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Relationship of trait curiosity to the dynamics of coping and quality of life in myocardial infarction patients

Abstract: This study is a continuation of the work of Professor Kazimierz Wrześniewski. It concerns the role of curiosity-trait in the dynamics of changes in coping and quality of life after a heart attack. The study was attended by 222 people after a heart attack (73% men), of whom 140 participated in the three stages of the study: at the beginning and at the end of cardiac rehabilitation and a year after leaving the resort. The participants aged 24–64 years ($M = 54.19$; $SD = 6.51$). Curiosity-trait was measured by Spielberger and Wrześniewski's STPI questionnaire. To assess coping strategies a modified version of the COPE by Carver et al., was used. The specific and general quality of life were measured by the Polish adaptations of MacNew and NHP questionnaires. The level of curiosity-trait significantly differentiated changes in the dynamics of positive reinterpretation, problem solving and resignation, but did not affect the change in quality of life within the year after a heart attack.

Key words: curiosity-trait, coping, health-related quality of life, myocardial infarction

Introduction

Psychological functioning of cardiac patients has been the subject of numerous publications in health psychology literature worldwide. The leading author engaged in research in this area in Poland was Kazimierz Wrześniewski (1936–2012), co-founder and long-time chairman of the Health Psychology Section, Polish Psychological Association. The study presented in this paper is a continuation of his work: focused on coping and quality of life (i.e. his major field of research for years), but including personality variables (namely, trait curiosity) that also used to be his area of interest and so far remained unverified.

Coping and quality of life after myocardial infarction from Wrześniewski's research perspective

Wrześniewski's studies on quality of life were preceded by his research on the problems of coping after myocardial infarction (MI), to a great extent inspired by the

stress and coping theory by Lazarus and Folkman (1984). Based on their theory an interactive model of coping with stress after MI has been systematically developed by Wrześniewski (2004) for a few years. In essence this model is an original approach to coping and stress appraisal taking into consideration both situational factors (e.g. the type and course of MI, the patient's current psychophysical status and their life situation) and individual characteristics (e.g. personality predispositions, gender, age, intelligence level) that influence the course of coping process. In this research area differentiation between strategies and styles of coping (Wrześniewski, 2000a) seems to be crucial. The differentiation may be seen as an analogy to that between dispositional and situational coping (Carver & Scheier, 1994) known from the literature. Cognitive and behavioral strategies denote efforts undertaken by the individual in a particular stressful situation, while styles are stable personality dispositions to coping with different types of situations. Coping in a particular situation depends on many factors, including specific features of the disease and its course, as well as the individual's appraisal of the disease, social support, and his/her stable characteristics.

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The experience of MI results in psychological stress. The dynamics of stressful transaction is determined not only by objective factors related to the circumstances of the onset of MI, its course, or hospitalization, but also by subjective factors such as perceived threat to the patient's life, possibilities of recovery and of functioning in the future. Due to the acute phase of MI specificity the patient urgently requires medical intervention and is fully dependent on others. Once the acute phase is over, physical threat to the patient's life gradually decreases and the patient's symptoms alleviate. However, medical assessments and procedures are continued and the patient becomes aware of a wide range of changes and limitations that will be present in his life not only during his hospitalization, but also later at home and in the course of rehabilitation. The patient is faced with new challenges including systematic medication and necessary modification of his/her lifestyle so as to prevent MI recurrence and to enhance health. Controllability of the patient's situation gradually increases. He has to return to and confront his temporarily suspended occupational and familial duties, but under different health-related circumstances (Wrześniewski, 2008a). The above-listed variables to a considerable extent determine the course of coping process and in consequence, the patient's functioning level. This is associated with the issue of quality of life.

Wrześniewski became interested in the problems of quality of life in response to "the existing reality", i.e. the systematically growing number of studies on quality of life in cardiac patients. Regretfully, the rise in the number of studies has not been reflected in an increased body of knowledge about these patients' quality of life. Most researchers agree that in consequence of progress in contemporary medical sciences the goals include not only saving lives and extending survival time, but also reducing burdensomeness of the patient's illness and improving their quality of life. However, in this research area a pragmatic approach seems to be still predominating, posing the question: "how" instead of "what" should be measured (Włodarczyk & Wróblewski, 2006). This objection refers to the generally criticized lack of a theoretical background and to controversies concerning the concept of quality of life (Wrześniewski, 2006). As summarized by Wrześniewski (2008b, p. 339): "The state-of-the-art knowledge about cardiac patients' quality of life is unsatisfactory. There is no coherent theory and no commonly accepted definition. Nevertheless, it is still possible to conduct scientific research in this area provided that precise operational definitions and reliable tools having satisfactory psychometric properties are used. The aim of the research should be to collect data that by way of inductive reasoning would allow to build a theoretical concept of quality of life in cardiac patients".

An important step towards putting the existing knowledge in order was the introduction of the now commonly recognized idea of health-related quality of life (HRQoL). The term denotes the patient's subjective perception of direct effects of his illness and treatment

process on his functioning (Shipper, 1990, cited after Dziurawicz-Kozłowska, 2002). HRQoL is not only one of indicators of therapy/rehabilitation efficacy and a significant predictor of the patient's clinical status (including e.g. frequency of seeking medical advice or morbidity) confirmed by an increasing number of studies, but also a manifestation of a holistic approach to the patient, a tendency gaining popularity in medicine. Despite the diversity of approaches some assumptions shared by a majority of researchers can be distinguished (Wrześniewski, 2009; 2010). HRQoL is measured in three major domains: physical, psychological and social. In spite of this construct dual nature, both subjective and objective, the crucial role is currently ascribed to the individual's subjective perception. The most important aspect of quality of life is the dynamics, or changes depending on internal and external factors. HRQoL can be construed either at a global level (irrespective of the type of illness), or specifically (in the context of a particular disease). Exploration of disease-specific HRQoL allows to grasp detailed relationships concerning a particular clinical group, while measurements of the generic HRQoL permits to compare patients with different health problems. Thus, if both these perspectives are taken into consideration in a research project, the two types of goals can be achieved (even if a given study is not comparative, through collecting unique data it makes such comparisons feasible).

In the present study coping and quality of life are analyzed in relation to trait curiosity within one year of MI. Curiosity as a predisposition is rather infrequently taken into consideration in health psychology. However, in view of positive psychology achievements it seems worthwhile to explore this trait also in this context. Since there are few publications on the subject in the Polish research literature, the issue of trait curiosity will be discussed in more detail in what follows.

Defining curiosity

Curiosity is usually associated with the research on cognitive functioning, since much attention is paid to this variable in psychology of cognitive processes, learning or creativity. On the other hand, curiosity is studied also in the context of emotional and motivational processes, as well as in personality psychology. In recent years that have witnessed the development of positive psychology, curiosity has been more and more often classified among the human psychological strengths responsible for wellbeing, happiness and health (Silvia & Kashdan, 2009).

One of the leading researchers investigating curiosity, C.D. Spielberger, analyzed this predisposition in the context of other states and traits such as anxiety, anger and depression (Spielberger & Reheiser, 2009). According to Spielberger, the assessment and monitoring of these properties is pivotal in the diagnosis and treatment of various disorders. He compared the diagnostic process to the routine medical examination where indicators of the patient's essential body functions, so-called vital signs,

are measured. Namely, pulse rate measurement would correspond to anxiety assessment, blood pressure would be a counterpart of anger, and temperature – of depression. By analogy with mental health, he termed anxiety, anger and depression critical psychological vital signs. Curiosity was regarded as a positive psychological vital sign that motivates exploratory behaviors, contributing that way to the individual's successful adaptation to environmental demands – first and foremost through increasing resources and problem solving capacities.

In the research on curiosity two tendencies, relatively independent of each other, can be seen in recent years. The first, focused on the nature of curiosity and its specific constituents/dimensions, is striving to establish whether curiosity is a one-dimensional or multidimensional phenomenon. The other, focused on individual differences regarding curiosity, is represented by studies on trait and state curiosity. In most recent studies attempts have been made to combine the two approaches (Kashdan & Steger, 2007; Litman & Spielberger, 2003).

Litman i Spielberger (2003) defined curiosity as a desire for acquiring new information (knowledge) and new sensory experience that motivates exploratory behaviors. Moreover, they described two basic dimensions of curiosity: epistemic (that stimulates exploratory behaviors aimed at information seeking) and perceptual (stimulating exploratory behaviors aimed at sensation seeking).

Kashdan and Roberts (2004) construed curiosity as a positive emotional-motivational system oriented towards recognition, pursuit and self-regulation of new experience and challenge. The system is responsible for proactive and intentional behaviors in response to stimuli characterized by novelty, uncertainty and discrepancy. The authors pointed out that considering curiosity as a one-dimensional phenomenon was unwarranted. Using confirmatory factor analyses they developed a two-dimensional model of curiosity and a tool for the measurement of the construct (Kashdan, Gallagher, Silvia, Winterstein, Breen, Terhar & Steger, 2009). The main aspects of curiosity in their concept are: exploration, or appetitive striving for novelty and challenge, and absorption, i.e. full engagement in specific activities. The two aspects of curiosity influence each other and lead to learning, increased competence and self-assurance. According to the authors, also the use of a global curiosity index (i.e. a combination of scores on the above-described scales) is warranted (Kashdan & Steger, 2007).

Reio, Petrosko, Wiswell and Thongsukmg (2006) proposed a three-dimensional model of curiosity based on results of factor analyses. The model includes cognitive curiosity, physical thrill seeking and social thrill seeking. Their study confirms once again that information seeking (i.e. cognitive or epistemic curiosity) is a separate dimension of curiosity.

Summarizing, in contemporary research curiosity is considered as a multifaceted phenomenon and efforts are made to precisely differentiate between its particular dimensions. However, research results are unclear, therefore global indicators of curiosity are commonly used.

Trait curiosity

As mentioned earlier, curiosity is analyzed also in terms of individual differences. This approach is represented by Spielberger, who has explored trait curiosity and state curiosity from the very beginning in his research (Spielberger & Reheiser, 2009). The former term denotes a relatively stable personality disposition to experience particular emotional states in a long time perspective, while the latter - an emotional response of possibly varying intensity to new and ambiguous stimuli. A similar approach is represented by Kashdan (2002), who defines trait curiosity as a general tendency towards the recognition, pursuit, and integration of novel and challenging information and experiences. Likewise, exploring curiosity in the context of motivational mechanisms Łukaszewski and Doliński (2000) in their analysis distinguish two perspectives: situational and dispositional. In the situational aspect curiosity is understood as a response to change (novelty), while the dispositional aspect denotes a particular characteristic of the individual manifested in readiness to respond to any changes and novel occurrences. A common denominator of curiosity is the preference for novelty.

To illustrate the dispositional aspect of curiosity (trait curiosity) such notions as breadth and depth of curiosity are used (Litman & Spielberger, 2003; Silvia & Kashdan, 2009). Breadth is operationalized as the number of factors making the individual interested or curious, while depth refers to the extent to which this state is maintained and developed so as to appropriately integrate the new knowledge and experience. Thus, a person with a high curiosity would experience state curiosity in a wider range of various circumstances, more readily, more frequently, and over longer periods of time as compared to an individual with a low curiosity level. It should be noted that people usually rate their own curiosity higher than that of their peers, which suggests that this property is rather desirable (Renner, 2006).

A well-known psychological construct similar to trait curiosity is openness to experience, included in the five factor model of personality traits, or the Big Five, together with conscientiousness, agreeableness, extraversion, and neuroticism (McCrae & Costa, 1992). Openness to experience is defined as active seeking new experiences accompanied by tolerance of and readiness to explore the unknown. A person open to experience is curious, creative, original, imaginative, has a wide range of interests and appreciates novelty, while a low level of this trait denotes conventionality, preference for the plain, earthbound, straightforward and familiar, a lack of artistic interests.

As pointed out by Silvia and Kashdan (2009), curiosity is among the first five personality traits most closely associated with general life satisfaction, job satisfaction, and living a pleasurable, involved and meaningful life. It is a factor that supports the individual's striving for personal growth and fulfillment.

In 1970s Spielberger developed successive versions of his questionnaire based on the state-trait model for

the assessment of state and trait curiosity (Spielberger & Reheiser, 2009). The published in 1971 State-Trait Curiosity Inventory (STCI) was later, in 1979, included in the State-Trait Personality Inventory (STPI) measuring state and trait anxiety, anger, depression and curiosity. The instrument can be used to assess not only curiosity and exploratory behavior levels at a given time point, but also individual differences in regard to experienced curiosity, inquisitiveness and interest in discovering the environment in a long-time perspective, irrespective of the situation specificity. Two versions of the STPI are used in Poland: the more popular three-factor state and trait personality inventory (TISCO, currently renamed: Self-Cognition Inventory, SPI) developed by Spielberger and Wrześniewski (Wrześniewski, 1991) for the measurement of state and trait anxiety, anger and curiosity. Less widely known is the SPI Questionnaire (Form D) developed by K. Wrześniewski and P. Oleś, containing additionally state and trait depression scales. In both versions of the questionnaire the state and trait curiosity scales consist of the same items.

Trait curiosity and the patient's functioning

There are rather few studies concerning curiosity in relation to coping with illness and to objective and subjective health indicators. Swan and Carmelli (1996) were the first to publish the results of the Western Collaborative Group Study on the relationship between curiosity and mortality among the elderly. At the 5-year follow-up the surviving participants as compared to the deceased subjects were found to have higher baseline state and trait curiosity levels. State curiosity turned out to be a significant predictor of survival outcomes when controlling for other risk factors, both in men and women. As regards the elderly patients, the importance of various aspects of curiosity is emphasized not only for longevity, but above all for the process of positive aging. Preserved abilities of keeping abreast of and coping with new things, as well as gaining reinforcement and benefits from new possibilities are the key factors that increase cognitive efficiency of the elderly (Silvia & Kashdan, 2009).

Some aspects of curiosity are also related to the functioning of patients with cardiovascular disorders. In this context Richman, Kubzansky, Maselko, Ackerson and Bauer (2009) investigated mental vitality defined as a permanent tendency to experience positive feelings such as interest and engagement in the environment, as well as flexibility in responding to challenge. In the development of an instrument for the measurement of this construct the authors used items selected from Spielberger's curiosity scale and from one of the scales for hope assessment. Mental vitality so understood was associated with decreased risk of cardiovascular disorders including coronary heart disease (CHD), cerebrovascular accidents, hypertension, and lipid abnormalities over a 2-year follow-up period.

Rather few studies have dealt with the relationship between openness to experience and health indicators. In

a 5-year longitudinal study by Wilson, Mendes de Leon, Bienias, Evans and Bennet (2004) death risk turned out to be unrelated either to openness, or to agreeableness. Significant relationships were found, above all, with neuroticism and conscientiousness, and to a lesser extent – with extraversion. Besides, in a 15-year follow-up period openness as a global factor was unrelated to mortality in patients diagnosed with CHD, while openness levels in the domains of affect, activity, esthetics and ideas were associated with lower risk of cardiac mortality (Jonassaint, Boyle, Williams, Mark, Siegler & Barefoot, 2007). In the discussion of their findings the authors point to many mechanisms potentially underlying the relationships of curiosity measured that way with health. For people with low trait curiosity levels adaptation to or acceptance of changes in their usual functioning or environment may be difficult. In stressful situations their coping efforts (e.g. seeking new solutions or new supportive relationships) may be insufficient. Moreover, various aspects of curiosity may be associated with health- or disease-related behaviors in different ways. For example, the individual's cognitive interest in a sports activity may facilitate their attempts at trying it out and initiating a new type of behavior, while the need for a particular type of stimulation may be responsible for maintenance of a given behavior.

Research problem

The research studies on curiosity have not given an answer yet to the question whether this feature is related to the functioning in illness, including that of patients after a severe cardiac event such as MI. This psychologically stressful situation requires adaptational efforts over an extensive period of time. Therefore, investigation of factors that might facilitate MI patients' effective coping and improve their quality of life is not only of cognitive importance, but also can have practical implications. The present study is one of the first in this domain, which to a large extent explains its exploratory character. The following research questions and hypotheses were posed:

- what is the relationship between trait curiosity and coping strategies at particular stages of treatment and rehabilitation after MI (higher levels of curiosity were expected to be favorable for active coping or engaging in constructive activities that might change the patient's situation, such as seeking new solutions or new sources of support);
- what is the relationship between trait curiosity and both generic and disease-specific quality of life at various stages of treatment and rehabilitation after MI (higher levels of curiosity were expected to promote a better quality of life);
- is the trait curiosity level related to changes in coping strategies utilized by the patient (curiosity was assumed to have a relationship with the dynamics of coping after MI, but no directional hypotheses were posed);
- is the level of trait curiosity associated with changes in the patients' quality of life (curiosity was assumed to

have a relationship with the dynamics of quality of life after MI, but no directional hypotheses were posed).

Method

Participants

Participants in the study were 222 MI patients (163 men and 59 women, 73% and 27%, respectively) aged 24 to 64 years ($M=54.19$; $SD=6.51$), referred for cardiac rehabilitation after their hospital stay. In a majority of cases it was the first (83%) and uncomplicated (92%) myocardial infarction. The duration of their hospital treatment ranged from 3 to 23 days ($M=7.33$; $SD=3.07$). On admission no symptoms of coronary heart disease preceding the MI were reported by 53% of the patients, while 17% had been experiencing coronary chest pain for less than 1 month prior to MI, and 40% of the patients – for over 1 month. The patients' general health status varied: 31% received no treatment for any comorbid condition, 21% reported one, and 44% more than one comorbid disease. As regards treatment, 92% of the patients had coronary angioplasty, while the remaining 8% underwent conservative treatment. During their stay in the rehabilitation center 74% reported no coronary pain, 23% had slight ailments, which in 3% of the patients were severe or troublesome. Most patients (65%) had a mild exercise program, 25% - an intense rehab program, and 10% - breathing exercises only. In the sample under study prevailed married patients (85%), who had been in employment at the time of their MI (63%), residents of district-level towns or province-level cities (78%). Most patients had either vocational (42%) or secondary (39%) education, 14% - college or university, and 5% - primary education.

Research instruments

Trait curiosity was measured using the relevant subscale of the Three-Factor State-Trait Personality Inventory (STPI) by C.D. Spielberg and K. Wrześniewski (Wrześniewski, 1991).

The tool allows to compute a global curiosity index including cognitive and sensory curiosity. The STPI consists of 10 items concerning the respondent's usual state of mind, e.g. "I feel interested". Each item is self-rated on a 4-point scale, from 1 – not at all, to 4 – very much so. In the sample under study Cronbach's alpha coefficient for this scale was 0.75.

Coping strategies were assessed using the modified version of Wrześniewski's Polish adaptation of the COPE Inventory (Carver, Scheier & Weintraub, 1989). The Inventory has 46 items allowing to compute scores for seven coping strategies. The following instruction is given to the patient: "... Keeping in mind your experience of myocardial infarction please read and rate each of the statements below..." The answers range from 1 – I haven't been doing this at all, to 4 – I've been doing this a lot. The instrument allows to measure the following strategies: positive reframing, humor, use of support, problem solving, religion, substance use, and resignation. Reliability coefficients computed for each scale at each

stage of the research ranged from 0.84 to 0.93, except for the resignation scale (0.60; 0.71 and 0.58 in successive measurements). Higher scores on a given subscale indicate higher levels of the strategy assessed.

MI-specific health-related quality of life was assessed using a questionnaire developed by MacNew, N. Oldridge'a and L. Lim, in the Polish adaptation by Wrześniewski (2009, 2010). The questionnaire contains 27 items concerning the effect of the disease on the patient's functioning in three dimensions (physical, emotional and social) during the past two weeks. Responses are indicated on a 7-point Likert scale. Scores for each dimension separately, as well as a global score can be calculated. Higher scores denote higher HRQoL levels. The scales have good reliability coefficients ranging from 0.81 to 0.93, computed at each stage of the research.

Generic quality of life was assessed using the Nottingham Health Profile (NHP) in the Polish adaptation (Wrześniewski, 2000b). In the present study NHP Part I was used, comprising 38 items concerning various ailments. Factor analyses yielded two global factors: physical symptoms (Cronbach's alpha coefficients in successive measurements were 0.80; 0.80 and 0.87) and psychosocial discomfort (Cronbach's alpha coefficients in successive measurements: 0.70; 0.70 and 0.63). Higher scores denote higher severity of limitations and symptoms, i.e. lower quality of life.

Procedure

Three measurements were conducted in the study. Trait curiosity was assessed only at the first stage, while coping and quality of life at all the three time points. The first two measurements were performed at cardiac rehabilitation centers: at the baseline, i.e. at the beginning of the rehabilitation program (stage I) and about 3 weeks later, on the rehab program completion (stage II). In the first two stages 222 MI patients participated. They were assessed by respective rehabilitation centers employees, psychologists trained in the research procedures administration. The patients had been informed about the purpose and nature of the assessment. Stage III was a follow-up conducted about 1 year after the cardiac rehabilitation completion. The subjects were 140 participants from the original sample, who filled out and returned the questionnaire forms they had received by mail. Detailed statistical analyses have confirmed that in terms of the medical and sociodemographic characteristics the follow-up group was very similar to that of drop-outs, and therefore also to the baseline sample. The only significant differences were noted as regards comorbidity (the follow-up respondents reported fewer health complaints), and rehabilitative training intensity (a larger proportion of the follow-up respondents had been given mild physical exercises).

Statistical analyses indicated that distributions of the variables under study did not differ significantly from the normal distribution, except for generic quality of life indicators at all the three stages. The latter indicators were analyzed using nonparametric tests. Subgroups differing

in trait curiosity levels (high vs. low) were distinguished on the basis of their mean scores (the group with high trait curiosity comprised patients scoring above the mean, while the low-curiosity group consisted of those who scored below the mean). Changes in coping strategies and quality of life were analyzed in patients, who participated in the 1-year follow up (N = 140).

Results

Relationship of curiosity to coping strategies and quality of life

Correlational analyses (see Table 1) show that trait curiosity was positively associated with four strategies: positive reframing, problem solving, use of support, and humor. The strength of associations between these variables was similar at the baseline and post-rehab measurements (stages I and II), but weaker, and in some cases non-significant at stage III, i.e. the 1-year follow-up. At baseline negative relationships between trait curiosity and two strategies: substance use and resignation, were noted. Most of the significant correlations were weak, and some were moderate.

Trait curiosity was also positively correlated with emotional and physical dimensions of the HRQoL (see Table 2). Correlations with the emotional dimension were present at all three stages, but at the 1-year follow-up the association was much weaker than at the first two stages. Correlations with the physical dimension were found only at stages I and II, and were weaker than these for the emotional dimension. Correlations with generic quality of life were negative and noted only in the first two stages. This result indicates that trait curiosity is related to lower severity of physical symptoms and psychosocial discomfort (both global quality of life indicators reflect complaints severity).

Curiosity and changes in coping strategies

The results of one-way repeated measures ANOVA showed that in follow-up patients (N = 140) significant changes noted in problem solving strategy utilization can be described as a quadratic rate of change ($F(1,139) = 5.81$; $p = 0.02$, $\eta^2 = 0.04$). The level of this strategy use at stage II (the post-rehab assessment) was significantly higher than that at stage I (baseline, $p = 0.04$), with a subsequent decrease at stage III (the 1-year follow-up). A curvilinear main effect of time was found also regarding the use of support ($F(1,139) = 4.55$; $p = 0.04$, $\eta^2 = 0.03$). Mean scores on the support use scale were higher post-rehab than both at baseline and at the 1-year follow-up, but the differences between pairs of mean scores were not significant. There were no significant changes over time in the utilization of remaining strategies: positive reframing ($F(1,139) = 0.49$; $p = 0.49$), humor ($F(1,139) = 0.09$; $p = 0.87$), religion ($F(1,139) = 0.03$; $p = 0.92$), substance use ($F(1,139) = 1.60$; $p = 0.21$), and resignation ($F(1,139) = 0.45$; $p = 0.61$).

Interaction effects between curiosity and time (univariate mixed model ANOVA) were noted as regards three coping strategies. The first was positive reframing ($F(2,137) = 3.5$ $p = 0.03$ $\eta^2 = 0.05$) (see Fig. 1).

Significant differences between patient subgroups were noted on the baseline and post-rehab assessments (stages I and II) ($p = 0.001$), where patients with low curiosity as compared to those with high curiosity levels turned out to use this strategy significantly less often. The intensity of positive reframing utilization has increased with time in low-curiosity patients, and decreased in high-curiosity participants. The differences between stage I (baseline) and II (post-rehab) scores in both these patient subgroups were non-significant, but finally at the 1-year follow-up the two subgroups did not differ from each other in the use of this strategy.

Table 1. Coefficients of correlation between trait curiosity and coping strategies at successive stages of the study

Stage	S1	S2	S3	S4	S5	S6	S7
I (N=222)	0.37**	0.24**	0.33**	0.36**	0.09	-0.22**	-0.23**
II (N=222)	0.37**	0.28**	0.27**	0.30**	0.03	-0.09	-0.12
III (N=140)	0.13	0.20*	0.18*	0.04	0.06	0.07	0.11

Note. S1 – Positive reframing, S2 – Humor, S3 – Use of support, S4 – Problem solving, S5 – Religion, S6 – Substance use, S7 – Resignation; * $p < 0.05$; ** $p < 0.01$

Table 2. Coefficients of correlation between trait curiosity and quality of life after MI at successive stages of the study

Stage	Disease-specific quality of life (Pearson's r)			Generic quality of life (Kendall's tau-b)	
	emotional	social	physical	symptoms	discomfort
I (N=222)	0.39**	0.08	0.22**	-0.18*	-0.27*
II (N=222)	0.37**	0.09	0.16*	-0.16**	-0.20**
III (N=140)	0.17*	0.04	0.07	-0.07	-0.06

Note. * $p < 0.05$; ** $p < 0.01$

Interaction effects were found also in the use of problem solving $F(2,137)=4.08$ $p=0.02$ $\eta^2=0.06$ and resignation $F(2,137)=3.1$ $p=0.048$ $\eta^2=0.04$ as coping strategies. As regards the former (see Fig. 2), problem solving was more intensely utilized both at baseline and post-rehab (stages I and II) by patients with high curiosity than by those scoring low on curiosity (p values = 0.001

Figure 1. Interaction effect between trait curiosity and changes in positive reframing as a coping strategy

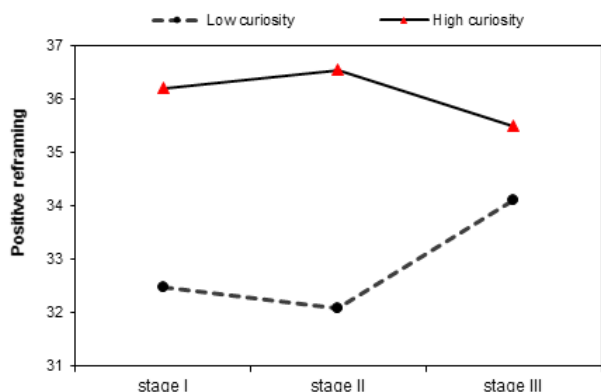


Figure 2. Interaction effect between trait curiosity and changes in problem-focused coping

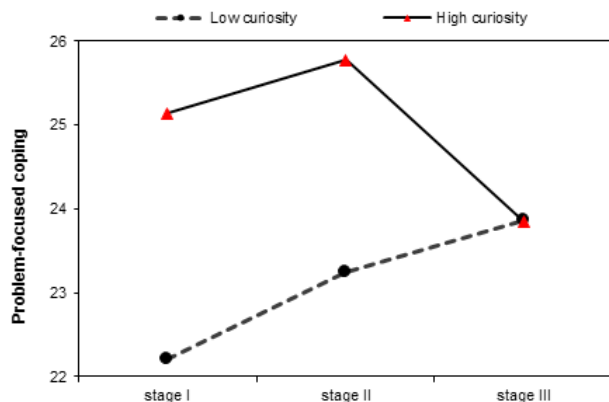
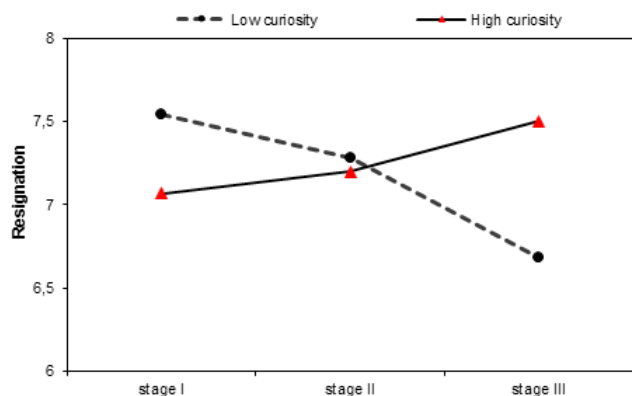


Figure 3. Interaction effect between trait curiosity and changes in resignation as a coping strategy



and 0.003, respectively). Then, in high-curiosity patients a significant decrease ($p=0.01$) was noted between stages II and III. Finally, at the 1-year follow-up after their discharge from the rehab center, the two groups did not differ significantly from each other.

As far as the strategy of resignation is concerned (Fig. 3), there were no significant differences between the two patient subgroups at stages I and II, but at stage III (the follow-up) the groups did differ ($p=0.02$). An analysis of mean scores shows that in low-curiosity patients the initial levels of resignation strategy were higher, but decreased over time. In consequence, the intensity of this strategy utilization at stage III was significantly lower in these patients than in the high-curiosity subgroup.

Significant main effects of curiosity emerged with regard to the other two strategies, i.e. humor and use of support ($F(2,137)=11.07$ $p=0.01$ $\eta^2=0.07$ and $F(2,137)=8.86$ $p=0.03$ $\eta^2=0.06$, respectively). Patients high on the curiosity scale as compared to those with low curiosity levels more intensely utilized humor as coping strategy in all three stages of the study ($p<0.05$; $p<0.01$; and $p<0.01$, respectively), and more often reported use of support at the baseline and post-rehab assessments (at both these stages $p<0.01$).

No significant effects of curiosity were noted in regard to the remaining two strategies: religion and substance use (respectively, $F(2,137)=3.15$ $p=0.08$, and $F(2,137)=0.23$ $p=0.63$).

Relationship of curiosity to quality of life and changes in QoL

The results of one-way repeated measures ANOVA showed significant changes in all the three aspects of disease-specific health-related quality of life (HRQoL). For emotional and physical dimensions of HRQoL relationships were described as a quadratic rates of change ($F=24.85$, $p=0.001$, $\eta^2=0.37$ and $F=9.11$, $p=0.001$, $\eta^2=0.14$, respectively) with the following mean scores on successive measurements: for the emotional dimension 5.35; 5.58; 5.13, and for the physical dimension 5.35; 5.62; 5.22). In both cases the significant differences were between stages I and II ($p=0.001$), as well as between II and III ($p=0.001$). The analysis concerning the social dimension yielded a linear relationship ($F=51.57$, $p=0.001$, $\eta^2=0.27$; mean scores: 4.34; 5.16; 5.25). Significant differences ($p=0.001$) were noted between stages I and II, as well as I and III.

Moreover, statistically significant quadratic rate of change emerged in both domains of the generic quality of life. Friedman's chi-square test for the domain of symptoms was 12.23 ($p=0.002$), with mean ranks for successive stages, respectively, 2.07; 1.80; and 2.13. The Wilcoxon test confirmed the significance of differences between stage I and II symptom scores ($p<0.001$), and between stage II and III scores ($p=0.002$). For the domain of psychosocial discomfort Friedman's χ^2 was 9.12 ($p=0.01$), with mean ranks at successive stages: 2.14; 1.83; 2.03, respectively. Significant differences were noted between stages I and II ($p=0.001$), and stages II and III ($p=0.03$).

Table 3. Relationship of trait curiosity to generic quality of life and its changes

	Curiosity Group	Stage I		Stage II		Stage III	
		M. rank	Z (p)	M. rank	Z (p)	M. rank	Z (p)
SY	L	118.56	-1.73	118.46	-1.76	70.73	-0.70
	H	104.05	(0.08)	104.15	(0.08)	70.27	(0.94)
DIS	L	126.11	-3.51	121.88	-2.51	69.14	-0.26
	H	96.08	(0.001)	100.54	(0.01)	70.88	(0.79)
Mean ranks							
		Stage I	Stage II	Stage III	Friedman's χ^2	Post hoc	
SY	L	2.13	1.79	2.08	7.55 (0.010)	I-II**; II-III*	
	H	1.99	1.82	2.19	6.30 (0.040)	II-III*	
DIS	L	2.26	1.81	1.93	11.29 (0.004)	I-II*	
	H	1.97	1.85	2.19	4.76 (0.090)	II-III*; I-III*	

Note. M. rank – mean rank; SY – symptoms; DIS – discomfort; L – Low-curiosity group; H – High-curiosity group;

* $p < 0.05$, ** $p < 0.01$.

Low- and High curiosity (L and H) groups comprised, respectively, 114 and 108 participants at stages I and II, and 70 participants each at stage III

No interaction effects between trait curiosity and time (using univariate mixed model ANOVA) were found in any of the disease-specific HRQoL dimensions (emotional: $F = 2.17$ $p = 0.11$; social: $F = 0.57$ $p = 0.56$; and physical: $F = 1.01$; $p = 0.36$). As regards the emotional dimension of HRQoL, a significant main effect of curiosity ($F = 5.78$ $p = 0.01$ $\eta^2 = 0.04$) was noted: both at baseline and on completion of the rehabilitation program high-curiosity patients scored higher on the emotional HRQoL dimension than did those with low curiosity (stage I mean scores were, respectively, 5.34 and 4.86; and stage II mean scores: 5.77 and 5.40). Curiosity level did not differentiate HRQoL scores on social and physical dimensions at any stage of the study (the main effect of curiosity for the social dimension was $F = 0.84$ $p = 0.36$, and for the physical dimension $F = 0.04$ $p = 0.82$).

The results concerning trait curiosity and changes in generic quality of life are presented in table 3.

As can be seen in Table 3, high-curiosity patients scored lower in the discomfort domain at stages I and II. However, changes in symptoms and discomfort severity occurred in both groups, i.e. in patients with either high or low trait curiosity, in a similar way. Namely, at stage II (post-rehab) both the subgroups scored lower (i.e. their quality of life improved in these domains), which was followed by an increase in the severity scores at stage III.

Discussion

The presented study findings indicate that trait curiosity is related to some coping strategies employed after myocardial infarction, and to some aspects of MI patients' quality of life, particularly in a short-term perspective. Corroborating hypotheses based on the nature of curiosity,

these results show that higher trait curiosity favors active coping, e.g. seeking new solutions or new supporting relationships (Jonassaint et al., 2007). A positive attitude toward novelty in life may contribute to perceiving new events, including illness, as a challenge – which is both motivating and activating. Moreover, such an attitude towards new situations as well as reevaluation in terms of challenge help to recognize potential benefits and opportunities. The individual is more likely to see positive aspects of the situation and to generate positive feelings. Sense of humor may be most helpful in this respect, but it can be also an independent attribute of cognitively open and creative people (Radomska, 2011).

Moreover, the presented research findings show that the dynamics of some coping strategies used after MI is related to trait curiosity. This relationship turned out to be rather similar in the case of two strategies: positive reframing and problem solving. Patients with low trait curiosity as compared to high-curiosity persons tended to use both these types of coping less intensely at the beginning and on completion of the rehabilitation program. However, the level of these strategies utilization by the former subgroup increased with time, attaining the high-curiosity patients' intensity of coping. This may suggest that low-curiosity individuals as compared to patients with high curiosity need more time to begin using the strategies of positive reframing and problem solving in their coping with illness. The existing research results have confirmed good outcomes of both these strategies utilization in coping with various difficulties, including physical illness (Folkman, 2008). This might suggest that these potentially effective strategies are available to high-curiosity individuals at earlier stages of their coping with health problems, and that at the very beginning of this

process the repertory of their coping strategies is more extensive than that of persons with low curiosity. The latter begin to use such strategies gradually, and with a delay in comparison to high-curiosity people. Interestingly, at the 1-year follow-up there were no differences between the two subgroups of MI patients in these strategies utilization level. As regards problem solving, this effect results not only from gradual changes occurring in both subgroups. In the high-curiosity subgroup the decrease in the level of this strategy utilization was statistically significant, which may be due to these patients' flexible adaptation to situational requirements: their feeling of being under direct threat related to their heart condition has been greatly reduced, and they have already achieved the desired level of adaptation. The effects in question may be also due to the very nature of curiosity concerning the attitude towards novelty (Spielberger & Reheiser, 2009). Since the number of new elements associated with the disease tends to decrease with time, high-curiosity patients' focusing on their condition regarded as a challenge may become less absorbing to them. It cannot be excluded that at this stage their illness "has too few novel features" and so neither evokes their exploratory behaviors, nor motivates them to enlarging resources and controlling their illness. High-curiosity persons at this stage may be seeking new sensations and dismissing further concentration on their illness as useless. At the same time, it seems quite likely that the focusing on illness-related tasks has been replaced by new interests and such life challenges as returning to work or pursuing their passions. Moreover, leaving the cardiac rehabilitation center they reduce their contacts with the therapeutic team members who used to stimulate the patient's interest in his condition and to set further goals to be achieved in the process of coping with illness. This may lead some patients to resignation from health-related goals. The latter approach would not be advisable from the medical point of view since ischemic heart disease is known to be a chronic condition that requires systematic treatment, prevention and one's own health promotion. Curiosity level was found to differentiate also the dynamics of change in resignation as a coping strategy, in a way fully corresponding to the decrease in the problem solving strategy utilization. The specificity of high trait curiosity consisted in a significant increase in the resignation coping within one year of myocardial infarction.

The hypothesis that persons with high trait curiosity utilize a broader range of coping strategies after MI has been confirmed also by their higher levels of humor and use of support regardless of stage of the study. Trait curiosity levels in the study sample were not associated with either religion or substance use as coping strategies. However, it is difficult to comment on this finding as there are no studies that address these issues.

Trait curiosity did not affect the dynamics of change in either the disease-specific, or generic quality of life in the MI patients under study. The dynamics turned out to be quite characteristic and differing the emotional and physical HRQoL dimensions from the social aspect, however, it was irrespective of trait curiosity level. MI patients with high

trait curiosity had higher levels of the emotional dimension of the disease-specific HRQoL, and of discomfort as the generic quality of life indicator, but only at early stages of the study. The result suggests that trait curiosity may facilitate the patient's emotional functioning after MI – however, the duration of the effect is relatively short.

Limitations and the exploratory nature of the study should be emphasized. In all three stages of the study participated 140 MI patients, but this sample size is too small to warrant more general conclusions. Since the group under study was quite homogeneous with regard to socio-medical characteristics, any generalization of the conclusions to the whole population of MI patients is unwarranted either. A methodological aspect should be also mentioned concerning the different time intervals between successive measurements. This was mostly due to clinical conditions concerning the course of treatment and recovery following this type of cardiac event. The inequality of time intervals made it more difficult to interpret changes over time. Nevertheless, results of the study seem to be interesting enough to encourage further health psychology research on the phenomenon of trait curiosity.

References

- Carver, C.S., Scheier, M.F. (1994). Situational coping and coping dispositions in a stressful transaction. *Journal of Personality and Social Psychology*, 66, 184–195.
- Carver, C.S., Scheier, M.F. & Weintraub, J.K. (1989). Assessing coping strategies: a theoretically-based approach. *Journal of Personality and Social Psychology*, 56, 2, 267–283.
- Dziurowicz-Kozłowska, A. (2002). Wokół pojęcia jakości życia [On the notion of quality of life]. *Psychologia Jakości Życia*, 2, 77–99.
- Folkman, S. (2008). The case for positive emotions in the stress process. *Anxiety, Stress, and Coping*, 21, 3–14. doi: 10.1080/10615800701740457
- Jonassaint, C.R., Boyle, S.H., Williams, R.B., Mark, D.B., Siegler, I.C. & Barefoot, J.C. (2007). Facets of openness predict mortality in patients with cardiac disease. *Psychosomatic Medicine*, 69, 319–322.
- Kashdan, T.B. (2002). Social Anxiety Dimensions, Neuroticism, and the Contours of Positive Psychological Functioning. *Cognitive Therapy and Research*, 26(6), 789–810.
- Kashdan, T.B. & Roberts, J.E. (2004). Trait and state curiosity in the genesis of intimacy: differentiation from related constructs. *Journal of Social and Clinical Psychology*, 23(6), 792–816.
- Kashdan, T.B. & Steger, M.F. (2007). Curiosity and pathways to well-being and meaning in life: Traits, states, and everyday behaviors. *Motivation and Emotion*, 31, 159–173. doi: 10.1007/s11031-007-9068-7
- Kashdan, T.B., Gallagher, M.W., Silvia, P.J., Winterstein, B.P., Breen, W.E., Terhar, D. & Steger, M.F. (2009). The curiosity and exploration inventory-II: Development, factor structure, and psychometrics. *Journal of Research in Personality*, 43, 987–998.
- Lazarus, R.S., Folkman, S. (1984). *Stress, appraisal and coping*. New York: Springer.
- Litman, J.A., Spielberger, Ch.D. (2003). Measuring Epistemic Curiosity and Its Diverive and Specific Components. *Journal of Personality Assessment*, 80(1), 75–86.
- Lukaszewski, W. & Doliński, D. (2000). *Mechanizmy leżące u podstaw motywacji [Mechanisms underlying motivation]*. In: J. Strelau (Ed.). *Psychologia*. Podręcznik akademicki (pp. 441–468). Gdańsk: Gdańskie Wydawnictwo Psychologiczne.
- McCrae, R.R. & Costa, P.T. (1992). An introduction to the five-factor model and its applications. *Journal of Personality*, 60, 175–215.
- Radomska, A. (2011). Humor From The Perspective Of Positive Psychology. Implications For Research On Development In Adult

- hood. *Polish Psychological Bulletin*, 42(4), 215–225. doi: 10.2478/v10059-011-0028-4
- Reio, T.G., Petrosko, J.M., Wiswell, A.K. & Thongsukmag, J.T. (2006). The Measurement and Conceptualization of Curiosity. *The Journal of Genetic Psychology*, 167(2), 117–135.
- Renner, B. (2006). Curiosity About People: The Development of a Social Curiosity Measure in Adults. *Journal of Personality Assessment*, 87(3), 305–316.
- Richman, L.S., Kubzansky, L.D., Maselko, J., Ackerson, L.K. & Bauer, M. (2009). The relationship between mental vitality and cardiovascular health. *Psychology of Health*, 24(8), 919–932.
- Silvia, P.J., Kashdan, P.B. (2009). Interesting Things and Curious People: Exploration and Engagement as Transient States and Enduring Strengths. *Social and Personality Psychology Compass*, 3(5), 785–797. doi:10.1111/j.1751-9004.2009.00210.x
- Spielberger, Ch.D., Reheiser, E.C. (2009). Assessment of Emotions: Anxiety, Anger, Depression, and Curiosity. *Applied Psychology: Health and Well-Being*, 1(3), 271–302. doi:10.1111/j.1758-0854.2009.01017.xap
- Swan, G.E., Carmelli, D. (1996). Curiosity and mortality in aging adults: a 5 year follow-up of the Western Collaborative Group Study. *Psychology of Aging*, 11(3), 449–453.
- Wilson, R.S., Mendes de Leon, C.F., Bienias, J.L., Eveans, D.A. & Bennett, D.A. (2004). Personality and mortality in old age. *Journal of Gerontology*, 59, 110–116.
- Włodarczyk, D. & Wróblewski, Ł. (2006). *Lęk-cecha i ocena stresu a jakość życia uwarunkowana stanem zdrowia u chorych po zawale serca [Trait-anxiety, stress appraisal and health-related quality of life in MI patients.]*. In: T. Pasikowski, H. Sęk (Eds.). *Psychologia zdrowia: teoria, metodologia i empiria* (85–99). Poznań: Bogucki Wydawnictwo Naukowe.
- Wrześniewski, K. (2010). Pomiar jakości życia pacjentów kardiologicznych w Polsce – status naukowy najczęściej stosowanych kwestionariuszy [Measurement of quality of life in cardiac patients in Poland – the scientific status of most widely used questionnaires]. *Polski Przegląd Kardiologiczny*, 12(2), 121–125.
- Wrześniewski, K. (2009). Jak badać jakość życia pacjentów kardiologicznych [How to assess quality of life in cardiac patients]. *Kardiologia Polska*, 67, 790–794.
- Wrześniewski, K. (2008a). *Pomoc psychologiczna pacjentom z zawalem serca [Psychological support for patients with myocardial infarction]*. In: J. Kubica, W. Sinkiewicz (Eds.). *Chory po zawale serca* (pp. 134–142). Gdańsk: Via Medica.
- Wrześniewski, K. (2008b). *Czy jakość życia kobiet z chorobą niedokrwinną serca jest gorsza niż mężczyzn? [Is quality of life lower in female than in male patients with ischemic heart disease?]*. In: J. M. Brzeziński, L. Cierpiałkowska (Eds.). *Zdrowie i choroba. Problemy teorii, diagnozy i praktyki* (334–341). Gdańsk: Gdańskie Wydawnictwo Naukowe.
- Wrześniewski, K. (2006). *Wybrane zagadnienia teoretyczne i metodologiczne pojęcia jakości życia [Selected theoretical and methodological issues concerning the notion of quality of life]*. In: T. Pasikowski, H. Sęk (Eds.). *Psychologia zdrowia: teoria, metodologia i empiria* (61–73). Poznań: Bogucki Wydawnictwo Naukowe.
- Wrześniewski, K. (2004). *Interakcyjny model radzenia sobie ze stresem po zawale serca [An interactive model of coping with stress after myocardial infarction]*. In: K. Wrześniewski, D. Włodarczyk (Eds.). *Choroba niedokrwinną serca. Psychologiczne aspekty leczenia i zapobiegania* (69–107). Gdańsk: Gdańskie Wydawnictwo Naukowe.
- Wrześniewski, K. (2000a). *Style i strategie radzenia sobie ze stresem. Problemy pomiaru [Styles and strategies of coping with stress]*. In: I. Heszen-Niejodek, Z. Ratajczak. *Człowiek w sytuacji stresu. Problemy teoretyczne i metodologiczne*. Katowice: Wydawnictwo US.
- Wrześniewski, K. (2000b). Development of a Polish version of the Nottingham Health Profile. *Quality of Life Newsletter*, 25, 10.
- Wrześniewski, K. (1991). Trójczynnikiowy inwentarz stanów i cech osobowości [A three-factor inventory of personality states and traits]. *Przegląd Lekarski*, 48, 222–225.