnaire allows for quantitative estimation of PTSD symptoms on two main dimensions, intrusion/hyperarousal (I/H) (recurrent thoughts relating to the traumatic event and causing arousal) and avoidance/numbing (A/N) (avoidance of trauma-related stimuli and weakened response to these stimuli. It has also general scale of PTSD symptoms. The PTSD-C has 30 items. Each item is rated on a 4-point scale from 1 (symptom is absent) to 4 (symptom is always present). The inventory has good reliability. Cronbach alfa for general scale and two subscales in the range from .90 to .97. The instruction provided in the current study referred to the experience of illness as traumatic event.

Quality of life was measured with the use of Polish version of SF-36 questionnaire (Tylka and Piotrowicz 2009). The inventory contains 36 questions about health and reactions to disease. Two main dimensions of quality of life are measured. Physical quality of life refers to physical sphere, from physical activity to pain and its negative consequences for daily activity. Emotional quality of life covers social activity, emotional consequences of restrictions resulting from health condition, level of energy and tiredness. SF-36 questionnaire provides also general quality of life index. Answers in the inventory are scored on a 0–5 points scale. In the polish version higher scores mean lower quality of life while lower scores mean higher quality of life. The inventory has good reliability with Cronbach alfa in the range from .75 to .95.

Statistical Methods

The main analysis had to stages. Firstly, relationships between subsequent psychological concepts included in the assumed model were tested with the use of regression analysis beginning from the quality of life and moving backwards to temperamental traits. The acquired regression coefficients allowed to build a model which was then tested with the means of path analysis. The entry model contained paths that were statistically significant according to the results of the preceding regression analysis.

Testing up to 6 predictors in one regression model and assuming statistical power of .80, significance level at .05 and medium effect size, which is f^2 of at least .15 the sample size has to be at least 98 participants, so having 129 participants in the current study was adequate in terms of sample size.

In order to conduct statistical analysis, IBM SPSS 24 and IBM AMOS 24 statistical package was used (SPSS Inc., 2016). The statistical power analysis was performed with the use of G*Power 3.1.9.2.

Results

Descriptive Data

Table 2 provides descriptive statistics on all interval scales. It also provides reliability coefficients based on the results acquired in the current study.

Quality of Life According to Sex, Size of Place of Residence, Education Level and Duration of Illness

Physical quality of life was higher in the group of men (M = 61.03; SD = 91.71) than in the group of women (M = 55.20; SD = 12.28). The difference was statistically significant according to Mann-Whitney U test, U = 1528.00, $p < .05$. Men and women did not differ significantly in terms of emotional quality of life, U = 1675.50, $p > .05$.

Correlations between quality of life and size of place of residence, education level and duration of illness were analysed with the use of Spearman's rank correlation coefficient.

Physical quality of life correlated positively with duration of illness, $\rho(n = 127) = .385$, $p < .001$, and with size of place of residence, $\rho(n = 127) = .192$, $p < .05$. It did not correlate with educational level, $\rho(n = 127) = .173$, $p > .05$.

Emotional quality of life did not correlate with size of place of residence, $\rho(n = 96) = -.016$, $p > .05$, with educational level, $\rho(n = 128) = -.057$, $p > .05$, nor with duration of illness, $\rho(n = 124) = .097$, $p > .05$.

Regression Models

Associations between subsequent stages of the model firstly were analysed with the use of regression analysis. PTSD symptoms were analysed as predictors of physical and emotional quality of life. Stress coping styles were analysed as predictors of intrusion and avoidance PTSD symptoms. Temperamental traits were analysed as predictors of coping styles. For the sake of nonnormality of univariate distributions bootstrapping was used with 1.000 of bootstrap samples. Table 3 presents acquired estimates of regression coefficients along with the 95% confidence intervals.

Physical quality of life and emotional quality of life were not related to level of PTSD symptoms, neither avoidance/numbing

Table 2 Descriptive statistics for interval scales

Questionnaires	Variables	*M*	*SD*	*min*	*max*	α
FCB-TI	Briskness	10.92	2.44	7	19	.82
	Perseveration	10.78	2.48	2	18	.72
	Sensory sensitivity	10.16	2.65	4	19	.73
	Emotional reactivity	10.72	3.05	0	24	.75
	Endurance	9.30	2.63	1	17	.71
	Activity	10.45	2.89	1	16	.72
CISS	Task-oriented coping	48.52	6.00	37	73	.70
	Emotion-oriented coping	48.47	6.34	30	64	.70
	Avoidant coping	48.85	5.99	32	64	.71
	Avoidant-distracted coping	24.32	3.64	15	32	.73
	Avoidant-social coping	15.49	2.50	10	23	.71
PTSD-C	Intrusion/arousal	35.98	5.17	17	47	.75
	Avoidance/numbing	36.16	4.63	25	45	.80
	PTSD-C Total score	72.15	9.29	42	89	.70
SF-36	Physical Qol	57.91	11.27	23	85	.75
	Emotional Qol	30.35	5.87	10	48	.80
	Quality of life index	88.26	15.59	33	126	.77

M, mean; *SD*, standard deviation; *min*, minimum; *max*, maximum; α, Cronbach's α reliability coefficient

nor intrusion/arousal, so in the next regression analysis coping styles were analysed as predictors of quality of life.

Emotion-oriented coping was associated with lower physical quality of life. Avoidant-social coping was associated with higher emotional quality of life.

Avoidant-distracted coping and emotion-oriented coping were positively related to avoidance/numbing while the association between avoidance/numbing and avoidant-social coping was negative.

Both higher emotion-oriented coping and higher avoidant-distracted coping were associated with higher level of PTSD symptoms, intrusion/arousal and avoidance/numbing.

Surprisingly there were no statistically significant association between emotion-oriented coping, avoidant-distracted coping and avoidant-social coping and temperamental traits. Temperamental traits where then analysed as predictors of physical and emotional quality of life. Higher emotional reactivity was associated with poorer emotional quality of life.

Path Analysis

Statistically significant predictors were included in the second stage of statistical analysis. The final model was tested with the use of path analysis which was also based on 1.000 of bootstrap samples. The results are presented in Fig. 2.

Paths between emotion-oriented coping and physical QoL and between avoidant-social coping and emotional QoL statistically significant in previous analysis were not statistically significant in the model that contained PTSD symptoms and emotional reactivity. They were removed from the model.

The final model fit was satisfactory, $\chi^2(18, N = 129) = 22.43$, $p > .05$, $CFI = .99$, $TLI = .98$, $RMSEA = .04$, [90% $CI = .01, .10$].

Higher level of emotional reactivity was associated with poorer emotional quality of life. Emotion-oriented coping correlated positively with avoidant-distracted coping and avoidant-social coping. Avoidant-distracted coping and avoidant-social coping also correlated positively. Emotion-oriented coping and avoidant-distracted coping both were positively related to PTSD symptoms, intrusion/arousal as well as avoidance/numbing. Emotion-oriented coping and avoidant-distracted coping explained 31.0% of intrusion/arousal level variance and 30.0% of avoidance/numbing level variance. Association between emotional reactivity and emotional quality of life was weaker. Emotional reactivity explained only 2.6% of emotional quality of life variance.

Intrusion/arousal level correlated positively with avoidance/numbing. Physical quality of life correlated with emotional quality of life.

There was no statistically significant relationship between emotional reactivity and PTSD symptoms. Stress coping was not significantly related to physical nor emotional quality of life. There were no association between PTSD symptoms and physical nor emotional quality of life.

Discussion

The analysis showed that there were hardly any associations between temperamental traits and psychological functioning in the sample of patients diagnosed with cancer. Specifically, there was no direct relationship between temperamental traits and stress coping, which means that hypothesis H1 was not confirmed.

Considering specific situation of patients diagnosed with cancer it seems that their coping may depend on their current situation and their perception of the course of the illness. Particular stressful events that are consequences of the disease such as aches after the operation, returning home after hospital stay, disturbances in close social relationships may explain

Table 3 Estimates from the regression models for subsequent stages

	Beta	SE	95% CI	*p* value
Physical Qol				
Intrusion/arousal	.13	.15	−.16, .44	.369
Avoidance/numbing	−.06	.15	−.32, .23	.695
Emotional Qol				
Intrusion/arousal	.14	.15	−.15, .45	.354
Avoidance/numbing	.02	.15	−.22, .31	.874
Physical Qol				
Task-oriented coping	−.17	.10	−.37, .07	.113
Emotion-oriented coping	.24	.12	.03, .47	.039
Avoidant-distracted coping	−.03	.11	−.24, .20	.755
Avoidant-social coping	−.09	.11	−.28, .12	.408
Emotional Qol				
Task-oriented coping	.05	.10	−.16, .28	.635
Emotion-oriented coping	.17	.12	−.04, .40	.147
Avoidant-distracted coping	−.01	.11	−.22, .25	.975
Avoidant-social coping	−.25	.11	−.46, −.06	.023
Intrusion/arousal				
Task-oriented coping	−.03	.09	−.20, .17	.781
Emotion-oriented coping	.35	.10	.15, .60	.001
Avoidant-distracted coping	.29	.09	.12, .47	.002
Avoidant-social coping	−.01	.09	−.19, .18	.974
Avoidance/numbing				
Task-oriented coping	.12	.09	−.06, .31	.190
Emotion-oriented coping	.34	.10	.16, .54	.001
Avoidant-distracted coping	.21	.09	.05, .39	.025
Avoidant-social coping	−.01	.09	−.19, .23	.943
Emotion-oriented coping				
Briskness	−.02	.09	−.24, .17	.853
Perseveration	.14	.09	−.07, .32	.150
Sensory sensitivity	.07	.09	−.11, .27	.429
Emotional reactivity	.11	.10	−.08, .32	.253
Endurance	.02	.09	−.16, .25	.800
Activity	.11	.09	−.10, .29	.250
Avoidant-distracted coping				
Briskness	−.14	.09	−.32, .07	.156
Perseveration	.10	.09	−.08, .31	.263
Sensory sensitivity	−.10	.09	−.30, .08	.286
Emotional reactivity	−.11	.10	−.30, .09	.235
Endurance	−.05	.09	−.26, .13	.572
Activity	.03	.09	−.15, .23	.719
Avoidant-social coping				
Briskness	.02	.10	−.19, .20	.864
Perseveration	.04	.09	−.17, .22	.701
Sensory sensitivity	.06	.09	−.13, .26	.554
Emotional reactivity	−.04	.10	−.23, .13	.690
Endurance	.16	.09	−.03, .34	.090
Activity	.12	.09	−.07, .31	.209
Physical Qol				
Briskness	.10	.10	−.09, .31	.283
Perseveration	.12	.09	−.08, .31	.195
Sensory sensitivity	−.04	.09	−.22, .17	.707
Emotional reactivity	.08	.10	−.11, .29	.391
Endurance	−.03	.09	−.24, .16	.787
Activity	.04	.09	−.14, .24	.674
Emotional Qol				
Briskness	.13	.09	−.09, .31	.172
Perseveration	.16	.09	−.02, .36	.084
Sensory sensitivity	−.01	.09	−.19, .17	.904
Emotional reactivity	.19	.09	.03, .37	.049
Endurance	.01	.09	−.18, .22	.981
Activity	−.05	.09	−.22, .14	.611

Beta, standardized regression coefficient; *SE*, standard error; *95% CI*, bootstrap confidence interval

current levels of coping strategies (Wasteson et al. 2002). Other situational determinants of coping strategies levels worth considering are the duration of the disease, the incidence of complications during treatment, subjective evaluation of how to improve the health status and satisfaction with treatment or length of hospital stay (Bucholc et al. 2016). The number of possible factors and their importance for patients suffering from possible life-threatening disease leads to conclusion that role of temperamental traits may be eventually verified only in studies designed to control most of the factors.

There was also no relationship between temperamental traits and PTSD symptoms, so the hypothesis H2 was not confirmed, however the coping styles were related to level of PTSD symptoms. Both, emotion-oriented coping and avoidant-distracted coping were positively related to the intensity of PTSD symptoms. These two strategies were also pointed out as dysfunctional in other research results (Pérez et al. 2014; Richardson et al. 2016), however the role of emotion-oriented coping was also found to be positive in terms of reducing PTSD symptoms over time (Johnsen et al. 2002). It is possible that avoidance during prolonged stress instead of reducing its level increases intrusive thoughts. Emotion-oriented coping precludes acceptance of the difficult situation of oncological patients. Active coping response is difficult and therefore psychological distress leads to psychopathological symptoms. Emotion-oriented coping is associated with higher state of anxiety and increased tension and both are characteristic for traumatic disorders.

The stress of cancer is a complex phenomenon. Sumalla, Ochoa, Blanco (2008) in the study of people after oncological treatment draws attention to the multiplicity of stressful stimuli in this disease and difficulties in grasping the most traumatic factor. A similar hypothesis is put forward by Kangas, Henry, Bryant (2002), claiming that diagnosis and treatment of cancer is not a simple trauma in which a reliable causal relationship between different types of stressors and the symptoms of post-traumatic stress disorder can be established. Perhaps in the presented study, trauma symptoms were also associated with other variables, not controlled in the study, especially with those concerning the course of illness and the course of treatment.

Out of six different temperamental traits only emotional reactivity was related to emotional quality of life and even this relationship was not mediated by stress coping nor PTSD symptoms. It was direct relationship, so the acquired results did not confirm the hypothesis H3. Higher emotional reactivity was associated with lower emotional quality of life. Although emotional reactivity explain a small part of the variability of quality of life (which suggests that in the studied group of cancer patients other factors play a more important role in moderating the quality of life), however, it shows a tendency of people with high scores in the above-mentioned scale to more adverse reception of their own situation. Strelau

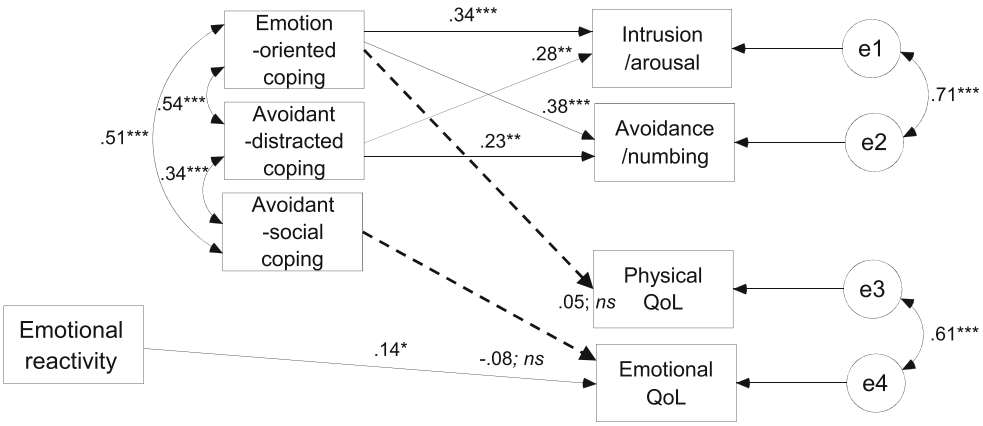

Fig. 2 The final model of associations between temperamental traits, stress coping styles, PTSD symptoms and quality of life with standardized regression coefficients

* $p<.05$; ** $p<.01$; *** $p<.001$; *ns* – not significant

in one of his works (Strelau 2006) puts the hypothesis that in the case of interaction between the requirements of the situation and the remedial possibilities of the individual, temperamental traits associated with the emotional sphere are conducive to experiencing emotions, especially negative ones. The process of dealing with stress shaping emotions, based on the constitutive personal features like emotional reactivity may lead to a decrease in the quality of life. Theoretically neuroticism can be connected with high emotional reactivity. The association have also been proved empirically (Zawadzki and Strelau 2010). The results from the current is therefore consistent with results from other investigators concerned with the role of neuroticism (Härtl et al. 2010; Aarstad et al. 2011; Beisland et al. 2013; Huang et al. 2017). According to Regulative Theory of Temperament people with higher emotional reactivity have reduced capacity threshold and prolonged stressful situations such as chronic disease, potentially life-threatening are especially difficult to bear for them.

The coping styles were related to level of PTSD symptoms but the PTSD symptoms were not related to quality of life, physical nor emotional, so the acquired results did not confirm the hypothesis H4. In order to interpret this result once again one has to be aware of importance of the patients' perception of their current health condition even when they are in the group of survivors (Watson et al. 2016; Jang et al. 2017). It is possible that when the treatment is perceived as effective and side-effects are minimal quality of life may be satisfactory despite the PTSD symptoms. This matter also needs further research design for controlling most health and treatment status related factors.

These findings are very different from results obtained in the sample of patients after myocardial infarction (Laskowska 2018). The result from that sample showed a complex model showing various relations between various psychological variables. The quality of life depended on many factors. Specifically, higher sensory sensitivity was associated with lower emotion-oriented coping which in turn lowered PTSD symptoms and improved physical and emotional quality of life. Higher level of briskness also lowered emotion-oriented coping and promoted avoidant-social coping which also lowered PTSD symptoms and in turn improved quality of life. The results from the current study did not confirm the role of temperamental traits for stress coping styles and did not confirm the role of PTSD symptoms for quality of life. Since both research projects were carried out with the use of exactly the same assessment inventories the differences between them should interpreted in terms of different psychological processes that occur among patients after myocardial infarction and among patients diagnosed with cancer.

The situation of patients diagnosed with cancer is specific, because they deal with long-term threat of life. It is a prolonged crisis and it is possible that it induces specific psychological processes. The situation is different from the plight of patients after myocardial infarction where fear of another attack is present initially, but its level decreases over time (Skrzynski 2006). Patients diagnosed deal with fear even if the treatment was successful and they are considered cancer survivors (Koch-Gallenkamp et al. 2016).

Clearly the results of the current study does not support the model of psychological processes in which subsequent stages are: temperament – coping styles – PTSD – quality of life although it was supported by the results obtained in the group of patients after myocardial infarction (Laskowska 2018). Coping strategies are important factor for PTSD symptoms level in both samples, but in contrary to the patients after myocardial infarction, in the sample of cancer diagnosed patients the role of temperamental traits was minimal and PTSD symptoms level did not affect quality of life.

The presented study has limitations. The most serious is lack of control of the factors concerned with current health and treatment status. Only duration of illness was measured

and it was done in wide intervals for descriptive purposes. Another limitation is lack of longitudinal data. The data collected during the process of adaptation or progress of the disease could strengthen conclusions. It can also be argued that control of variables concerning health condition in many aspects besides cancer disease, the quality of medical care and its consequences is needed as well as control of environmental variables including relations with relationships with relatives and loved ones providing support (Luszczynska et al. 2013; Leung et al. 2016). Another important factor decisive for quality of life of patients diagnosed with cancer that was not included in the current study is spirituality. Its role is mentioned in other research reports (Laubmeier et al. 2004; Park and Cho 2016). It was found to reduce symptoms of distress in cancer patients regardless of life threat and to have associations with the level of adjustment.

The current study proofed the role of emotional reactivity for emotional quality of life and the role of stress coping for the intensity of PTSD symptoms. Higher level of emotional reactivity and higher level of avoidant and emotion-oriented coping were associated with lower level of functioning in the group of patients with cancer.

Acknowledgments This study was funded by grant BST 1445/02-2009 from the Faculty of Psychology, University of Warsaw.

Compliance with Ethical Standards

Conflict of Interest Author declares that she has no Conflict of Interest

Animal Studies This article does not contain any studies with animals performed by any of the authors.

Ethical Standards All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

The research project was accepted by the local Research Ethics Committee at the Faculty of Psychology, University of Warsaw.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

References

Aarstad, A. H., Beisland, E., Osthus, A. A., & Aarstad, H. J. (2011). Distress, quality of life, neuroticism and psychological coping are related in head and neck cancer patients during follow-up. *Acta Oncologica, 50*(3), 390–398. https://doi.org/10.3109/0284186X.2010.504227.

Ahmad, S., Fergus, K., Shatokhina, K., & Gardner, S. (2017). The closer 'We' are, the stronger 'I' am: The impact of couple identity on cancer coping self-efficacy. *Journal of Behavioral Medicine, 40*(3), 403–413. https://doi.org/10.1007/s10865-016-9803-1.

Arnaboldi, P., Lucchiari, C., Santoro, L., Sangalli, C., Luini, A., & Pravettoni, G. (2014). PTSD symptoms as a consequence of breast cancer diagnosis: Clinical implications. *SpringerPlus, 3*(1), 392. https://doi.org/10.1186/2193-1801-3-392.

Beisland, E., Aarstad, A. H., Osthus, A. A., & Aarstad, H. J. (2013). Stability of distress and health-related quality of life as well as relation to neuroticism, coping and TNM stage in head and neck cancer patients during follow-up. *Acta Oto-Laryngologica, 133*(2), 209–217. https://doi.org/10.3109/00016489.2012.720032.

Bucholc, M., Kucharczyk, M., Kanadys, K., Wiktor, K., & Wiktor, H. (2016). Selected determinants of strategies to cope with the disease among women treated for gynecological cancer. *Polish Journal Of Public Health, 126*(4), 161–164. https://doi.org/10.1515/pjph-2016-0033.

Deb, K., & Deka, K. (2015). Perceived stress and coping in patients with head and neck cancer. *Dysphrenia, 6*(2), 122–126. https://doi.org/10.5958/2394-2061.2015.00009.9.

Derogatis, L., Morrow, G., Fetting, J., Penman, D., Piasetsky, S., Schmale, A., Henrichs, M., & Carnicke, C. (1983). The prevalence of psychiatric disorders among cancer patients. *JAMA, 249*, 751–757.

Endler, N. S., & Parker, J. D. A. (1990). Multidimensional assessment of coping: A critical evaluation. *Journal of Personality and Social Psychology, 58*(5), 844–854.

Gil, F., Costa, G., Hilker, I., & Benito, L. (2012). First anxiety, afterwards depression: Psychological distress in cancer patients at diagnosis and after medical treatment. *Stress And Health: Journal Of The International Society For The Investigation Of Stress, 28*(5), 362–367. https://doi.org/10.1002/smi.2445.

Gopalan, M. (2013). 1313 – Prevalence of psychiatric disorders among cancer patients admitted in a tertiary care Centre. *European Psychiatry, 281*, 1. https://doi.org/10.1016/S0924-9338(13)76371-5.

Groarke, A., Curtis, R., Groarke, J. M., Hogan, M. J., Gibbons, A., & Kerin, M. (2017). Post-traumatic growth in breast cancer: How and when do distress and stress contribute? *Psycho-Oncology, 26*(7), 967–974. https://doi.org/10.1002/pon.4243.

Haugland, T., Wahl, A. K., Hofoss, D., & DeVon, H. A. (2016). Association between general self-efficacy, social support, cancer-related stress and physical health-related quality of life: A path model study in patients with neuroendocrine tumors. *Health & Quality Of Life Outcomes, 141*(7), 11. https://doi.org/10.1186/s12955-016-0413-y.

Heymach, J., Krilov, L., Alberg, A., Baxter, N., Chang, S. M., Corcoran, R., et al. (2018). Clinical Cancer advances 2018: Annual report on Progress against Cancer from the American Society of Clinical Oncology. *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology, 36*(10), 1020–1044. https://doi.org/10.1200/JCO.2017.77.0446.

Huang, I.-C., Lee, J. L., Ketheeswaran, P., Jones, C. M., Revicki, D. A., & Wu, A. W. (2017). Does personality affect health-related quality of life? A systematic review. *PLoS One, 12*(3), 1–31.

Jang, J. W., Drumm, M. R., Efstathiou, J. A., Paly, J. J., Niemierko, A., Ancukiewicz, M., … Zietman, A. L. (2017). Long-term quality of life after definitive treatment for prostate cancer: Patient-reported outcomes in the second posttreatment decade. Cancer Medicine, 6(7), 1827–1836. https://doi.org/10.1002/cam4.1103.

Johnsen, B. H., Eid, J., Laberg, J. C., & Thayer, J. F. (2002). The effect of sensitization and coping style on post-traumatic stress symptoms and quality of life: Two longitudinal studies. *Scandinavian Journal of Psychology, 43*(2), 181–188.

Kangas, M., Henry, J. L., Bryant, R. A. (2002). Posttraumatic stress disorder following cancer. A conceptual and empirical review. *Clinical Psychology Review, 22*, 499–524.

Karademas, E. C., Argyropoulou, K., & Karvelis, S. (2007). Psychological symptoms of breast Cancer survivors: A comparison

with matched healthy controls and the association with Cancer-related stress and coping. *Journal of Psychosocial Oncology, 25*(3), 59–74. https://doi.org/10.1300/J077v25n03-04.

Koch-Gallenkamp, L., Bertram, H., Eberle, A., Holleczek, B., Schmid-Höpfner, S., Waldmann, A., et al. (2016). Fear of recurrence in long-term cancer survivors—Do cancer type, sex, time since diagnosis, and social support matter? *Health Psychology, 35*(12), 1329–1333.

Laskowska, A. (2018). Quality of life after myocardial infarction as a function of temperamental traits, stress coping styles and PTSD symptoms.

Laubmeier, K. K., & Zakowski, S. G. (2004). The role of objective versus perceived life threat in the psychological adjustment to cancer. *Psychology & Health, 19*(4), 425–437. https://doi.org/10.1080/08870440420001967l9.

Laubmeier, K. K., Zakowski, S. G., & Bair, J. P. (2004). The role of spirituality in the psychological adjustment to cancer: A test of the transactional model of stress and coping. *International Journal of Behavioral Medicine, 11*(1), 48–55.

Lehto, R. H. (2017). Psychosocial challenges for patients with advanced lung cancer: Interventions to improve well-being. *Lung cancer: Targets and Therapy, 8*, 79–90. https://doi.org/10.2147/LCTT.S120215.

Leung, J., Smith, M. D., & McLaughlin, D. (2016). Inequalities in long term health-related quality of life between partnered and not partnered breast cancer survivors through the mediation effect of social support. *Psycho-Oncology, 25*(10), 1222–1228. https://doi.org/10.1002/pon.4131.

Luszczynska, A., Pawlowska, I., Cieslak, R., Knoll, N., & Scholz, U. (2013). Social support and quality of life among lung cancer patients: A systematic review. *Psycho-Oncology, 22*(10), 2160–2168. https://doi.org/10.1002/pon.3218.

Moye, J., & Rouse, S. (2014). Posttraumatic stress in older adults: When medical diagnoses or treatments cause traumatic stress. *Clinics in Geriatric Medicine, 30*, 577–580. https://doi.org/10.1016/j.cger.

Myers, S. B., Manne, S. L., Kissane, D. W., Ozga, M., Kashy, D. A., Rubin, S., et al. (2013). Social–cognitive processes associated with fear of recurrence among women newly diagnosed with gynecological cancers. *Gynecologic Oncology, 128*(1), 120–127. https://doi.org/10.1016/j.ygyno.2012.10.014.

Occhipinti, S., Chambers, S. K., Lepore, S., Aitken, J., & Dunn, J. (2015). A longitudinal study of post-traumatic growth and psychological distress in colorectal Cancer survivors. *PLoS One, 10*(9), 1–12. https://doi.org/10.1371/journal.pone.0139119.

Ogińska-Bulik, N., & Juczyński, Z. (2010). *Osobowość, stres a zdrowie [personality, stress and health]*. Warsaw: Difin.

Oniszczenko, W., & Laskowska, A. (2014). Emotional reactivity, coping style and cancer trauma symptoms. *Archives of Medical Science, 10*(1), 110–116.

Park, C. L., & Cho, D. (2016). Spiritual well-being and spiritual distress predict adjustment in adolescent and young adult cancer survivors. *Psycho-Oncology, 26*(9), 1293–1300. https://doi.org/10.1002/pon.4145.

Park, C. L., Edmondson, D., Fenster, J. R., & Blank, T. O. (2008). Positive and negative health behavior changes in cancer survivors: A stress and coping perspective. *Journal of Health Psychology, 13*(8), 1198–1206. https://doi.org/10.1177/1359105308095978.

Pedersen, A. F., & Zachariae, R. (2010). Cancer, acute stress disorder, and repressive coping. *Scandinavian Journal of Psychology, 51*(1), 84–91. https://doi.org/10.1111/j.1467-9450.2009.00727.x.

Pérez, S., Galdón, M. J., Andreu, Y., Ibáñez, E., Durá, E., Conchado, A., & Cardeña, E. (2014). Posttraumatic stress symptoms in breast Cancer patients: Temporal evolution, predictors, and mediation. *Journal of Traumatic Stress, 27*(2), 224–231. https://doi.org/10.1002/jts.21901.

Richardson, A. E., Morton, R. P., & Broadbent, E. (2016). Coping strategies predict post-traumatic stress in patients with head and neck cancer. *European Archives of Oto-Rhino-Laryngology, 273*(10), 3385–3391. https://doi.org/10.1007/s00405-016-3960-2.

Rzeszutek, M., Oniszczenko, W., Schier, K., Biernat-Kałuża, E., & Gasik, R. (2015a). Trauma symptoms, temperament traits, social support and the intensity of pain in a polish sample of patients suffering from chronic pain. *Personality and Individual Differences, 83*, 13–17. https://doi.org/10.1016/j.paid.2015.03.036.

Rzeszutek, M., Oniszczenko, W., Żebrowska, M., & Firląg-Burkacka, E. (2015b). HIV infection duration, social support and the level of trauma symptoms in a sample of HIV positives polish individuals. *AIDS Care: Psychological, and Socio-medical Aspects of AIDS/HIV, 27*, 363–369. https://doi.org/10.1080/09540121.2014.963018.

Rzeszutek, M., Oniszczenko, W., & Firląg-Burkacka, E. (2016). Gender differences in posttraumatic stress symptoms and the level of post-traumatic growth among a polish sample of HIV-positive individuals. *AIDS Care: Psychological, and Socio-medical Aspects of AIDS/HIV, 28*, 1411–1415. https://doi.org/10.1080/09540121.2016.1182615.

Sellick, S., & Edwardson, A. (2007). Screening new cancer patients for psychological distress using the hospital anxiety and depression scale. *Psycho-Oncology, 16*(6), 534–542. https://doi.org/10.1002/pon.1085.

Sheridan, C. L., & Radmacher, S. A. (1992). *Health psychology: Challenging the biomedical model*. Wiley.

Skrzynski, W. (2006). *Psychologiczne wyznaczniki jakości życia osób przewlekle chorych [psychological determinants of the quality of life of chronically ill persons]*. Warszawa: Wydawnictwo Naukowe Medium.

Strelau, J. (1996). The regulative theory of temperament: Current status. *Personality and Individual Differences, 20*(2), 131–142.

Strelau, J. (2006). *Temperament jako regulator zachowania z perspektywy półwiecza Badań [temperament as the regulator of behavior from the perspective of half a century research]*. Gdańsk: Gdańskie Wydawnictwo Psychologiczne.

Strelau, J. (2008). *Temperament as a regulator of behavior: After fifty years of research*. Percheron Press.

Strelau, J., & Zawadzki, B. (1995). The formal characteristics of behavior – Temperament inventory (FCB-TI): Validity studies. *Eur J Pers, 9*, 207–229.

Strelau, J., Zawadzki, B., Oniszczenko, W., & Sobolewski, A. (2002). Questionnaire for PTSD factorial version (PTSD-C). construction of the questionnaire diagnosing main components of posttraumatic stress disorder. *Przeglad Psychol, 45*, 149–176.

Strelau, J., Jaworowska, A., Wrześniewski, K., & Szczepaniak, P. (2005). CISS – Coping in stressful situations. In *Manual*. Warsaw: PTP.

Sumalla, E. C., Ochoa, C., Blanco, I. (2008). Posttraumatic growth in cancer: Reality or illusion? *Clinical Psychology Review, 29*, 24–33.

Tylka, J., & Piotrowicz, R. (2009). Kwestionariusz oceny jakości życia SF-36 – Wersja polska [quality of life measure SF-36 – Polish version]. *Kardiologia Polska, 67*, 1166–1169.

Wasteson, E., Nordin, K., Hoffman, K., Glimelius, B., & Sjödén, P. (2002). Daily assessment of coping in patients with gastrointestinal cancer. *Psycho-Oncology, 11*(1), 1–11.

Watson, E., Shinkins, B., Frith, E., Neal, D., Hamdy, F., Walter, F., et al. (2016). Symptoms, unmet needs, psychological well-being and health status in survivors of prostate cancer: Implications for redesigning follow-up. *BJU International, 117*(6B), E10–E19. https://doi.org/10.1111/bju.13122.

WHO (1995). Styl życia a zdrowie. Promocja Zdrowia. *Nauki Społeczne i Medycyna, 1*(2), 99–111.

Zawadzki, B., & Strelau, J. (2010). Structure of personality: Search for a general factor viewed from a temperament perspective. *Personality and Individual Differences, 49*, 77–88.

Zebrack, B. J., Corbett, V., Embry, L., Aguilar, C., Meeske, K. A., Hayes-Lattin, B., & Cole, S. (2014). Psychological distress and unsatisfied need for psychosocial support in adolescent and young adult cancer patients during the first year following diagnosis. *Psycho-Oncology, 23*(11), 1267–1275. https://doi.org/10.1002/pon.3533.