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PERSONALITY TRAITS AND QUALITY OF LIFE OF MOTHERS WHO HAVE CHILDREN WITH CEREBRAL PALSY

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SUMMARY

***Background**: The quality of life (QOL) of mothers who have children with cerebral palsy (CP) is significantly worse than in mothers with typically developing children. In available literature we have not found an approach which analyzes the correlation of mothers' personality traits with their QOL and health related quality of life (HrQOL).*

***Subjects and methods**: The study included 101 mothers of children with CP, aged 4 to 18 years. Mothers' personalities have been assessed by Eysenck EPQ - R questionnaire that determines three personality traits: neuroticism/emotional stability, extroversion/introversion and psychoticism. Maternal HrQOL was assessed by SF-36 questionnaire, Short Form, and their emotional well-being by WHO 5 well-being index. In addition, the influence of mothers' religiosity was also analyzed, using DUREL Religiosity Questionnaire. Motor assessment of children was performed using Gross Motor Function Classification System. The control group consisted of mothers of typically developing children of the same age.*

***Results**: Participants with high levels of extraversion had better QOL and HrQOL, as opposed to those with high levels of neuroticism and psychoticism, who had worse physical and mental health. The degree of children's motor impairment and mothers' religiosity did not influence QOL.*

Regression analysis distinguishes the following predictors for better mothers' QOL: better their mental health, greater level of their vitality, extroversion, living with a partner, a lesser degree of children's motor impairment and better their QOL.

***Conclusions**: It is vital to identify the factors that affect QOL of a mother and a child with CP. We consider it justified to regularly conduct mothers' professional monitoring and treatment simultaneously with children's treatment and we propose the protocol for the individual and targeted approach.*

***Key words:** cerebral palsy - quality of life - personality traits – religiosity - mothers*

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INTRODUCTION

Cerebral palsy (CP) is a group of developmental disorders of movement and posture that cause limitations in activities as a result of non-progressive damage of fetal or neonatal brain. Motor disorder is often accompanied by sensory, cognitive, communicative and behavioral disorders, as well as by seizures (Bax et al. 2005).

It is one of the most common causes of chronic disability in childhood (Naletilic et al. 2009, Yeargin – Allsop et al. 2008).

Parenthood naturally involves constant care for child. The role and importance of this care changes significantly in respect of a child who is chronically disease and condemned to a long-lasting dependency. Caring for this children permeates all aspects of life of their families, particularly parents, causing a deterioration of their physical and mental health, and the quality of their life (QOL)) (Davis et al. 2010, Guillamon et al. 2013, Khayatzadeh et al. 2013, Ones et al. 2005).

If a parent is unable to provide their child with adequate care and support because of their own poor physical or mental health, the child is likely to achieve a lower degree of functionality and independence in relation to its potential (Murphy et al. 2011). How parents will deal with this demanding parenting depends on their techniques to cope with stress, their self-confidence and capabilities to adapt to a challenging situation (Guillamon et al. 2013). Research shows that a parent who spends more time caring for their disabled child, and that is the mother in most cases, had worse mental health than those who are less with their child (Byrne et al. 2010).

QOL is an individual's personal experience of life in the context of personal value systems and culture to which they belong, taking into account their goals, standards, expectations and interest (WHOQOL 1995). Health-Related Quality of Life (HrQOL), is a narrower term that encompasses health components that are related to life satisfaction as well as the ability of self-caring and nursing, mobility and communication (Rosenbaum et al. 2007).

Among a lot of available studies on the impact of various factors on the health and QOL of children with CP and their families, we have not found an approach which analyzes the correlation of mothers' personality traits with their QOL. It is well-known that there are people who look at life negatively and gloomily, despite the favorable circumstances in their lives, while on the other hand, there are people with cheerful and positive life attitude despite the failure and difficulties (Sprangers et al. 2010). The way an individual will cope with stress depends on environmental factors, but also on their genetic traits.

The structure of personality is very broad and poorly defined term, but it could be claimed that it is relatively stable combination of thoughts, feelings and behaviors that make an individual unique (McCrae et al. 2000).

According to Eysenck or PEN personality theory, there are three main traits: psychoticism, extroversion/ introversion and neuroticism/mental stability (Eysenck 1970). Extroversion is characterized by sociability, vitality, activity, while neuroticism is marked with anxiety, low self-esteem, and shyness accompanied with depression. People with high levels of psychoticism are aggressive, cold, impulsive, antisocial, unsympathetic, but creative as well (Eysenck 1970, Eysenck 1992).

As in our traditional Balkan conditions mothers conduct most of nursing and care for their disabled children, submitting their lives entirely to their child's life, we aimed to investigate the correlation of their health and QOL with their personality traits.

SUBJECTS AND METHODS

Data for this study were collected from the Registry of children with CP, which is kept by the Department of Physical Medicine and Rehabilitation at the University Clinical Hospital Mostar and, from the Archives of the Department for Psychophysical and Speech Difficulties of the Health Center Mostar and schools for children with special needs in Western Herzegovina, i.e. the southern part of Bosnia and Herzegovina.

Inclusion criteria for this study were:

- Children with CP, aged 4 to 18 years, and their mothers;
- A child and his/her mother had to live in the same household in Herzegovina.

After contacting mothers and after their written inform consent to participate in the research together with their children, we invited them to come with their children to the Department of Physical Medicine and Rehabilitation to fill in questionnaires and to conduct an assessment of the children's motor abilities. In case that a mother could not come, we went to her home. Thus, the testing sample was performed on 101 mothers with children with CP (CP group).

The control group was formed in collaboration with family physicians. It consisted of mothers of typically developing children, ie, children without chronic diseases of the same age. They filled in the same questionnaire as the CP group of mothers.

Children's motor assessment was made on the background of analysis of their gross motor abilities using the Gross Motor Function Classification System (GMFCS) (Palisano et al. 1997). This classification system clearly shows the extent of the impairment and gross motor abilities.

After the clinical examination, the children were classified into one of five levels of impairment: Level I - independently moveable at home and in the community; Level II - independently moveable children who need help out of the house and in demanding activities; Level III – children who use aids for walking around the house and in the community; Level IV – those who need help of aids or support of arms when sitting down and standing up, move with the help of aids, and need the help of others when climbing stairs; Level V - severe motor impairment, they do not move with the help of aids, completely dependent on the help of others.

Mothers filled in the following standardized questionnaires:

- SF – 36, Short Form (Ware & Sherbourne 1992);
- Eysenck Personality Trait Questionnaire (Eysenck & Eysenck 1975);
- Questionnaire on general well-being of the World Health Organization (WHO Five Well - Being Index 1998) (WHO 1998);
- Religiosity Questionnaire – Duke University Religion Index (DUREL 1997) (Koenig et al. 1997).

SF - 36 Questionnaire, Short Form, assesses the HrQOL of people older than fourteen. It is used to self-assess the following eight health domains: physical functioning, role limitations (physical problems), role limitations due to emotional problems, social functioning, mental health, vitality and energy, bodily pain, general health perception. This questionnaire measures the physical and mental health and its two general manifestations: functioning and well-being (Ware & Sherbourne 1992). Domains of physical health, limitations due to physical difficulties, bodily pain and general health are related to the physical component, while domains of mental health, limitations due to emotional difficulties, social functioning and vitality/ energy are related to the mental component.

QOL of mother and child was measured on a numerical scale of zero to 10. Mothers circled the value that best fits their perception of their QOL and the children's QOL as they see it (from 0 = not at all satisfied to 10 = completely satisfied).

Eysenck's Personality Trait Questionnaire, EPQ-R, measures three basic dimensions of personality: extroversion/introversion, neuroticism/mental stability and psychoticism, and mendacity. Croatian translation of EPQ-R questionnaire, Short Form, was used, which

consists of 48 questions that offered "yes/no" answer patterns (Eysenck & Eysenck 2003). The maximum number of points for each personality traits is twelve, and a higher score indicates the greater tendency towards a certain type of personality.

Extroversion means openness, propensity to socializing; neuroticism is emotional instability, emotionality and anxiety, while psychoticism is characterize by aggressiveness, coldness, numbness and egocentricity. Mendacity is dissimulation, giving socially acceptable answers, the factor of social conformism (Eysenck & Eysenck 1975).

A short questionnaire of the general well-being (WHO) evaluates general emotional well-being through five positive statements, which were offered six types of responses. Answers are graded from 0 (not at all) to 5 (constantly), where a higher score indicates better emotional state. The score under thirteen points indicates poor well-being and requires further testing for depression.

Three major dimensions of religiosity are assessed by the DUREL Questionnaire: Organizational, Non-organizational and Intrinsic. Organizational religiosity means participation in religious ceremonies; Non-organizational religiosity means frequent personal prayers and meditation, whereas Intrinsic religiosity means deep, personal religiosity („in my life I felt the presence of the supernatural", „my religious beliefs underlie all my life's endeavours", „I really try hard to convey my religion to all other areas of my life").

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

Ethical approval

This study procedures were reviewed and approved by the Ethics Committee of Clinical Hospital Mostar and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Statistical data analyzes

Symmetry of the distribution of continuous variables was tested by Kolmogorov-Smirnov test, and the mean values and measures of dispersion of continuous variables are presented by median and interquartile range for distribution that is significantly different from normal. The analysis of these continuous variables was therefore conducted by the Mann-Whitney U test, while correlation was tested by Spearman's rho Correlation Coefficient. The study used linear regression to create predictive models, where the regression analysis was performed using gradual methods. Nominal and ordinal variables were tested by χ^2 test.

The values of $P<0.05$ were considered statistically significant. Data analysis was obtained with software package SPSS for Windows (version 17.0, SPSS Inc., Chicago, Illinois, USA) and Microsoft Excel (version 11 Microsoft Corporation, Redmond, WA, USA).

Table 1. Correlation of mother's and child's quality of life and domains of the questionnaire SF-36 with the personality traits of extraversion, neuroticism, psychoticism of the mothers in the CP group

Variables		Extraversion	Psychoticism	Neuroticism
Quality of life				
Mother's quality of life	Spearman's rho*	0.372	-0.223	-0.423
	P	*<0.001*	0.025	*<0.001*
Child's quality of life	Spearman's rho	0.297	-0.118	-0.371
	P	0.003	0.242	*<0.001*
Domains of SF-36				
Physical functioning	Spearman's rho	-0.071	-0.105	-0.185
	P	0.480	0.294	0.064
Role limitations (physical problems)	Spearman's rho	0.050	-0.274	-0.271
	P	0.621	0.006	0.006
Bodily pain	Spearman's rho	0.089	-0.215	-0.233
	P	0.374	0.031	0.019
General health perceptions	Spearman's rho	0.164	-0.333	-0.456
	P	0.102	0.001	*<0.001*
Vitality and energy	Spearman's rho	0.353	-0.074	-0.538
	P	*<0.001*	0.461	*<0.001*
Social functioning	Spearman's rho	0.160	-0.256	-0.398
	P	0.110	0.010	*<0.001*
Role limitations (emotional problems)	Spearman's rho	0.035	-0.258	-0.314
	P	0.731	0.009	*0.001*
Mental health	Spearman's rho	0.305	-0.285	-0.554
	P	0.002	0.004	*<0.001*

Spearman's rho: Spearman's rho correlation coefficient

RESULTS

Correlation of QOL and HrQOL with personality traits of mothers from CP group and Control group

In the CP group, the level of maternal and the children's QOL increased with an increase the level of maternal extraversion, while the growth of neuroticism induced decrease of their QOL. In addition, the level of maternal QOL decreased with the increase in the level of psychoticism as a personality trait (Table 1).

Limitation due to physical difficulties, bodily pain, general health perception, social functioning, limitation due to emotional difficulties and mental health, as the domains of the questionnaire SF-36, were significantly negatively associated with the traits of psychoticism and neuroticism, and their values were lower with the growth of levels of these two traits. On the other hand, the vitality and energy and mental health were significantly positively associated with extraversion (Table 1).

In the control group, the level of mother's QOL was significantly negatively associated with higher expression of psychoticism and neuroticism, while the level of the child's QOL was negatively associated only with greater expression of psychoticism (Table 2).

Physical functioning, limitation due to physical difficulties, bodily pain, general health perception, vitality and energy, social functioning, and mental health as domains of SF-36 questionnaire were significantly negatively associated with the traits of psychoticism and neuroticism, and their values were declining with increase of the level of these two traits. In addition, the limitation due to emotional problems, as an additional domain of the questionnaire, was significantly negatively correlated only with the level of psychoticism (Table 2).

Correlation between the age of children and the QOL of their mothers

Although there was a tendency of decreasing mothers' QOL as the age of their children increased, it was not statistically significant in the CP group (rho=-0.132; P=0.187).

In addition, there was not a significant correlation between the age of children and self-esteemed QOL of mothers in the control group, despite the positive tendency (rho=0.148; P=0.115).

Correlation of QOL and HrQOL with the degree of motor impairment of a child

When analyzing the correlation of the QOL of the mother and child and the domains of the SF-36 questionnaire with the degree of the child's motor impairment measured by the GMFCS in the CP group, it was evident that the degree of the child's motor impairment was significantly positively associated with the domain of limitations due to physical difficulties in the SF-36 questionnaire. A lower level of the child's motor impairment results in lower mother's limitations due to physical difficulties (Table 3).

Table 2. Correlation of mother's and child's quality of life and domains of the SF-36 questionnaire with the mothers' personality traits of extraversion, psychoticism and neuroticism in the control group

Variables		Extraversion	Psychoticism	Neuroticism
Quality of life				
Mother's quality of life	Spearman's rho*	0.091	-0.219	-0.271
	P	0.332	0.019	0.003
Child's quality of life	Spearman's rho	-0.079	-0.228	-0.093
	P	0.401	0.014	0.325
Domains of SF-36				
Physical functioning	Spearman's rho	0.152	-0.270	-0.202
	P	0.104	0.003	0.031
Role limitations (physical problems)	Spearman's rho	0.136	-0.377	-0.228
	P	0.147	*<0.001*	0.014
Bodily pain	Spearman's rho	0.013	-0.330	-0.379
	P	0.891	*<0.001*	*<0.001*
General health perceptions	Spearman's rho	0.040	-0.356	-0.278
	P	0.673	*<0.001*	0.003
Vitality and energy	Spearman's rho	0.065	-0.339	-0.271
	P	0.489	*<0.001*	0.003
Social functioning	Spearman's rho	0.089	-0.360	-0.337
	P	0.342	*<0.001*	*<0.001*
Role limitations (emotional problems)	Spearman's rho	-0.023	-0.332	-0.179
	P	0.811	*<0.001*	0.055
Mental health	Spearman's rho	0.031	-0.284	-0.418
	P	0.738	0.002	*<0.001*

Spearman's rho: Spearman's rho correlation coefficient

Table 3. Correlation of mother's and child's quality of life and domains of the questionnaire SF-36, with the degree of motor impairment in the CP group

Variables		GMFCS**
Quality of life		
Mother's quality of life	Spearman's rho*	0.009
	P	0.928
Child's quality of life	Spearman's rho	0.164
	P	0.104
Domains of SF-36		
Physical functioning	Spearman's rho	0.135
	P	0.178
Role limitations (physical problems)	Spearman's rho	0.245*
	P	*0.013*
Bodily pain	Spearman's rho	0.119
	P	0.235
General health perceptions	Spearman's rho	0.050
	P	0.617
Vitality and energy	Spearman's rho	0.058
	P	0.566
Social functioning	Spearman's rho	0.180
	P	0.071
Role limitations (emotional problems)	Spearman's rho	0.058
	P	0.562
Mental health	Spearman's rho	0.060
	P	0.551

Spearman's rho: Spearman's rho correlation coefficient; ** GMFCS: Gross Motor Function Classification System

Table 4. Overview of the comparison of the mother's and child's QOL, and the domains of the SF-36 questionnaire based on the ability of a child to walk in the CP group

Variables	C (Q) points on the scale according to the children's group		Mann-Whitney U	P
	Ability to walk	Inability to walk		
Quality of Life				
Mother's Quality of Life	70.0 (30)	70.0 (30)	1131.500	0.583
Child's Quality of Life	70.0 (30)	60.0 (50)	1011.000	0.230
SF-36 Domains				
Physical functioning	46.6 (16.7)	46.6 (16.7)	1204.000	0.972
Role limitations (physical problems)	49.1 (21.2)	42.1 (14.1)	1002.500	0.139
Bodily pain	46.5 (18.4)	46.4 (25.3)	1156.000	0.708
General health perception	46.2 (12.6)	46.2 (12.6)	1126.500	0.564
Vitality and energy	51.4 (11.8)	51.5 (14.2)	1136.500	0.611
Social functioning	46.2 (12.2)	40.8 (10.8)	1077.000	0.348
Role limitations (emotional problems)	44.8 (21.1)	44.8 (21.0)	1195.000	0.918
Mental health	45.9 (11.3)	45.9 (9.1)	1204.000	0.972

In the CP group, parents had significantly more often children with the ability to walk (n=62; 61.4%), than children without the ability to walk (n=39; 38.6%, χ^2=5.238, df 1; P=0.022). No significant difference in the QOL of the mother, or the domains measured by the SF-36 questionnaire was shown between the children with the ability to walk and the children without the ability to walk (Table 4).

Correalation of QOL and HrQOL with mothers' religiosity

In a statistically significant manner, mothers' general religiosity index is positively related to the domain of menthal health, as well as to the domain of limitations caused by emotional problems, which were measured SF – 36 Questionnaire (Table 5).

Comparison of mothers' and childs' QOL and mothers' HrQOL between CP and control groups

Maternal QOL, as well as the QOL of their children, was significantly lower in the CP group compared to the control group. Also, in all domains of the SF-36 questionnaire, the participants of the CP group achieved significantly lower scores than women in the control group. In the questionnaire on general well-being of the WHO, the subjects in the CP group evaluated their own general well-being significantly lower in comparison to women in the control group (Table 6).

Table 5. Correlation of mother's and child's QOL, and domains of the questionnaire SF-36 with General Religiosity Index in the CP group

Variables		General Religiosity Index
Quality of Life		
Mother's QOL	Spearman's rho*	0.148
	P	0.139
Child's QOL	Spearman's rho*	0.138
	P	0.171
SF-36 Domains		
Physical Functioning	Spearman's rho	0.025
	P	0.807
Role limitations (physical problems)	Spearman's rho	0.106
	P	0.807
Bodily pain	Spearman's rho	0.087
	P	0.388
General health perception	Spearman's rho	0.111
	P	0.270
Vitality and energy	Spearman's rho	0.181
	P	0.070
Social functioning	Spearman's rho	0.132
	P	0.190
Role limitations (emotional problems)	Spearman's rho	0.263
	P	*0.008*
Mental health	Spearman's rho	0.221
	P	*0.026*
General well-being Questionnaire		
General well-being	Spearman's rho	*0.157*
	P	0.117

* Spearman's rho: Spearman's rho correlation coefficient

Table 6. Overview of comparison of mother's and child's quality of life and domains of SF-36 questionnaire between CP and control groups

Variables	C (Q) points on the scale according to the research group		Mann-Whitney U	P
	Test	Control		
Quality of Life				
Mother's Quality of Life	70.0 (30)	80.0 (20)	4067.000	*<0.001*
Child's Quality of Life	70.0 (30)	90.0 (20)	2333.000	*<0.001*
SF-36 Domains				
Physical functioning	46.6 (15.7)	52.9 (8.4)	3934.000	*<0.001*
Role limitations (physical problems)	49.1 (21.2)	56.2 (14.1)	3905.500	*<0.001*
Bodily pain	46.5 (18.4)	51.6 (16.3)	4234.500	*<0.001*
General health perception	46.2 (11.7)	50.9 (11.7)	3738.000	*<0.001*
Vitality and energy	51.4 (11.8)	53.8 (7.1)	3998.500	*<0.001*
Social functioning	46.2 (16.3)	46.3 (16.3)	4297.000	*0.001*
Role limitations (emotional problems)	44.8 (21.1)	55.3 (10.5)	4186.000	*<0.001*
Mental health	45.9 (10.2)	50.4 (13.6)	3782.000	*<0.001*
Questionnaire on general well-being				
General well-being	64.0 (30)	72.0 (20)	4024.000	*<0.001*

Table 7. Overview of predictive models of maternal quality of life with involved investigated variables in the CP group

Variables	Non-standardized β coefficient	Standardized β coefficient	t	P	95%CI	
					Bottom limit	Top limit
Mental health (SF-36)	0.650	0.273	3.129	0.002	0.237	1.062
Child's Quality of Life	0.314	0.371	5.198	*<0.001*	0.194	0.434
Vitality and energy (SF-36)	0.587	0.231	2.644	0.010	0.146	1.027
Marital status *(married/single)*	*-12.808*	*-0.180*	*-3.039*	*0.003*	*-21.178*	*-4.437*
Extroversion	1.913	0.146	2.269	0.026	0.239	3.587
Range of motor impairment	1.643	0.135	2.257	0.026	0.197	3.089

Predictive model of the QOL of mothers with children with CP

The following investigated variables were involved in the analysis of the predictive model of maternal QOL: the scale of general well-being, child's QOL, the domain of mental and physical functioning, as well as variables that measured personality traits, and the scope of motor impairment. A model for predicting the maternal QOL, which was created from these variables proved to be statistically significant (adjusted R^2=0.683; F(6.99)=33.463; P<0.001). Therefore, in this model the adjusted coefficient of determination, a measure of representative quality of the model, explained 68% of the variation of maternal QOL. Graded regression analysis showed that maternal QOL increases with the improvement of their mental health, by improved children's QOL, by their greater vitality and energy, by the presence of a spouse, by more expressed extroversion, and by a lesser extent of motor impairment of their child (Table 7).

DISCUSSION

A number of factors that can affect the mother and child QOL were investigated. Physical and mental functioning are key elements of QOL, and, besides other things, they are determined by an individual's personality traits.

Correlation of QOL and HrQOL with personality traits of mothers in the CP and control groups

Mothers' personality traits have a strong impact on the experience of their own QOL, QOL of their children, as well as the HrQOL.

Mothers with higher levels of extraversion had significantly better self-perceived QOL, and they described their children's QOL as much better, compared to mothers with higher levels of neuroticism and psychoticism. Also, participants with higher levels of extraversion had a significantly greater degree of vitality, energy and better mental health than those with higher levels of neuroticism and psychoticism. Other studies confirm the positive effect of extraversion on QOL and subjective well-being (Steel et al. 2008, Strobel et al. 2011). Extrovert people have a much higher degree of self-confidence, positive thoughts and emotions, which consequently allows them to gain greater life satisfaction (Strobel et al. 2011). They even actively try to increase their sense of satisfaction and happiness in challenging life circumstances, which is not the case with the introverts (Tamir 2009).

A higher degree of vitality, energy and mental health in this type of personality in our study may be explained by their way of solving problems and coping with stress. Their techniques of coping with stress are effective because they have a positive effect on cognitive restructuring and are directed towards others, providing much needed social support in coping with it (Carver & Connor-Smith 2010). Other studies have also found positive influence of extraversion on mental health (Steel et al. 2008).

Contrary to expectations, physical health and functions resulting from it were not statistically associated to a great extent with higher levels of extraversion in this research. Most studies report a positive correlation between extraversion, physical health and physical activity (Rhodes & Smith 2006).

A higher degree of neuroticism and psychoticism of a mother's personality was negatively related to her assessment, both of her QOL and the QOL of her child. Also, a high level of neuroticism had a negative impact on physical and mental health and on the functions that result from them. Our results coincide with a number of other studies that found a negative correlation between these components (Khan et al. 2006, Lahey 2009, Smith & MacKenzie 2006). The reason probably lies in the fact that this type of personality perceives most life situations and events as stressful and negative, and responds to them with much more emotion in comparison to mentally stable people (Lahey 2009). Their techniques of coping with stress are less effective because they are too emotionally focused, thus hindering the development of coping strategies that require careful planning (Carver & Connor-Smith 2010).

The research by Friedman et al. has shown that high levels of neuroticism can have a positive effect on health and mortality reduction, distinguishing that the so-called "healthy neuroticism" ensures sound health concerns through leading a healthy lifestyle in order to protect the health (Friedman 2000, Friedman et al. 2010).

Psychoticism is a dimension of personality that had a similar negative correlation with the general health and QOL as neuroticism did. Unlike research of extraversion and neuroticism, the number of scientific papers that explore the impact of this personality trait on the QOL is significantly smaller. Most recent theories of personality considered this dimension insufficiently reliable and completely ignored it. McCrae and Costa believe that the low level of "comfort" and "conscientiousness" in the theory of the "Big Five" correspond to Eysenck's psychoticism dimension (McCrae & Costa 1985). If we accept this argument, then, in literature, we can find data on the negative impact of these characteristics on mental health (van Kampen 2009, Kotrla Topic et al. 2012).

In the control group, a significant correlation between personality traits and the QOL was also shown, with higher levels of neuroticism and psychoticism having a negative impact on mental and physical health as in the CP group, while extroversion had no significant impact.

Correlation between the age of children and the QOL of their mothers

This study showed that the QOL of mothers in the CP group slightly decreased as the age of their children increased, although this was not statistically significant. The situation in the control group was opposite. In fact, as the children grew up, the QOL of mothers in the control group increased, although this also was not statistically significant. Statistical significance would probably have occurred if we had had a larger and less asymmetric sample.

Studies of other authors suggest that there are no more or less difficult periods in the care about these children, but each stage of their development is the source of some of the new challenges, difficulties or the stress, and it demands different kinds of support and adjustment (Rein et al. 2011).

Correlation of maternal QOL and HrQOL with the degree of motor impairment of a child

The degree of motor impairment of the child was not significantly associated with either the mother's or child's QOL, as perceived by the mother. Most other studies also found no correlation between a child's motor limitations and QOL of either parents or children (Davis et al. 2010, Majnemer et al. 2012, Parkes et al. 2011). Although motor impairment is the most visible, it seems that it is not the most important to experience QOL. Obviously, some other factors have greater significance.

We have not found a significant association between the child's ability to walk and maternal or child QOL, or maternal HrQOL domains. In the existing literature we can find only the information about the importance of the degree of motor impairment and QOL of the child when the parents assessed it in the social domain, and the domain of child's physical functioning (Arnaud et al. 2008).

With regard to the HrQOL domains, the degree of a child's motor impairment was significantly associated only with limitations due to mother's physical problems. Greater physical damage means greater physical involvement of mothers in everyday care about the child, such as toilets, feeding, dressing, transferring in bed, transfer bed - wheelchair and the other, causing damage to mothers' physical health and difficulties in physical functioning. The negative impact of the child's degree of motor impairment to physical health of mothers is cited by other studies (Murphy 2011).

Correlation of QOL and HrQOL with mothers' religiosity

This research had shown that mothers with greater degree of religiosity have better mental health and less limitations caused by emotional difficulties. However, no significant corellation was found between the religiosity, mothers' or children's QOL or physical domains. In the literature, there is well founded evidence of positive impact of religiosity, especially to depression, suicidal tendencies and abuse of narcotic drugs (Bonelli & Koenig 2013). Besides positive impact on the mental health we may also find dana about its positive influence on QOL and physical functioning (Lucchetti et al. 2011).

Comparison of maternal QOL in CP and control groups

In this research, we found a significant difference between the CP and control group in all domains of HrQOL and QOL. Mothers of children with CP compared to mothers of healthy children had significantly lower QOL, their children's QOL, and their physical and mental health and functions that come out of these was essentially worse than the health of mothers with healthy children. When parents are expecting a child, in most cases, they are filled with optimistic expectations about what their child will be like and what they will be like as the parents (Leerkes & Burney 2007). The literature suggests that coping with a diagnosis of CP and the knowledge that their child will never be as parents expected and wanted, dramatically alters their perspective to parenting and causes a very complex emotional reactions of anxiety and sadness, exacerbating their physical and mental functioning (Schuengel et al. 2009).

Predictive model of QOL of mothers with children with CP

Stepwise regression analysis showed that the possibility of better maternal QOL increases with her better mental health, better QOL of the child, her greater vitality and energy, extraversion in the structure of her personality, married life, and a lesser degree of motor impairment of the child.

The positive impact of mental health on the QOL and well-being of mothers has also been confirmed in other studies (Brehaut et al. 2004, Davis et al. 2010). Good mental health of mothers is a prerequisite for the development and use of effective techniques to cope with stress, which include a positive attitude and goal-oriented activities, unlike the emotionally colored strategies (Rentick et al. 2007).

Also, a higher degree of extraversion ensures to have a better QOL because it is associated with a higher degree of self-confidence, positive thoughts and feelings (Strobel et al. 2011).

An important predictor of better QOL for mothers is also the degree of motor impairment of their child. As noted above, most of the researchers claim the complete absence of correlation (Ones et al. 2005, Unsal-Delialioglu et al. 2009), or a slight correlation (Majnemer et al. 2012). This study, however, shows that mothers of children with higher degree of motor impairment certainly need more intensive monitoring and support of appropriate services.

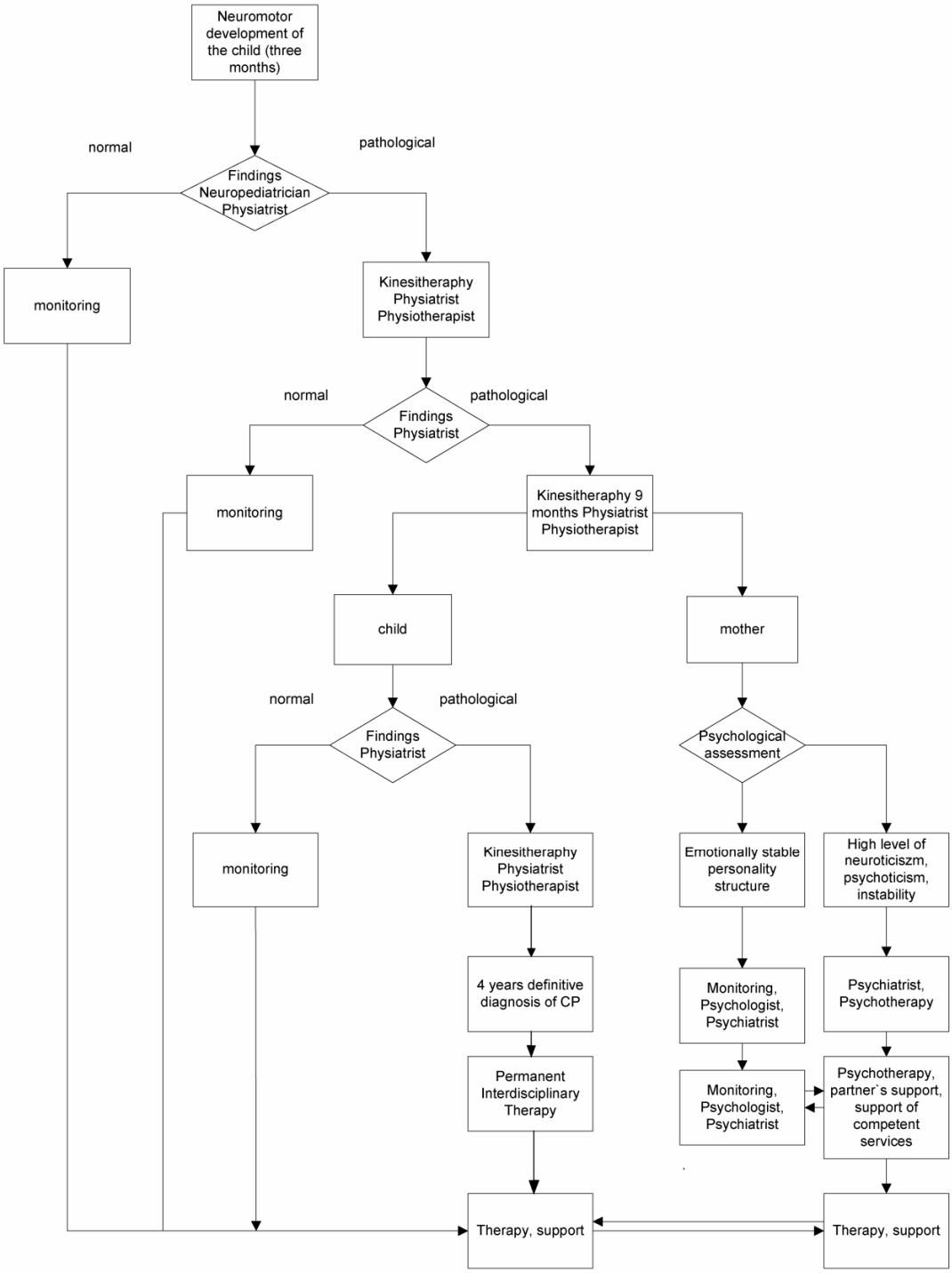

Figure 1. Protocol for individual approach to mother who have children with cerebral palsy

A predictor of better QOL for mothers is also living with a partner. If the partner's support is absent, mothers feel abandoned and alone. Second European Quality of Life Survey in 31 European countries conducted in 2010 (27 EU countries, Norway, Croatia, Macedonia and Turkey) showed that people who lived with a partner had a better QOL (Watson et al. 2010).

CONCLUSIONS

The duty of all professionals who deal with these issues is, along with the treatment of the children, to take all necessary measures to maintain and maximize the physical and mental health of their mothers and families. It is particularly important that the health care system recognizes those mothers who have difficulties in coping with stress and are unable to run their internal adaptive mechanisms to ensure appropriate care for their child, and are exposed to greater risk of deterioration of their mental and physical health.

Therefore, we propose the protocol for the individual and targeted approach to families and mothers who have children with cerebral palsy (Figure 1).

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Contribution of individual authors:

Mladenka Naletilic: study conception and design, acqusition of data, literature analysis and interpretation of data, writing the manuscript;

Vajdana Tomic: study conception and design, literature analysis and interpretation of data, writing the manuscript;

Ljerka Ostojić: study conception and design, literature analysis and interpretation of data, writing the manuscript;

Vesna Miljanović Damjanović: study conception and design, acquisition of data, literature analysis and interpretation of data, writing the manuscript;

Mirjana Grabovac: literature research.

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