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Health enhancing coping as a mediator in relationships of positive emotionality and cognitive curiosity with quality of life among type 2 diabetes patients

Abstract: *The number of people suffering from type 2 diabetes has been growing recently. This chronic disease is connected with lower perceived quality of life and experiencing a lot of stressful situations. Some of these situations can be anticipated. Thus, it is possible to prepare oneself for future difficult situations by using proactive coping strategies. The aim of this research was to verify the level of satisfaction with various areas of life, the frequency of use of proactive coping strategies in the case of type 2 diabetes patients and healthy individuals, as well as mediation role of these strategies in the relationship between positive emotionality, cognitive curiosity and perceived quality of life. One hundred and seventy four persons took part in the research: 85 persons with diabetes and 89 healthy individuals. We used instruments with recognized psychometric properties: The Proactive Coping Inventory, The World Health Organization Quality of Life Instrument-BREF, PANAS Questionnaire and State-Trait Personality Inventory. The analysis of the results showed, among other things, that people suffering from type 2 diabetes are the least satisfied with their health, and the most with their treatment and knowledge about the disease. Healthy individuals are the most satisfied with the physical domain and one's present life, whereas the least satisfied with the environmental domain. Both groups differ in terms of using proactive coping strategies. People with diabetes most often adopt a preventive strategy, whereas healthy individuals a reflective one. Two strategies turned out to be able to mediate in the relationship of positive emotionality and life satisfaction in the diabetes group. It was a strictly proactive and preventive coping strategy. No mediation effect was found in the group of healthy people. The results show that in the face of anticipated difficulties, people with type 2 diabetes try to protect their current resources by resorting to their existing knowledge, the level of which they are most satisfied with. The higher the positive emotionality/cognitive curiosity among people with type 2 diabetes, the higher their satisfaction with life, which is due to the fact, that they more frequently use proactive or preventive strategies to cope with stress.*

Key words: *diabetes mellitus type 2, proactive coping, positive emotionality, cognitive curiosity*

According to the World Health Organization (1993) quality of life is defined as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.

Quality of life is affected by the person's physical health, psychological state, social relationships, independence level, and their relationships to salient features of their environment. A term frequently used in medicine nowadays is Health-Related Quality of Life (Schipper, 1990), which assumes that this domain is one of the fundamental indicators of quality of life (Wołowicka, 2001). This relation is particularly noticeable in the case of diseases, such as chronic non-communicable diseases, including type 2 diabetes (WHO, 2011). The frequency

of the occurrence of diabetes in the population, as with other diseases of civilization, keeps growing. It accounts for 90% of all diabetes cases. Current statistics show that three million people in Poland suffer from diabetes, whereas only 2/3 of this group has been diagnosed (Novo Nordisk, 2014). This disease was described by the UN at the end of 2006 as the first among the epidemics of the 21st century (Silink, 2007). Diabetes is considered to be one of the main health care problems these days, both from a medical and socioeconomic point of view (Tatoń, Czech, & Bernas, 2008). It affects people regardless of their race or the place they live. Diabetes, just like other chronic diseases, affects patients' general perceived quality of life and their satisfaction with individual areas (Walker, 2007). Monitoring the quality of life of

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diabetic patients was an issue proposed in the St. Vincent Declaration in 1989 (Krans, Porta, & Keen, 1992). This indicates that the significance of this parameter is related, among other things, to finding its determining factors. The research shows that the level of perceived quality of life is affected by both clinical and sociodemographic factors. The quality of life among people suffering from diabetes deteriorates with age and the duration of the disease (Rubin & Peyrot, 1999; Redekop et al., 2002). This relationship is particularly noticeable in the group of women (Coelho, Amorim, & Prata, 2003). Indicators of a positive assessment of quality of life decrease together with an increase in the level of education. Disease-related complications and methods of treatment for them are also of importance (Redekop et al., 2002). Another factor connected with a low subjective assessment of quality of life is a lower level of physical activity related to everyday activities performed by the sick person (Glasgow et al., 1997). The research by Bradley et al. shows the importance of dietary restrictions (Bradley & Speight, 2002), overweight and a high level of HbA1c (Bradley & Lewis, 1990) as the variables implicating a reduced psychological well-being. In their study, Koligat et al. (2012) established that social participation, strong family bonds and good living conditions have a positive influence on the level of perceived quality of life. A disease, which has lasted for many years, may affect the quality and quantity of social contacts, lowering satisfaction with this domain at the same time (Pietrzykowska, Zozulińska, & Wierusz-Wysocka, 2007). A sick person may be dissatisfied with their psychological domain and have a lowered quality of life in this respect at the same time (Bosić-Živanović, Medić-Stojanoska, & Kovačev-Zavišić, 2012). Bradley and Speight (2002) showed that among the sick, in almost every case a negative influence of a disease on the quality of life can be noticed in all the domains, with a high level of satisfaction with treatment at the same time.

According to positive psychology, a person's well-being and perceived quality of life depend highly on the person's characteristics (predispositions), which "on the one hand make an individual independent and responsible for their quality of life, and on the other decide to a large extent what use does he/she make of their biological and social opportunities for his/her own and other people's well-being" (Trzebińska, 2008, p. 67). One of the crucial features in this context is positive emotionality, i.e., a predisposition to consistently experience positive emotions, which, as the research shows (Costa & McCrae, 1980, 2005; Watson, 2004), is equated with extroversion. Positive emotions lead in many ways to a good life (e.g., Fredrickson, 2002; Isen, 2004; Watson, 2002). They initiate physiological processes, which are beneficial for our health, they lead to changes in the organization of cognitive processes and improve social functioning (Isen, 2004). They also create the ability to integrate diverse material (Isen, 2005). Positive emotions are conducive to new behaviours, including problem solving. They reconstruct, broaden and develop the mental resources of a person (Fredrickson, 1998, 2001), lead to a bigger number and variety of ideas, and

to more inventive (creative) behaviour by leaving behind habitual ways of coping (Fredrickson & Branigan, 2005). They produce an effect of removing the changes, which occur due to negative emotions (Fredrickson, Mancuso, Branigan, & Tugade, 2000). Influenced by positive emotions we develop "resources, which may be used in the future when coping with life challenges and difficult situations" (Sęk, 2008, p. 77). Aspinwall (1998) underlines that people with a higher level of positive reactions use less defence mechanisms in the processes of coping with difficult situations and less escapist strategies. To sum up, the frequency of experiencing positive emotions is important for an individual's well-being, quality of life and health. Positive emotions and well-being in patients with type 2 diabetes are connected with better glycaemic control (Papanas et al., 2010; Tsenkova, Love, Singer, & Ryff, 2007, 2008), a smaller percentage of complications such as coronary heart disease (Davidson, Mostofsky, & Whang, 2010), and a decline in mortality rate (Moskowitz, Epel, & Acree, 2008). The research showed also that positive emotions are linked in this case with a lower level of cortisol secretion during the day, after awakening, and in stressful situations (Bostock, Hamer, Wawrzyniak, Mitchell, & Steptoe, 2011; Mikolajczak et al., 2010). A relation was also found between positive emotions and increased physical activity (Plotnikoff, Trinh, Courneya, Karunamuni, & Sigal, 2011).

Another important feature connected to this subject is cognitive curiosity. It is a predisposition associated with a readiness to respond to any changes and innovations, a preference for novelty, a willingness to seek and broaden one's knowledge, a tendency to eliminate information loopholes and solve problems (Berlyne, 1954; Spielberg & Starr, 1994; Litman, 2008; Spielberg & Reheiser, 2009). Cognitive curiosity is bound up with cognitive openness (McCrae & John, 1992), flexibility of thinking and understanding one's own situation, as well as with openness to unconventional interpretations. The research shows that this feature, similarly to cognitive curiosity, is connected to life satisfaction (DeNeve & Cooper, 1998; Park, Peterson, & Seligman 2004; Peterson, Ruch, Berman, Park & Seligman, 2007; Shimai, Otake, Park, Peterson, & Seligman, 2006). Eldesouky (2012) thinks that cognitive curiosity, openness to experience, which is defined as an acceptance of changes, ability to imagine various consequences, and thinking of events in different possible ways, helps an individual to function better emotionally during the disease. This feature is helpful in adjusting to the conditions of physical illness also because it manifests itself in an activeness oriented towards adopting coping activities. Curious and cognitively open individuals are willing to engage themselves in behaviours, which are satisfying for them. This is particularly important in the case of people with a chronic disease. Seeking activeness, also cognitive, improves patients' mood, strengthens their self-confidence and helps them to fight the disease (Eldesouky, 2012). Cognitive openness helps in the cognitive study of a disease situation, and one's current and future abilities, because it is a basis for a broad

understanding of various events, fluency of thinking and noticing a larger number of possible solutions (DeYoung et al., 2003; after: Eldesouky, 2012). The research shows that proactive strategies (Greenglass, Schwarzer, Jakubiec, Fisenbaum, & Taubert, 1999) and cognitive curiosity (Eldesouky, 2012) are conducive to a better functioning and sense of health, and sometimes to a higher assessment of one's quality of life (Kjell, Nima, Sikstrom, Archer, & Garcia, 2013). However, the example from the research by Hambrick and McCord (2010) shows that the relationship between cognitive openness measured by the BIG-FIVE personality test with applying proactive strategies is very weak. Richman et al. (2005) observed, that curiosity is related to lower prevalence of type 2 diabetes.

Every disease, chronic in particular, may be a source of psychological stress (Heszen & Sęk, 2008). This stress is generated by both difficulties stemming from many limitations dictated by the disease, which entail lifestyle changes, and awareness of the possibility of the occurrence of future secondary difficulties concerning the somatic and psychological domains. According to research by DAWN 2 (Diabetic Attitudes, Wishes and Needs), 56.7% of diabetics in Poland suffer from severe stress connected with their disease (Nicolucci et al., 2013). Thus, it is crucial to be able to cope with emerging difficulties. Recently, the importance of proactive strategies has been underlined. They are oriented towards anticipated stress and are used with the aim of avoiding, reducing and preventing the development of difficulties in their early phase, instead of eliminating stress factors after their activation (Aspinwall & Taylor, 1997). Proactive strategies give the possibility of personal development, they are challenge-oriented, conducive to the creation and reinforcing of the resources helpful in achieving one's own goals (Greenglass, 2002; Schwarzer 2001; Schwarzer & Taubert, 2002). The concept of proactive coping with difficulties is connected to a salutogenetic approach to stress, underlines a positive aspect of coping (Schwarzer & Knoll, 2003) and thus deserves to be widely used in health psychology (Heszen & Sęk, 2008). The research results conducted on various groups show that proactive coping strategies are associated with a higher level of satisfaction with life (Greenglass, 2002; Sęk & Pasikowski, 2003; Uskul & Greenglass, 2005), as well as with subjective health indicators (Pasikowski, Sęk, Greenglass, & Taubert, 2002) and a positive attitude (Greenglass & Fiksenbaum, 2009). The research conducted on the group of patients with diabetes revealed, among other things, that proactive coping strategies are conducive to a better preparation for life with the disease, including more effective self-control in the case of both recently diagnosed patients (Thoolen et al., 2009) and patients already suffering from the disease, especially those middle-aged and older (Naik et al., 2012). In the last case, proactive strategies are also conducive to keeping resources necessary for coping with aging processes. As Collins, Bradley, Sullivan and Perry (2009) showed in interviews conducted with the group of sick people, a higher level of self-control among people proactively coping with a disease is connected with a personal conviction about one's own responsibility for

functioning in the disease and a feeling of self-efficacy, as well as acknowledging health as one of the highest values. People with a proactive attitude actively plan their own actions taken in the context of the disease (including glycaemic control) and contact health services more frequently in order to dispel doubts and set treatment goals.

In the context of chronic diseases associated with numerous complications that generate stressful situations, it seems legitimate to examine the relationships between health-related quality of life (Health-Related Quality of Life, Schipper, 1990), proactive coping with difficult situations and the personal predispositions of an individual, including positive emotionality and cognitive curiosity. Not much research has been conducted in this field in Poland so far, especially when it comes to people with type 2 diabetes. Thus, this research has been conducted, the aim of which was to answer the question as to whether proactive strategies of coping serve as mediators in relationships between positive emotionality/cognitive curiosity and general perceived quality of life as well as in terms of satisfaction with individual areas in the group of people with diabetes and in the group of healthy people. The research was exploratory in nature and, therefore, no particular expectations were framed. Analyses were carried out to find out what the level of perceived quality of life is in the groups studied and which area the respondents are most satisfied with. Our aim was to show also whether type 2 diabetes patients and healthy individuals differ in terms of using proactive coping strategies and which of these strategies are chosen most often. Intra group differences in the level of positive emotionality and cognitive curiosity were also verified.

Research method

Participants

One hundred and eighty middle-aged and older persons took part in the research: 90 persons with type 2 diabetes (43 women) and 90 (45 women) healthy persons (control group). Due to the partial lack of information, the final analysis was conducted on 174 persons: 85 persons with type 2 diabetes (38 women) and 89 healthy persons (44 women). The average age of both groups was similar ($t(172) = 1.77, p > .005, d = .27$). In the diabetes group it was 63.62 ($SD = 12.43$), whereas in the healthy group 6.63 ($SD = 9.91$). In the diabetes group 67% and in the healthy group 68.5% of the subjects had completed a higher or high school level of education. In the group of people with diabetes, 64% came from a big city and 24.7% from a small town. In the group of healthy people, 78.3% came from a big city and 12% from a small town. In the group of people with diabetes, 78.8% of the subjects were married, whereas in the group of healthy people 75.2%. 72% of subjects in the group with diabetes and 81% in the healthy group had children. The research was conducted at the premises of Naval Hospital Gdańsk (Szpital Marynarki Wojennej w Gdańsku). These people were hospitalized due to cardiovascular diseases, diabetic neuropathy, eye complications, or the necessity of metabolic adjustment. The average age of the disease duration was 1.85 years

(SD = 6.70). The research on healthy individuals was conducted on the participants of educational courses held in the academic centres of Tricity.

Procedure

The subjects started by filling out a form detailing their demographics, including sociodemographic information, and in the case of individuals with type 2 diabetes information regarding their disease (year of diagnosis, treatment methods). We used methods with recognized psychometric properties in the following part of the research. It is assumed that in the health-related quality of life research, both general methods (generic) as well as specific ones, which are oriented towards a particular disease, should be used. Thus, in the research we used two questionnaires to study this field. The World Health Organization Quality Of Life Instrument WHOQoL-Bref (WHO, 1995; Polish adaptation by Wołowicka & Jaracz, 2001) was used to evaluate the quality of life of healthy individuals and diabetic patients in the following areas: physical, psychological, concerning social relationships and environmental influences as well as general level of satisfaction with present life and health. This instrument contains 26 items and constitutes an abbreviated version of the WHOQoL 100 item method. The questions included in the instrument were concerned with positive and negative aspects assessed on a five-point scale. The first two questionnaire questions are analysed separately. The first one concerns satisfaction with the current situation, whereas the second satisfaction with health. The remaining 24 questions concern four previously mentioned areas. Questions regarding the physical domain are connected with everyday life activities, dependency on medications and treatment, energy and tiredness, feeling pain and discomfort, relaxation and sleep as well as ability to work (e.g., "To what extent do you think physical pain limits you in doing what you feel like doing?"). Questions related to the psychological domain concern external appearance, negative and positive emotions, self-esteem, spirituality and the cognitive sphere (e.g., "To what extent are you able to accept your appearance?"). Questions regarding social relationships deal with personal relationships, social support and sexual activity (e.g., "How satisfied are you with your personal relationships?"). The domain related to environmental influences concerns financial assets, freedom, physical and psychological security, health, availability and quality of health care, home environment, the possibility of acquiring new information and skills, the possibility of resting and taking part in recreational activities, and various aspects of the physical environment (pollution, noise, traffic, climate) (e.g., "How healthy in your opinion is your neighbourhood?"). All the questionnaire results are positive-oriented, the higher the score, the better quality of life in the particular domain. Cronbach's α for subscales in the research fell within the range of .71 to .84.

Quality of life in type 2 diabetes was measured with the use of Diabetes Quality of Life Brief Clinical Inventory – DQL (Burroughs, Desikan, Waterman, Gilin & McGill, 2004) in the Polish version (Dudzińska et al., 2013). The

questionnaire concerns the opinions of patients regarding different aspects related to their disease and its treatment (e.g., "Are you satisfied with your current diabetes treatment?"). It contains 15 items rated on a five-point scale. A higher combined result means a higher quality of life. The accuracy of the instrument is satisfactory, Cronbach's $\alpha = .75$. This questionnaire was used in the case of the criterion group only.

The Proactive Coping Inventory/Reactions to Daily Events Questionnaire (Greenglass, Schwarzer & Taubert, 1999; after: Pasikowski et al., 2002) was used to evaluate proactive coping strategies. The questionnaire consists of 55 statements to measure seven coping strategies. Proactive coping regards cognitive and behavioural strategies, which connect autonomy and goal setting as well as the achievement of these based on self-regulation (e.g., "Having reached one goal, I am seeking another one, which I would find more challenging."). Reflective coping applies to creating and considering alternative strategies (e.g., "I take action only after having considered the problem."). Strategic planning is connected to the process of making out a goal-oriented action schedule (e.g., "I draw up a plan and act according to it."). Preventive coping concerns general cognitive and behavioural strategies regarding anticipated stressful situations (e.g., "I am preparing myself for unfavourable circumstances."). Instrumental support seeking applies to one's social network as a source of help in the form of advice and general information (e.g., "Talking to other people may be very helpful, because it shows the problem from a different perspective"). Emotional support seeking is related to making use of one's own social network in order to open oneself emotionally and find company (e.g., "Other people make me feel that I am taken care of."). Avoidance coping is a passive and distanced approach to stress (e.g., "When I have a problem, I like to 'sleep it over', 'postpone it.'"). The subjects answer on a four-point scale, where one is "never" and four is "always" (Cronbach's α for the individual subscales is .64 – .79).

The Polish version of the Positive and Negative Affect Schedule PANAS (Watson, Clark & Tellegen, 1988; adaptation by Brzozowski, 2010) was used to measure emotional traits. This method consists of a list of 20 adjectives that describe positive (e.g., "enthusiastic") and negative (e.g., "upset") feelings. A subject should estimate with the use of a five-point scale the extent of the affect, which he/she usually feels. In this research the scale was used to measure positive emotionality. The accuracy of the instrument is satisfactory, Cronbach's α in the presented research for the positive emotions' scale was .83, and for negative .89.

The adaptation of a tripartite State-Trait Personality Inventory (Spielberger, 1979; Polish adaptation by Wrześniewski, 1991) was also used in the research. The questionnaire consists of 30 items regarding anxiety (e.g., "I feel tense and anxious, when I think about my recent problems."), anger (e.g., "I get angry very easily.") and curiosity (e.g., "I feel like getting to know my neighbourhood.") as a state or a trait. The study used a scale relating to curiosity as a permanent characteristic of an

emotional response. This subscale consists of 10 statements, which the subject rates on a four-point scale, evaluating how he/she feels generally. Cronbach's α for anxiety scale was .81, for curiosity scale .83, for the anger scale .88.

Results

A statistical analysis was carried out with the use of a SPSS 21 package.

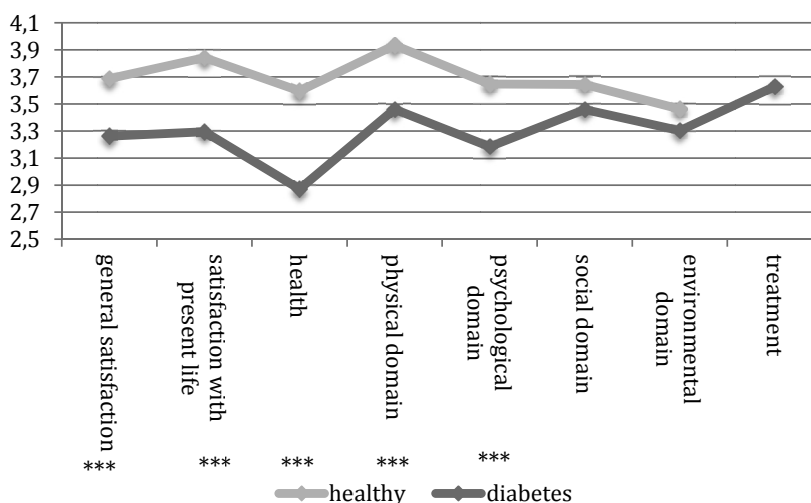
In order to verify the differences in satisfaction with aspects of life in general and in terms of satisfaction with specific areas, an analysis was conducted of variance in a mixed scheme, where the independent variable between the groups was membership of the group 2 (patients with diabetes \times healthy individuals), the intra group variable was the area of satisfaction 7 (area: general satisfaction \times satisfaction with present life \times satisfaction with health \times satisfaction with physical domain \times satisfaction with psychological domain \times satisfaction with social domain \times satisfaction with environmental domain), and the dependent variable was the level of satisfaction (Figure 1).

The analysis revealed the main effect of the satisfaction area: $F(6, 1032) = 17.65; p < .001, \eta^2 = .09$ and the effect of the interaction of both variables: $F(6, 1032) = 7.78; p < .001, \eta^2 = .04$. We carried out a direct effects analysis to study the interaction effect. This analysis showed a statistically significant difference in terms of general satisfaction ($M_h^1 = 3.68; SD = .51; M_d^2 = 3.26; SD = .52; t(161.642) = 4.94, p < .001, d = 1.31$), satisfaction with present life ($M_h = 3.82; SD = .76; M_d = 3.29; SD = .93; t(162.488) = 4.21, p < .001, d = 1.26$), satisfaction with health ($M_h = 3.59; SD = .91; M_d = 2.87; SD = .84; t(172) = 5.43, p < .001, d = 1.26$), satisfaction with physical domain ($M_h = 3.93; SD = .53; M_d = 3.46; SD = .94; t(163.599) = 5.26, p < .001, d = 1.17$)

and satisfaction with psychological domain ($M_h = 3.64; SD = .58; M_d = 3.18; SD = .76; t(154.546) = 4.39, p < .001, d = 1.28$). No significant intra group differences were observed with regard to the social domain ($M_h = 3.64; SD = .68; M_d = 3.45; SD = .82$) and the environmental domain ($M_h = 3.46; SD = .47; M_d = 3.30; SD = .69$).

The next step was to compare the satisfaction with individual areas for each group separately. It revealed which areas the subjects are the most and the least satisfied with. In the case of the type 2 diabetes group the analysis considered the results of Diabetes Quality of Life Brief Clinical Inventory DQL, which evaluates the quality of life of patients with diabetes, with a particular emphasis on treatment. The highest level of satisfaction in this group considers satisfaction with treatment, the lowest satisfaction with health. Satisfaction with treatment is considerably higher than other variables singled out in this scope, such as: general satisfaction with life ($t(84) = 8.17, p < .001, d = .67$); satisfaction with present situation ($t(84) = 4.28, p < .001, d = .47$); satisfaction with health ($t(84) = 9.37, p < .01, d = 1.11$); satisfaction with physical domain ($t(84) = 3.72, p < .001, d = .31$); satisfaction with psychological domain ($t(84) = 6.34, p < .001, d = .70$); satisfaction with social domain ($t(84) = 2.48, p < .001, d = .28$); and satisfaction with environmental domain ($t(84) = 5.31, p < .001, d = .56$). Satisfaction with health is considerably lower than other variables: general satisfaction ($t(84) = 5.49, p < .001, d = .53$); satisfaction with present life ($t(84) = 3.49, p < .001, d = .47$); satisfaction with psychological domain ($t(84) = 3.71, p < .001, d = .38$); satisfaction with social domain ($t(84) = 5.78, p < .001, d = .72$); satisfaction with environmental domain ($t(84) = 4.62, p < .001, d = .56$); and satisfaction with treatment ($t(84) = 9.37, p < .001, d = 1.11$). Satisfaction with the physical and social domain remains at a similar

Figure 1. Satisfaction with life (quality of life) in general aspects and in individual areas: average results



*** $p < .001$

¹ healthy people

² people with diabetes

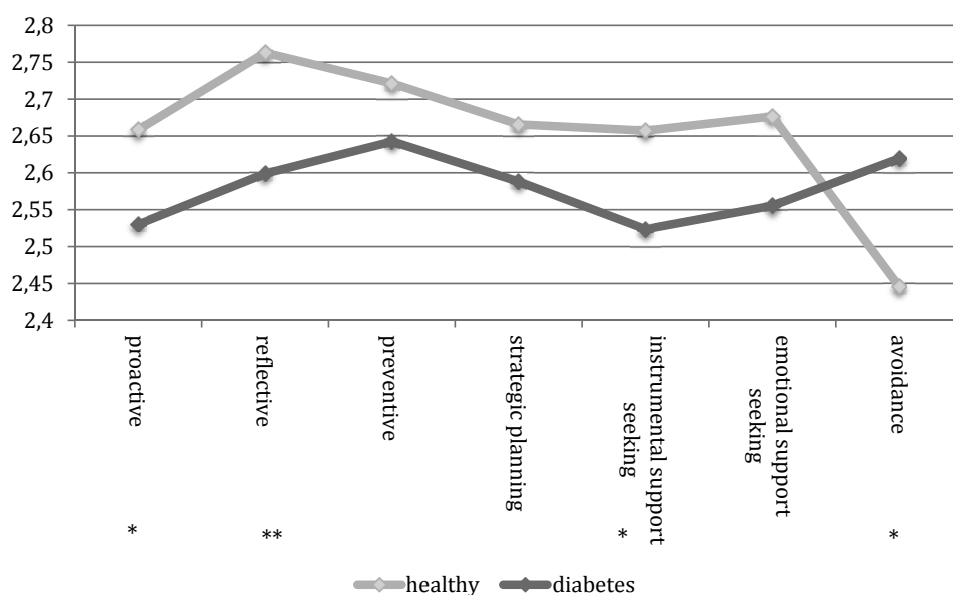
level. Satisfaction with the physical domain differs from satisfaction with the environmental domain ($t(84) = 2.99, p < .01, d = .25$); satisfaction with present life ($t(84) = 2.22, p < .05, d = .22$); general satisfaction ($t(84) = 5.23, p < .001, d = .30$); satisfaction with psychological domain ($t(84) = 4.07, p < .001, d = .39$); and satisfaction with health ($t(84) = 7.31, p < .001, d = .79$). Satisfaction with the social domain differs from satisfaction with the environmental domain ($t(84) = 2.12, p < .05, d = .21$); general satisfaction ($t(84) = 3.66, p < .001, d = .31$); and satisfaction with the psychological domain ($t(84) = 4.12, p < .001, d = .38$). Satisfaction with environmental and psychological domains, and satisfaction with present life and general satisfaction do not differ from each other.

In the healthy group, the highest, substantially different from the others, level of satisfaction concerns satisfaction with the physical domain and one's present life. Satisfaction with these domains is higher than the general level of satisfaction with life. Satisfaction with the physical domain differs from general satisfaction ($t(88) = 6.39, p < .001, d = .49$); satisfaction with health ($t(88) = 4.31, p < .001, d = .46$); satisfaction with the psychological domain ($t(88) = 5.19, p < .001, d = .52$); satisfaction with the social domain ($t(88) = 3.95, p < .001, d = .63$); and satisfaction with the environmental domain ($t(88) = 9.63, p < .001, d = .93$). Satisfaction with one's present life differs from general satisfaction ($t(88) = 3.20, p < .01, d = .25$); satisfaction with health ($t(88) = 4.12, p < .001, d = .30$); satisfaction with the psychological domain ($t(88) = 2.78, p < .01, d = .30$); satisfaction with the social domain ($t(88) = 2.71, p < .01, d = .29$); and satisfaction with the environmental domain ($t(88) = 5.28, p < .001, d = .60$). General satisfaction with life, and the psychological, social and health domains remain at a similar level. The lowest level of satisfaction concerns satisfaction with the

environmental domain. It differs from general satisfaction with life ($t(88) = 6.06, p < .001, d = .45$); satisfaction with one's present life ($t(88) = 5.28, p < .001, d = .60$); satisfaction with the physical domain ($t(88) = 9.63, p < .001, d = .94$); satisfaction with the psychological domain ($t(88) = 3.93, p < .001, d = .34$); and satisfaction with the social domain ($t(88) = 2.52, p < .01, d = .35$).

In order to verify the differences in terms of using proactive coping strategies, a second analysis was conducted of variance in a mixed scheme, where the independent variable between the groups was membership of the group 2 (patients with diabetes \times healthy individuals), an intra group variable was the type of proactive strategy used 7 (strategy: proactive \times reflective \times strategic planning \times preventive \times instrumental support seeking \times emotional support seeking \times avoidance), whereas a dependent variable was the preference (frequency) of using a strategy (Figure 2). The analysis revealed the main effect of the strategy $F(6, 1032) = 3.42, p < .001, \eta^2 = .02$ and the effect of both variables' interactions $F(6, 1032) = 4.01, p < .01, \eta^2 = .023$. We carried out a direct effects analysis to study the interaction effect. This analysis showed a statistically significant difference in terms of the frequency of use of a strictly proactive strategy ($M_h = 2.65; SD = .28; M_d = 2.53; SD = .41; t(148.200) = 2.36, p < .05, d = 1.30$), reflective strategy ($M_h = 2.76; SD = .32; M_d = 2.59; SD = .46; t(148.323) = 2.69, p < .01, d = 1.31$), instrumental support seeking strategy ($M_h = 2.65; SD = .39; M_d = 2.52; SD = .44; t(172) = 2.09, p < .05, d = 1.24$) and an avoidance strategy ($M_h = 2.44; SD = .45; M_d = 2.61; SD = .53; t(172) = -2.32, p < .05, d = 1.06$). No significant intra group differences were observed with regard to strategic planning ($M_h = 2.66; SD = .43; M_d = 2.58; SD = .69$), preventive coping ($M_h = 2.72; SD = .45; M_d = 2.64; SD = .47$) and emotional support seeking ($M_h = 2.44; SD = .45; M_d = 2.61; SD = .53$).

Figure 2. Proactive coping strategies in the examined groups: average results



* $p < .05$; ** $p < .01$

The next step was to compare between the strategies for each group separately in order to determine the most frequently used ones.

The most frequently used strategy in the diabetes group is the preventive one, the frequency of use of which differs substantially from the two least frequently used: emotional support seeking ($t(84) = 2.26, p < .05, d = .18$) and the strictly proactive one ($t(84) = 3.70, p < .01, d = .25$). No significant differences have been found between the remaining strategies in the group with diabetes. In the control group the most frequently used strategy was reflective coping. It has been used substantially more often in comparison to the strictly proactive strategy ($t(88) = 3.12, p < .01, d = .29$), strategic planning ($t(88) = 2.14, p < .05, d = .23$) instrumental support seeking ($t(88) = 1.98, p < .05, d = .26$), and the avoidance strategy ($t(88) = 5.61, p < .001, d = .71$). In the case of healthy individuals, the least often used strategy is avoidance. It is used much less often in comparison to the proactive strategy ($t(88) = 3.43, p < .001, d = .56$); the preventive strategy ($t(88) = 4.16, p < .001, d = .62$); strategic planning ($t(88) = 3.36, p < .001, d = .5$); instrumental support seeking ($t(88) = 3.98, p < .001, d = .5$) and emotional support seeking ($t(88) = 3.71, p < .001, d = .52$).

In order to verify the differences between the average levels of positive emotionality and cognitive curiosity in the groups studied, we carried out an analysis with the Student's *t*-test for the independent groups. The analysis revealed a significant difference in the level of positive emotionality ($M_h = 29.94; SD = 5.29; M_d = 28.29; SD = 4.08; t(172) = 2.09, p < .05, d = .32$) with no differences in terms of cognitive curiosity at the same time ($M_h = 27.79; SD = 5.81; M_d = 27.12; SD = 4.22$).

Subsequently, we conducted a number of analyses of mediation, in which the dependent variable was the level of satisfaction with life (in general terms and in specific areas), the independent variable was positive emotionality/cognitive curiosity, and proactive coping strategies served as a mediator. We used a statistical inference procedure developed by Baron and Kenny (1986). This procedure is used to show that an independent variable predicts a mediator (path a), a mediator is a predictor of a dependent variable, while controlling for an independent variable

(path b), and an independent variable is a predictor of a dependent variable, while controlling for a mediator (path c). It also tests a direct effect of an independent variable on a dependent variable without a mediator's involvement (path c'). Mediation occurs when the conditions of the statistical significance of the β value of a and b paths are met. Figure 3 shows the tested model.

Additionally, mediation effects were confirmed by Sobel's test. The results of a statistical analysis are presented in Tables 1–4.

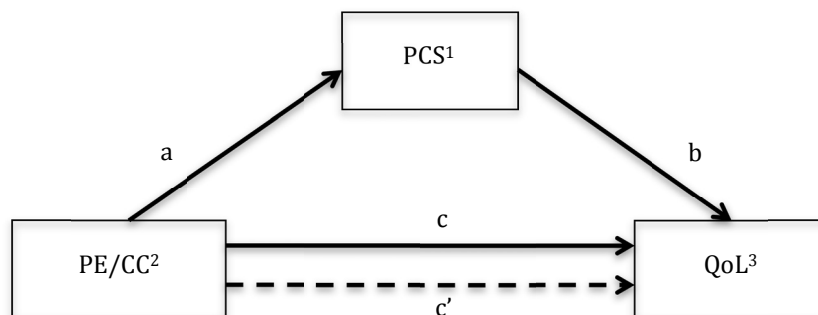
Two strategies turned out to be able to mediate in the relationship of positive emotionality and life satisfaction in the diabetes group. It was a strictly proactive and preventive coping strategy. In the case of a positive emotionality relationship with general quality of life, current satisfaction, satisfaction with health, satisfaction with the physical, social and environmental domain, and satisfaction with treatment, the mediation of a strictly proactive strategy is complete, whereas in the case of satisfaction with psychological domain, it is partial.

In the case of the relationship between positive emotionality and the general quality of life, current satisfaction, satisfaction with the psychological domain, satisfaction with the social and satisfaction with the environmental domain, the mediation of the preventive strategy is partial, whereas in the case of satisfaction with health it is complete. A mediation role of the preventive strategy in the relationship of positive emotionality and satisfaction with treatment was not found.

In the case of the relationship between cognitive curiosity relationship and general quality of life, and satisfaction with the psychological domain, the mediation of a strictly proactive strategy is partial. In the case of the other strategies no mediation role of this strategy in cognitive curiosity relationship with quality of life in the specified aspects was observed.

In the case of the relationship between cognitive curiosity and general quality of life, and satisfaction with the psychological domain, the mediation of a preventive coping strategy is partial. No mediation role of a preventive strategy was found in the relationship between cognitive curiosity and satisfaction with one's present life, satisfaction with health, satisfaction with the physical,

Figure 3. Tested mediation model



1 – proactive coping strategy; 2 – positive emotionality/cognitive curiosity; 3 – quality of life

Table 1. The results of the regression analysis including the effect of positive emotionality on the quality of life, mediated by a strictly proactive strategy

	General satisfaction			Satisfaction with present life		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
X→Y (c)	.05	.01	.40***	.06	.02	.32**
X→M (a)	.04	.01	.44***	.04	.01	.44***
M(X)→Y (b)	.95	.13	.63***	1.07	.22	.48**
X(M)→Y (c')	.02	.01	.15	.03	.02	.14
Sobel's Test	$Z = 3.56, p = .001$			$Z = 2.88, p = .004$		
	Satisfaction with health			Satisfaction with physical domain		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
X→Y (c)	.04	.02	.3**	.04	.01	.29**
X→M (a)	.04	.01	.44***	.04	.01	.44***
M(X)→Y (b)	.60	.21	.37***	.83	.15	.54***
X(M)→Y (c')	.01	.02	.01	.01	.01	.08
Sobel's Test	$Z = 2.59, p = .009$			$Z = 3.23, p = .001$		
	Satisfaction with psychological domain			Satisfaction with social domain		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
X→Y (c)	.07	.015	.42***	.05	.02	.33**
X→M (a)	.04	.01	.44***	.04	.01	.44***
M(X)→Y (b)	1.18	.16	.62***	.97	.19	.49***
X(M)→Y (c')	.03	.02	.18*	.02	.02	.14
Sobel's Test	$Z = 3.49$	$p = .001$		$Z = 3.21$	$p = .01$	
	Satisfaction with environmental domain			Satisfaction with treatment		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
X→Y (c)	.05	.01	.37***	.03	.01	.33**
X→M (a)	.04	.01	.44***	.04	.01	.44***
M(X)→Y (b)	.92	.15	.55***	.51	.12	.41***
X(M)→Y (c')	.02	.01	.16	.02	.01	.19
Sobel's Test	$Z = 2.93, p = .003$			$Z = 2.421, p = .015$		

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

social, and environmental domains, as well as satisfaction with treatment.

In the case of healthy individuals, proactive coping strategies are not mediators in the relationship between positive emotionality and satisfaction with life in both general aspects and individual areas. Similarly, no mediation role of these strategies was observed in the relationship between cognitive curiosity and variables regarding perceived quality of life.

Summary and discussion

A chronic disease is a situation of continuous stress. When suffering from a chronic disease, one can be faced with a loss of strength, a deterioration of one's health and difficulties in everyday functioning, which result, among other things, from complications or from being on medications. Such a state may bring about a loss of an individual's emotional and coping resources. Thus, those

Table 2. The results of the regression analysis including the effect of positive emotionality on the quality of life, mediated by a preventive coping strategy

	General satisfaction			Satisfaction with present life		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
X→Y (c)	.05	.01	.4***	.06	.02	.32**
X→M (a)	.03	.01	.34**	.03	.01	.34**
M(X)→Y (b)	.66	.12	.51***	.67	.20	.35***
X(M)→Y (c')	.03	.01	.25**	.04	.02	.23*
Sobel's Test	$Z = 2.57, p = .01$			$Z = 1.92, p = .05$		
	Satisfaction with health			Satisfaction with physical domain		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
X→Y (c)	.04	.02	.30*	.04	.01	.29**
X→M (a)	.03	.01	.34**	.03	.01	.34**
M(X)→Y (b)	.62	.18	.38***	.59	.13	.44***
X(M)→Y (c')	.01	.01	.04	.02	.01	.17
Sobel's Test	$Z = 2.19, p = .028$			$Z = 2.39, p = .016$		
	Satisfaction with psychological domain			Satisfaction with social domain		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	<i>B</i>
X→Y (c)	.07	.20	.42***	.05	.02	.33**
X→M (a)	.03	.01	.34**	.03	.01	.34**
M(X)→Y (b)	.75	.16	.46***	.74	.17	.43***
X(M)→Y (c')	.05	.02	.30**	.03	.02	.21*
Sobel's Test	$Z = 2.36, p = .018$			$Z = 2.33, p = .019$		
	Satisfaction with environmental domain					
	<i>B</i>	<i>SE</i>	β			
X→Y (c)	.05	.01	.37**			
X→M (a)	.03	.01	.34**			
M(X)→Y (b)	.61	.14	.43***			
X(M)→Y (c')	.04	.01	.25**			
Sobel's Test	$Z = 2.27, p = .023$					

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

who are the most successful in coping with the disease are people who show personal competence, which enables them to use proactive coping strategies aimed at reducing anticipated potential stress, strategies, which can prevent these difficulties or change their form into a milder one. It should be underlined that proactive strategies are considered as a resource of health (Poprawa, 2009). They are related to a feeling of control and to creating competence resources both in a situation of normative stress as well as in a disease-related one (Sęk & Pasikowski, 2003; Heszen, 2013). The research conducted showed that patients with type 2 diabetes

with numerous complications resulting from the disease use different proactive coping strategies in difficult situations in comparison to healthy people. Sick persons resort to a strictly proactive strategy, reflective coping and instrumental support seeking strategies less often than avoidance strategies. In effect, they set new life goals, create alternative action plans and evaluate their efficiency much less often than healthy individuals. They also show much less desire to obtain information, tools and ways of dealing with the problem than healthy people. However, they more frequently distance themselves from the problem situation. Similarly to healthy

Table 3. The results of the regression analysis including the effect of cognitive curiosity on the quality of life, mediated by a strictly proactive strategy

	General satisfaction			Satisfaction with psychological domain		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
X→Y (c)	.11	.01	.74***	.11	.01	.58***
X→M (a)	.06	.01	.64***	.06	.01	.64***
M(X)→Y (b)	.95	.13	.63***	1.18	.16	.62***
X(M)→Y (c')	.08	.01	.57***	.05	.02	.31**
Sobel's Test	$Z = 2.74, p = .006$			$Z = 3.47, p = .001$		
Satisfaction with environmental domain						
	<i>B</i>	<i>SE</i>	β			
X→Y (c)	.12	.01	.64***			
X→M (a)	.06	.01	.64***			
M(X)→Y (b)	.92	.15	.55***			
X(M)→Y (c')	.08	.02	.48**			
Sobel's Test	$Z = 2.14, p = 0.032$					

** $p < .01$, *** $p < .001$ **Table 4. The results of the regression analysis including the effect of cognitive curiosity on the quality of life, mediated by a preventive coping strategy**

	General satisfaction			Satisfaction with psychological domain		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
X→Y (c)	.11	.01	.74***	.12	.02	.58**
X→M (a)	.06	.01	.50***	.06	.01	.50***
M(X)→Y (b)	.67	.12	.51***	.75	.16	.46***
X(M)→Y (c')	.24	.11	.19*	.09	.02	.46***
Sobel's Test	$Z = 2.44, p = .04$			$Z = 1.98, p = .047$		

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

individuals, they use strategies connected with the process of determining a specific goal-oriented action schedule, they try to anticipate and prevent threats, and use their own social networks for emotional openness and for seeking company. The research conducted on a younger group of people with type 2 diabetes, suffering from the disease for a shorter time and characterized by fewer complications, showed no differences in their level of use of all the proactive coping strategies in comparison to healthy people (Kalka, 2014). The analysis of differences in the use of strategies within the examined groups showed that people with diabetes with many complications of the disease most often adopt a strategy based on risk anticipation and prevention, while they are the least likely to generate new goals associated with the process of self-realization, and seek advice and information on the ways of coping with difficulties in their

own social network. The previously conducted research in the younger group of patients, who had suffered from the disease for a shorter time period, revealed that they choose most often a strategy based on the analysis of the situation, creating alternative action plans and evaluating their efficiency. Avoidance and distancing from the problems are used least frequently by this group (Kalka, 2014). Such a system of strategy selection turned out to be characteristic of the older group of healthy people in the current research. It should be underlined that younger healthy individuals did not differ in terms of their use of proactive strategies (Kalka, 2014). The significance of learning positive proactive strategies (excluding avoidance strategy) in the case of people with type 2 diabetes was indicated in the research by Thoolen et al. (2009), which shows that interventions aimed at proactive coping learning by examining potential

limitations and difficulties connected with the disease, and by creating effective action plans for the future and trying them out in the case of recently diagnosed patients are conducive to a better preparation for life with the disease, including more effective self-control. People with a high level of self-control are characterized by a bigger engagement in coping with their disease, as well as by an expectation of acquiring the necessary information, also by more frequent contact with doctors (Collins, Bradley, Sullivan, & Perry, 2009). It should be noted that an appropriate level of self-control may positively affect a delay in the emergence of disease-related complications, is conducive to sticking to dietetic instructions and a change of lifestyle. The research by Naik et al. (2012) showed that proactive strategies become more significant in the case of middle-aged and older people, who struggle with a disease and its consequences for a long period. The results of the research presented in the article show however, that in the case of people with type 2 diabetes, their age, the duration and the extent of the disease-related complications may constitute significant factors influencing their choice of proactive coping strategies' use. Perhaps suffering from the disease for a long time and struggling with its complications cause people with type 2 diabetes, in the face of the anticipated difficulties, to protect their current resources and resort only to their existing knowledge. Distancing from the problem situation blocks the possibility of increasing one's resources, that is, a proactive attitude. These variables will be taken into consideration in the future research.

As was already mentioned, diabetes, just like other chronic diseases, affects patients' general perceived quality of life and their satisfaction with individual areas of life (Rubin & Peyrot, 1999; Koligat et al., 2012; Pietrzykowska, et al., 2007; Bosić-Živanović, et al., 2012; Kalka, 2014). The results of the presented research show that sick persons (who have suffered from the disease for many years) declare lower, both general perceived quality of life and perceived quality of life in terms of their current situation and the health domain. It should be noted at the same time that the latter is the area with which people with diabetes are the least satisfied. Lower perceived quality of life in this respect is undoubtedly connected with limitations and complications resulting from the disease, generating negative tension and emotions, or with the co-existence of other diseases, as well as with the necessity of changing one's lifestyle. The highest declared level of satisfaction among people with diabetes, on the other hand, concerns broadly understood treatments and information about the disease area. This result seems to correspond with the rarest use of the coping strategy in the form of instrumental support seeking. The results of the presented research coincide with the results of the already quoted research by Bradley and Speight (2002), which showed that in case of the most sick, a decrease in quality of life can be noticed, with a high level of satisfaction with treatment at the same time.

Sick people are also less satisfied with the physical domain concerning activities of everyday life, energy levels, mobility, the possibility of resting and sleeping, and the ability to work and the psychological domain connected with satisfaction with appearance, spirituality

and the cognitive sphere in comparison to healthy people. However, the research conducted on the younger group of patients, who had suffered from the disease for a shorter time, revealed no differences in comparison to healthy individuals in terms of the psychological domain (Kalka, 2014). In the presented research, the assessments of the quality of life do not differ between the groups only in these aspects of life, which do not concern an individual and his/her state and condition directly, that is in the social and environmental domains. Studies found in the literature show that diabetes, which has lasted for many years, may influence the quality and quantity of social contacts. The people closest to the sick person may not be able to support the sick person in the way he/she needs and even the sick people themselves may withdraw from social life (Pietrzykowska, et al., 2007) and lower their satisfaction in this area.

According to positive psychology, a person's well-being and perceived quality of life depend highly on the person's characteristics (predispositions). In our own research, we paid attention to two predispositions: positive emotionality and cognitive curiosity. The level of the first of these traits turned out to be higher in the group of healthy individuals, whereas the second one remains at a similar level in both the diabetes group and the healthy one.

The grounds for examining the mediation function of proactive coping strategies for the relationship with positive emotionality/cognitive curiosity and quality of life are the connections between those factors presented separately (e.g. Fredrickson, 2003; Aspinwall, 1998; Park, et al., 2004; Greenglass, 2002; Kjell, et al., 2013). Both in the case of type 2 diabetes patients and healthy people, a relationship was observed between positive emotionality and cognitive curiosity with the quality of life indicators, including general satisfaction, satisfaction with present life, satisfaction with health, satisfaction with physical, psychological, social and environmental domains, satisfaction with a broadly understood treatment, and knowledge about the disease. Two of the proactive strategies turned out to mediate this relationship only in the group of sick people. In the case of the connection between the examined predispositions and general satisfaction, only the strictly proactive strategy functions as a mediator in the complete mediation for the relationship between positive emotionality and a specific satisfaction indicator. Regarding the preventive strategy, in the case of the relationship of both predispositions with perceived quality of life in general aspects, mediation is partial, just as with regard to the proactive strategy in the case of the relationship between cognitive curiosity and general satisfaction. Complete mediation, including a mediation role of the proactive strategy and a partial role of the preventive strategy, concerns the relationships between positive emotionality and satisfaction with one's present situation. In the case of the relationship of this trait with satisfaction with health and the physical domain, both strategies serve as mediators in complete mediation. Both in the case of the proactive as well as the preventive strategy, mediation between both predispositions and satisfaction

with appearance, spirituality and the cognitive sphere is partial. In the case of satisfaction with relationships with others, mediation was observed only in the connection with positive emotionality: full mediation in the case of the proactive strategy and partial mediation in the case of the preventive strategy. The proactive strategy completely mediates and the preventive one partially mediates the relationships between positive emotionality and satisfaction with one's living environment. The proactive strategy also partially mediates the relationship between cognitive curiosity and this area of satisfaction. It is worth mentioning that in the case of the relationship between one's predisposition to experience positive emotions, and satisfaction with treatment and the level of knowledge about diabetes, only the proactive strategy serves as a mediator and mediation is of a complete character. Thus, persons with type 2 diabetes, who have predispositions to experience positive emotions and persons with a higher level of cognitive curiosity, rate their quality of life higher in many aspects, as long as they use cognitive and behavioural proactive coping strategies based on increasing their resources in the first case, and protecting them in the second. In the group of healthy individuals, no mediation role of the proactive strategies oriented towards future stress for the relationship between positive emotionality/cognitive curiosity and satisfaction with life was found. Healthy individuals, regardless of the applied coping strategy, assess their quality of life as being higher if they are inclined to positive emotions and if they are cognitively curious.

To sum up – the results obtained expand on the previous research, which is described in the theoretical part of the article, showing relationships between the explored variables (e.g. Fredrickson, 2003; Aspinwall, 1998; Park, et al., 2004; Greenglass, 2002; Kjell, et al., 2013). The relationships of the examined predispositions with perceived quality of life are not of a direct character, but an indirect one. The two future-oriented coping strategies function as mediators. The higher the positive emotionality/cognitive curiosity among people with type 2 diabetes, the higher their satisfaction with life, which is due to the fact that they more frequently use proactive or preventive strategies to cope with stress. This study expands the results of the previous research on the determinants of the perceived quality of life in the case of people with type 2 diabetes. In the Polish research field, the main subject of the study was the role of reactive strategies, e.g., in the research by Kaczmarek (2011) conducted on other groups of chronically ill, it was shown that reactive strategies (e.g., positive redefinition) function as mediators between another predisposition – psychological resilience and satisfaction with life. The occurrence of partial mediation in the above mentioned cases suggests the necessity for further exploration in this field. Thanks to dealing with the relationships between predispositions, perceived quality of life and the variables, which are essential for this relationship, we are able to explain individual differences in the level of well-being and planning the interactions, which increase individuals' ability to achieve a good life

(Trzebińska, 2008). In the case of people with diabetes, education, including teaching patients how to use proactive strategies, enables them to develop a better self-control with respect to the disease and its complications, as well as an improvement of the quality which results in a prolonging of the patient's life. These kinds of interventions are effective irrespective of their form: they may include direct contact with a sick person or interventions by phone. Naik et al. (2012) confirmed the effectiveness of short (30–45 minutes long) interventions held for 12 weeks in developing self-control in terms of physical and emotional health among people with type 2 diabetes.

A limitation of the presented research may be that it focused only on people with type 2 diabetes in their late adulthood. It would be advisable to broaden the analysis in further research to groups of patients of other ages. It would also be advisable to control for other variables, which have not been taken into account in this research, and which, to a large extent, are connected to the process of adapting to the role of a sick person, with significance for the perceived quality of life at the same time (Dąbrowska et al., 2012). They also constitute the factors, which influence the process of developing a strategy of coping with difficult situations. These are, among others, sex, age at which the disease was diagnosed, a disease's duration, various kinds of complications, a type of therapy (Redekop et al., 2002; Pufal et al., 2004). It is also worth broadening the field of exploration by looking at other personal predispositions.

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