

# FUNCTIONALITY AND SOCIAL SUPPORT AS ASPECTS OF QUALITY OF LIFE IN ELDERLY STROKE PATIENTS

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**Abstract:** *Functionality in activities of daily living and social support are often used as indicators of quality of life, especially in research involving gerontological and geriatric populations that assesses the functional independence of the patient and their need to rely on help from others.*

*The effects of a stroke can significantly reduce the quality of life of the elderly. Therefore, the aim of this paper was to examine the relationship between functionality and social support and the quality of life of elderly stroke patients.*

*This study included 50 stroke patients over the age of 65 years. All the participants lived at home in Zagreb. The participants' quality of life was measured using The World Health Organization Quality of Life Brief Version (WHOQOL-BREF questionnaire), which determines quality of life based on four domains (Physical, Psychological, Social relationships, and Environment). Functionality was measured using the Functional Independence Measure, while social support was measured using the Social Support Scale.*

*The correlation between functionality and quality of life was statistically significant with respect to physical health ( $r = 0.77$ ,  $p < 0.00$ ), as well as psychological health ( $r = 0.53$ ,  $p < 0.00$ ). The correlation between social support and quality of life was also significant with respect to social support from friends in the Social relationships domain ( $r = 0.40$ ,  $p < 0.00$ ) and in the Environment domain ( $r = 0.45$ ,  $p < 0.00$ ), as well as in the overall social support in Social relationships ( $r = 0.29$ ,  $p < 0.04$ ) and Environment domains ( $r = 0.35$ ,  $p < 0.01$ ).*

*A higher level of functionality indicates a higher quality of life in the Physical and Psychological domains, as well as in the overall quality of life of elderly stroke patients. Strong social support from friends can encourage and help elderly stroke patients to integrate into their social environment more successfully, thus potentially increasing their quality of life. The results of this study imply that functionality and social support can be important factors in the quality of life in elderly stroke patients.*

**Key words:** *functionality, social support, quality of life, stroke, elderly*

## INTRODUCTION

Stroke is a major and common public health issue, both in our country and across the world, since it is associated with severe effects such as inability to work, impairments, and high treatment costs (Kralj & Brkić Biloš, 2013). Data from the World Stroke Organisation shows that 12.2 million new strokes are reported every year across the world (WSO, 2022). The highest prevalence of stroke in the world has been observed in Eastern Europe, South Asia, Oceania, Indonesia, Mongolia, Afghanistan, and Central African Republic (Feigin et al., 2021). Stroke is one of the three leading causes of death in Europe and

its incidence increases over the age of 65 years (Pogosova, 2019). Even though the incidence of stroke in the 65+ population has been decreasing during the last 10 years in developed countries, it continues to increase in countries with a lower standard of living (Feigin et al., 2021). Cerebrovascular diseases are the second leading cause of death in Croatia, and according to the Croatian Institute of Public Health (Croatian Institute of Public Health, 2018), cerebrovascular diseases accounted for 11.5% of the overall number of deaths in 2017. Several studies have reported an increased incidence of stroke in the elderly population (Poeck, 2000). Old age is a non-modifiable risk factor for all types of strokes, whereas

the most common neuropathological causes of stroke in the elderly are atherosclerosis of small brain vessels or brain vasculitis, which can lead to subarachnoid and intracerebral haemorrhage (Chen et al., 2010). The most prevalent effects of a stroke are sensory motor difficulties such as problems with gait and functioning in activities of daily living (Opara & Jaracz, 2010; Carod-Artal & Egido, 2009), balance disorders, loss of movement and coordination control, as well as loss of motor skills such as sitting, standing, or walking, and fine motor movement (Gonzalez et al., 2006; WHO, 2010). One-third of the patients have a permanent neurological deficit, 25% of the patients are permanently hospitalised, and 40% are dependent on other people's help (Zavoreo & Butković Soldo, 2014). Other issues such as aphasia, and cognitive and emotional problems occur often. According to Grönberg et al. (2022), one-third of the patients suffer from aphasia (a motor difficulty related to the production and/or recognition and understanding of speech) as an effect of a stroke. Some studies show that the number of patients with aphasia following a stroke is even higher (Ellis & Urban, S. 2016). Aphasia can also become a problem in the rehabilitation process, making experts like speech therapists indispensable members of the rehabilitation team. Apart from doctors, neurologists, other professionals who specialise in understanding the comorbidities elderly patients, nurses, physiotherapists, speech therapists, psychologists, social workers, and orthotists, it is important that all individuals involved in the rehabilitation process of stroke patients must be included in the team.

Some studies show that a lot of patients ( $\geq 80\%$ ) are unable to continue with speech therapy because of the unavailability of speech therapists or other adverse circumstances (mobility, treatment complications, and so on; Vlah & Dominić-Tratinjak, 2015).

The role of the speech therapist in the rehabilitation team is to explain the way in which the patient's communication skills are impaired, how to interpret some of the patient's patterns of behaviour, what can and cannot be expected when communicating with the patient, and how to ap-

proach different individuals (Dilworth, 2008). Most aphasia patients recover in the first 3 to 6 months after the stroke, while patients with global aphasia show improvement only 6 months after the stroke (Oljača et al., 2016).

Functionality of stroke patients becomes considerably limited. According to Carod-Artal & Egido (2009), factors such as advanced age, severe motor deficits, urinary incontinence, and a higher level of dependence are associated with a poor quality of life. A sedentary way of life following a stroke and a higher probability of various complications caused by low levels of physical activity can lead to a reduction in functional activities of daily living, and thus, a reduction in the quality of life of stroke patients (Aguar et al., 2017). Research carried out by Knoflach et al. (2012) indicated that functional outcomes are significantly correlated with age and tendency of a poorer functional recovery in elderly stroke patients. Lamb et al. (2008) showed that therapy for stroke patients is mainly focused on physical recovery.

A study by Hikichi et al. (2015) confirmed that functionality can be improved by good social support. Siedlecki et al. (2014) reported that strong social support leads to a higher quality of life. Obembe & Eng (2016) researched the effects of treatment on the outcomes of social participation and concluded that successful treatment can help in the reintegration of stroke patients into society, particularly if group exercises are included in the treatment plan as a form of physical activity. Social support should be personalised and planned at an individual level since it highly motivates stroke patients to achieve therapy goals (Pearce et al., 2015).

Quality of life can be interpreted in various ways, and it is often used in medicine to describe a patient's functionality (Lučev & Tadinac, 2008). To understand the problems that elderly stroke patients face, it is necessary to understand the physiological effects of aging on quality of life, as well as how a stroke influences the quality of life of elderly patients, especially because of their reduced functionality (Carod-Artal & Egido, 2009). Understanding the factors influencing the quality

of life of elderly stroke patients can help determine the approaches used to improve it. According to Opara & Jaracz (2010), stroke patients face changes in several quality of life domains, including physical, psychological, and social domains. Northcott & Hilari (2011) showed that stroke patients with a higher degree of social isolation have a lower quality of life, but maintaining previous social contacts and making new social networks can improve their quality of life.

## METHODS

### Aim of the study and hypotheses

A stroke can considerably change the quality of life of a patient. Therefore, the aim of this paper was to establish whether there is a correlation between sociodemographic variables and the quality of life in elderly stroke patients, as well as to determine the relationship between the level of functionality and social support and the quality of life in elderly stroke patients. A better understanding of the levels of functionality and social support and their correlation with quality of life can contribute to better outcomes of functional recovery and improved quality of life in older patients after a stroke. Better functional activity, as one of the facilitators, can encourage elderly stroke patients to engage in social activities. Social support from family and friends is important in the recovery of older stroke patients and can provide an additional motivational component in their recovery.

The following three hypotheses were considered to be the starting point of this empirical research study:

H1: There is a significant correlation between sociodemographic variables and the quality of life in elderly stroke patients.

Sociodemographic characteristics of the elderly, including age, gender, level of education, and marital status, were analysed in relation to their quality of life after a stroke. Four sub-hypotheses were formulated:

H1.1: There is a significant correlation between age and the quality of life in elderly stroke patients.

H1.2: There is a significant correlation between gender and the quality of life in elderly stroke patients.

H1.3: There is a significant correlation between level of education and the quality of life in elderly stroke patients.

H1.4: There is a significant correlation between marital status and the quality of life in elderly stroke patients.

H2: There is a significant correlation between functionality and the quality of life in elderly stroke patients.

H3: There is a significant correlation between social support and the quality of life in elderly stroke patients.

### Participants

The sample in this research included 50 participants over the age of 65 years who had suffered a stroke (resulting in hemiplegia or hemiparesis). All participants were diagnosed using magnetic resonance imaging and the diagnoses were confirmed by a neurologist. At the time the research was conducted, all the participants were in the chronic stage of recovery (more than 6 months after the stroke), and all of them had undergone rehabilitation in the acute phase of the recovery (up to 6 months after the stroke). Participants of both genders, who were residents of Zagreb, took part in the study from the privacy of their homes after being informed about the purpose of the research and providing signed informed consent. Their participation was voluntary and interviews were conducted individually between May and August 2018 by the researcher and district nurses working with the chosen general practitioners. The questionnaires used in the present study were standardised and included user manuals, which were studied by the district nurses before administering them. The participants completed the questionnaire on their own and the interviewers completed it on behalf of participants who were physically unable to fill it in. The exclusion criteria in this research study were mental diagnoses, cognitive impairment, or diagnosed aphasia, because all the members of the rehabilitation team were unable

to be present during the research. A total of 68 participants were included in the study, but 18 of them did not answer all the questions completely and were therefore excluded from the research, resulting in the final sample of 50 participants.

## Instruments

For the purpose of this study, the participants' quality of life was measured using the WHOQOL-BREF Questionnaire designed by the World Health Organisation, functionality was measured using the Functional Independence Measure (FIM), and social support using the Social Support Scale (SSS). A sociodemographic questionnaire was used to collect data on the respondents' age, gender, level of education, and marital status. No special permits were required for using the above-mentioned instruments.

Informed consent (which was called Consent for Adults to Participate in a Research for the purpose of this research) is a statement signed by a respondent participating in a scientific research project authorising the researcher to apply certain measures, treatments, or inclusion in the scientific research protocol. It is valid only if an individual personally and voluntarily gives his or her consent after being informed about and fully understanding the purpose of the research and the research procedure (Sorta Bilajac, 2011). All the participants in the present study voluntarily signed the Consent for Adults to Participate in a Research statement designed for this research.

The World Health Organization Quality of Life instrument – WHOQOL-BREF is a shorter version of the WHOQOL-100 questionnaire and is based on a multicultural concept and available in many languages (Skevington, Lotfy & O'Connell, 2004; WHO, 1996). The WHOQOL-BREF questionnaire begins with sociodemographic information (gender, age, level of education, marital status), followed by self-assessment questions about quality of life and health satisfaction (Skevington et al., 2004; Opara & Jaracz, 2010). The next part of the questionnaire consisted of 24 questions about the four domains of the WHOQOL-BREF questionnaire: physical health (7

questions), psychological health (6 questions), social relationships (3 questions), and environment (8 questions). The WHOQOL-BREF questionnaire results are coded and transformed into the scale from 1 to 100, where a higher score indicates a higher quality of life.

The Social Support Scale assesses the perception of social support received from family and friends, both available and currently given support (Ivanov & Penezić, 2010). It consists of 56 questions, of which 28 refer to social support from the family and 28 to social support from friends. Each of the two subscales contains four types of social support: emotional, instrumental, information, and self-esteem. Statements in the Social Support Scale are graded on a scale of 1-5, where 1 indicates "I strongly disagree with the statement", 2 indicates "I mostly disagree", 3 indicates "I neither agree nor disagree", 4 indicates "I mostly agree", and 5 indicates "I strongly agree with the statement".

The Functional independence Measure (FIM) assesses functionality through 18 activities. 13 statements are related to activities of daily living and are grouped under four sections: independent care, sphincter control, transfers, and movement; 5 statements are related to cognitive and social activities and are organised in two sections (Uniform Data System for Medical Rehabilitation, 2012). The FIM provides an insight into the participant's level of incapacity, his or her level of disability, and assistance necessary to perform activities of daily living. Scores in each activity are graded on a scale of 0-7. Scores 0-2 indicate a complete dependence on other people, scores 3-5 indicate a medium dependence, while scores 6-7 indicate independent performance of the activity in question. The maximum overall score is 126 and any overall score of all the activities that is over 75 was considered high. The lower the score, the greater the dependence.

## Ethical approval

For the purpose of the present study, we received permission from the Ethics Committees of the general medical centres where the partici-

participants were receiving treatment from their chosen general practitioners: Health Centre Zagreb -West (Dom zdravlja Zagreb - Zapad), Health Centre Zagreb - East (Dom zdravlja Zagreb - Istok), and Health Centre Zagreb - Centre (Dom zdravlja Zagreb - Centar). All respondents signed a Consent for Adults to Participate in a Research statement prior to filling in the questionnaire.

## Data processing

Research results were processed using SPSS V23.0. Descriptive statistics were used to collect, edit, present, and process sociodemographic data about the participants in the research sample. The relationship between variables was determined by inferential statistics or correlations (Pearson Correlation Test, Point-Biserial Correlation Test, Spearman's Rank-Order Correlation, and Eta Correlation Test).

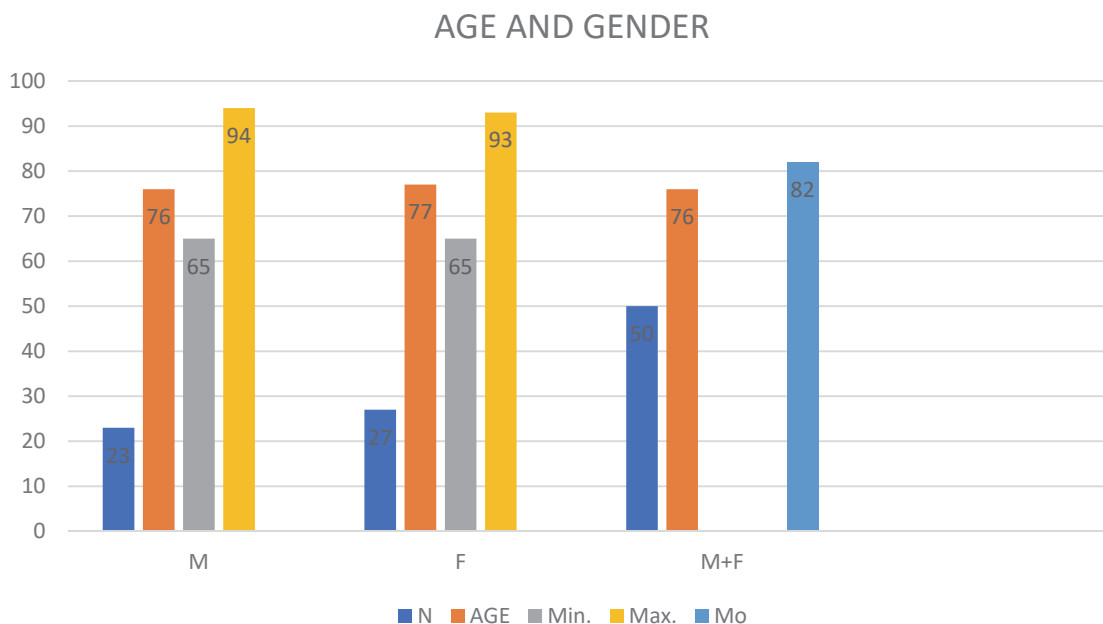
## Sociodemographic characteristics of the participants

The research sample included 50 participants over the age of 65 years - 23 men (46%) and 27 women (54%). The average age of the respondents was 76.26 years, with a standard deviation of 7.48 (Table 1, Figure 1).

**Table 1.** Age distribution of the research participants

<i>N</i>	50
<i>Mean</i>	76
<i>Standard deviation</i>	7.48

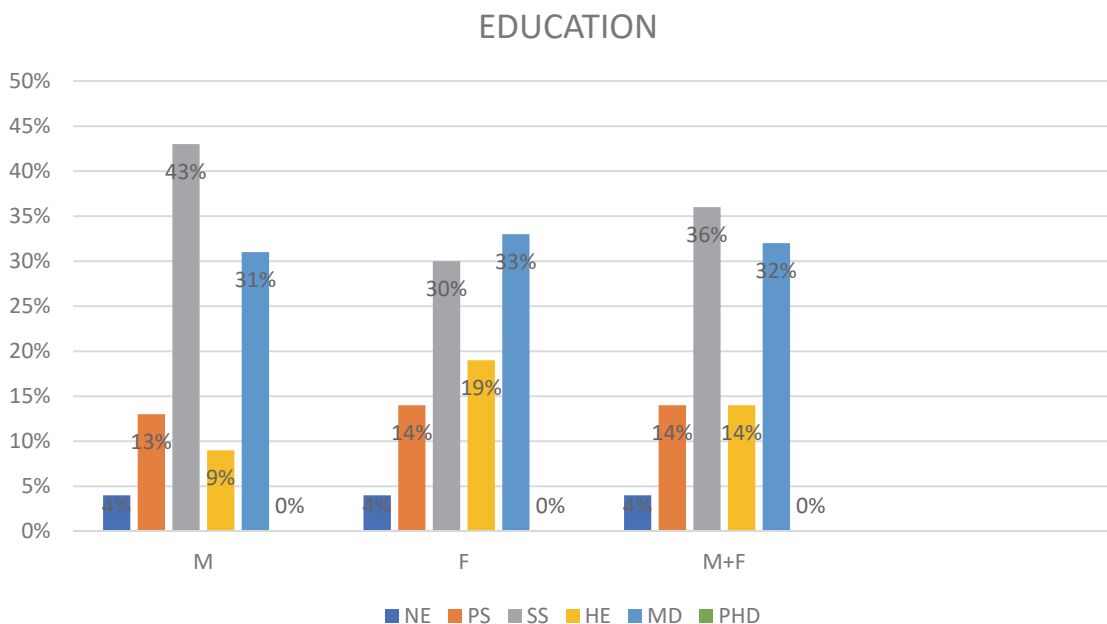
Figure 1 shows the distribution of participants by gender, age, minimal age, and maximum age. A large proportion of the participants were 82 years old.



**Figure 1.** Distribution of participants by age and gender

According to the level of education, the participants were classified into the following groups: no education, primary school, secondary school,

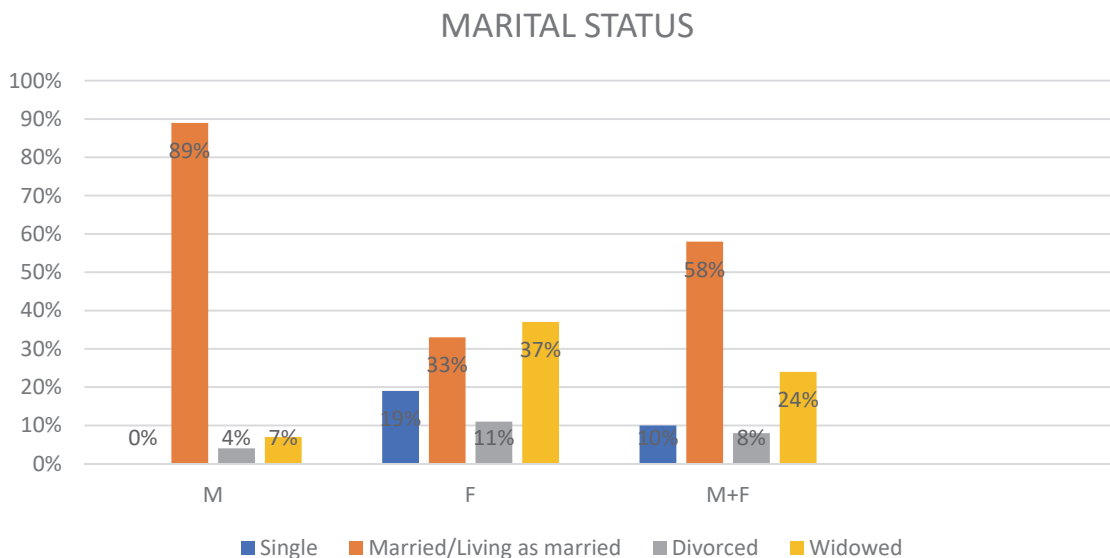
higher education (2 to 4 years), master's degree, doctorate (Fig. 2).



**Figure 2.** Distribution of participants by level of education and gender

According to marital status, the participants were classified into the following groups: single, married/living as married, divorced, and

widowed. The distribution of respondents by marital status and gender is shown in Figure 3.



**Figure 3.** Distribution of participants by marital status and gender

## RESULTS AND DISCUSSION

The WHOQOL-BREF questionnaire enables results to be derived on three levels: the overall score on the questionnaire, results related to the four subscales (domains of the Quality of life questionnaire), and self-assessment of quality of life and health satisfaction. When conditions allowed for it, parametric statistics was prioritised when processing the results, whereas non-parametric statistical procedures were used only in certain cases. A  $p$  value  $< 0.05$  indicated significant degree of risk.

The results of the WHOQOL-BREF questionnaire were coded and transformed into a 1:100 scale, which enabled the comparison of the results with those obtained using the complete WHO 100 FORM (Karimlou & Zayeri, 2011).

Based on the data in Table 2, it is clear that the average overall result of the WHOQOL-BREF questionnaire of the experimental group is  $M = 57.06$  ( $SD = 17.54$ ). Taking into consideration the measured domains of the WHOQOL-BREF questionnaire, it was noted that the relatively most highly graded domain was Domain 3 ( $M = 70.92$ ;  $SD = 24.97$ ), while Domain 4 achieved relatively low grades ( $M = 20.40$ ;  $SD = 8.15$ ). The mean value of the participants' answers in Domain 1 was  $29.44$  ( $SD = 17.50$ ), while the mean value of Domain 2 was  $25.24$  ( $SD = 13.09$ ).

**Table 2.** Distribution of participants' results based on the WHOQOL-BREF questionnaire (overall and by domains)

WHOQOL-BREF	<i>M</i>	<i>SD</i>
Domain 1	29.44	17.50
Domain 2	25.24	13.09
Domain 3	70.92	24.97
Domain 4	20.40	8.15
WHOQOL-BREF - total	57.06	17.54

The respondents' results in the domains of the WHOQOL-BREF questionnaire provide data on the quality of life through the perspective of four aspects of the WHOQOL-BREF. Quality of life aspects are presented as domains in the WHOQOL-BREF questionnaire. There are four

domains in the WHOQOL-BREF questionnaire: Physical domain (Domain 1), Psychological domain (Domain 2), Social relationships domain (Domain 3), and Environment domain (Domain 4).

Overall quality of life is a complex phenomenon that encompasses several aspects of life in the context of the sociocultural value system of an individual. The WHOQOL-BREF questionnaire measures the overall quality of life through domains such as physical health, psychological health, social relationships, and environment. Effects of a stroke cause functional incapacity and reduce the patient's independence (Lui & Nguyen, 2018), which in turn affects the quality of his or her life.

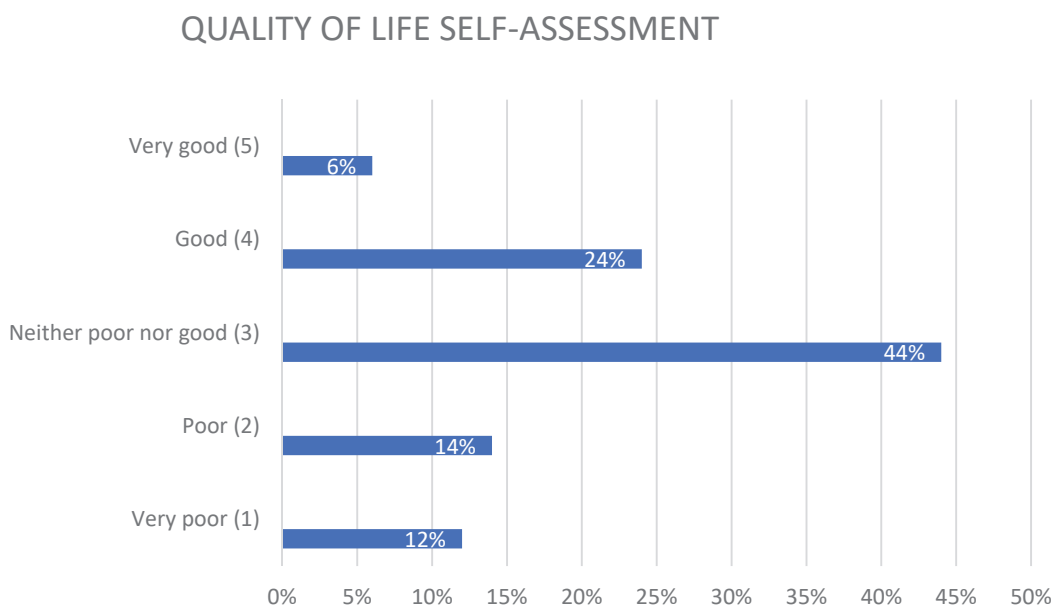
Table 2 shows that the mean value of the participants' results in the overall quality of life in the present study, measured using the WHOQOL-BREF questionnaire, is  $57.06$  ( $SD = 17.54$ ) out of a total of 100 points. The somewhat low overall quality of life of the respondents can be explained by reduced functionality, a weaker performance in activities of daily living, and increased dependence on other people. Ganesh Kumar, Majumdar & Pavithra (2014) showed that the overall quality of life in participants with problems in performing activities of daily living, also measured using the WHOQOL-BREF questionnaire, was  $42.43$  ( $SD = 6.62$ ). Other studies demonstrate similar results in the overall quality of life in stroke patients, as well as a correlation between chronic diseases and poor quality of life (Almeida-Brasil et al., 2017). Kim et al. (2015) found a lower quality of life in patients suffering from effects of a stroke in comparison to patients who were not suffering from these effects.

In the present study, the data obtained through the participants' responses to the WHOQOL-BREF questionnaire were processed using descriptive statistics in terms of the domains from the questionnaire. They show that the respondents gave their social relationships relatively high grades, i.e., Domain 3 of the WHOQOL-BREF questionnaire ( $M = 70.92$ ,  $SD = 24.97$ ). Social relationships, communication, as well as activities of the patient in his or her social environment

represent an important segment in the quality of life of individuals who have undergone a stroke (Lynch, Butt, Heinemann, Victorson, Nowinski, Perez & Cella, 2008). Research on quality of life predictors has confirmed that elderly stroke patients have poor social relationships and interactions with their environment (Gunaydin et al., 2011). The domain with the lowest grades in the WHOQOL-BREF questionnaire was Domain 4, i.e., Environment domain ( $M = 20.40$ ,  $SD = 8.15$ ). The Environment domain in the WHOQOL-BREF questionnaire assesses quality of life aspects such as quality and availability of health and social care, financial resources, physical safety and protection, transport, and so on. The environment as a factor of the quality of life in stroke patients was recognised in the present research study, which is similar to other papers. According to research conducted by Olai et al. (2009), most patients return home after a stroke, but their surroundings are often not adapted to suit the patient's needs: these results were confirmed by Brajković, Godan & Godan (2009). The participants obtained somewhat better results in Domain 2, the psychological health domain ( $M = 25.24$ ,  $SD = 13.09$ ), which includes assessment of self-

esteem, body image and appearance, memory, concentration, and so on. Poor psychological health (depression, cognitive problems, low self-esteem) is associated with reduced level of activities of daily living (Feigin et al., 2010) and a lower quality of life. Some researchers consider them the most consistent predictors of the quality of life in patients after a stroke (Teoh et al., 2009), which corresponds to the results of the present study. Respondents' results in Domain 1, which assesses activities of daily living, dependence on medicine and aids, mobility, and pain, showed a mean value of 29.44 ( $SD = 17.50$ ; Table 2). A poorer quality of life caused by weak physical health can be experienced by people suffering from milder effects of a stroke (Almkvist Muren, Hütler & Hooper, 2008), which correlates with our results.

Participants were offered the following answers (from 1 to 5, according to the type of Likert Scale) to the question "How do you assess your quality of life?" in the self-assessment of the quality of life in the WHOQOL-BREF questionnaire: 1 – "very poor", 2 – "poor", 3 – "neither poor nor good", 4 – "good", and 5 – "very good". The participants' results are shown in Figure 5.



**Figure 5.** Distribution of the participants' self-assessment of the quality of life

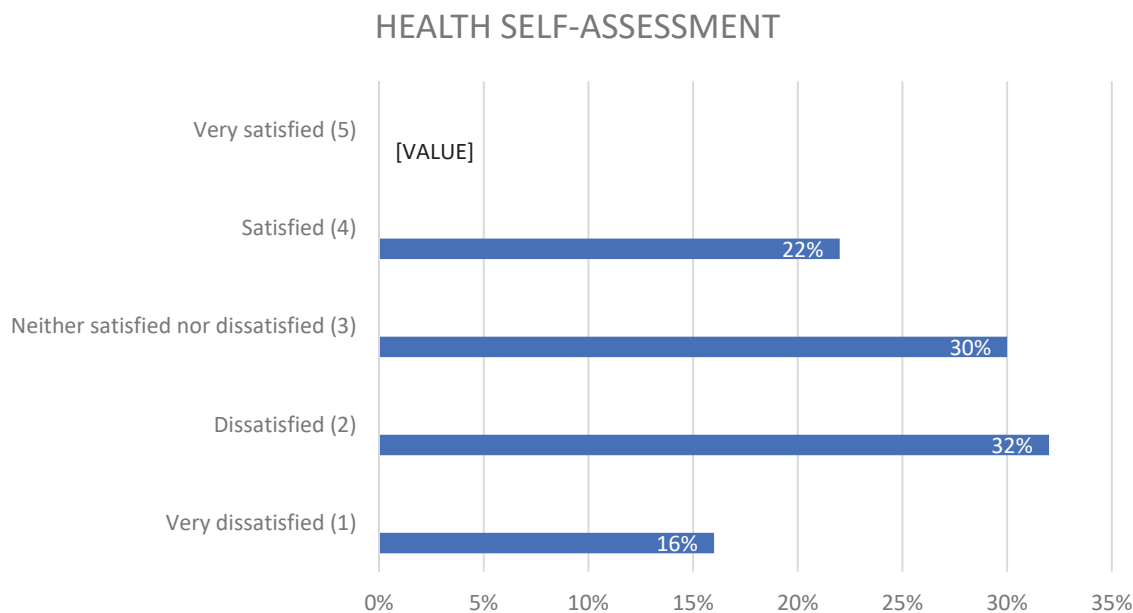


Our results on the respondents' quality of life self-assessment show that the most frequent grade was grade 3 (Fig. 5), which indicates medium satisfaction with the quality of life. Apart from the disability caused by stroke, low economic status of senior citizens and meagre pensions (Hrvatski zavod za mirovinsko osiguranje, 2018) probably caused lower quality of life self-assessments, given that the economic factor is one of the most complex factors of quality of life and it can affect how quality of life is perceived. According to the research carried out by Dayapoglu & Tana (2010), quality of life increases when the patient's income grows. Results obtained by researchers in Luxembourg indicate a higher quality of life after a stroke in older populations, which they associate with a better economic situation and a higher national income in Luxembourg than in other European countries (Baumann et al., 2012).

The following answers (from 1 to 5) were offered to the question "How satisfied are you with your health?" in the health self-assessment of the WHOQOL-BREF questionnaire: 1 – "very dissatisfied", 2 – "dissatisfied", 3 – "neither satisfied

nor dissatisfied", 4 – "satisfied", and 5 – "very satisfied". The participants' results are shown in Figure 6.

Self-assessment of health satisfaction is a person's evaluation of his or her own health, which comprehensively assesses his or her health status and includes conditions and feelings that are not precisely defined (Au & Johnston, 2014). The results in the self-assessment of health satisfaction show that the majority of participants rated it quite low, and the most frequent grade was grade 2 on the rating scale of 1-5 (Fig. 6), which suggests that the participants were dissatisfied with their health. Since the sample in this research study consisted of stroke patients, this result is not surprising because stroke is generally associated with low self-assessment of health. Larsen et al. (2016) obtained similar results from their respondents when they compared them with healthy older people. Mavaddat, Sadler, Lim, Williams, Warburton, Kinmonth, ... & McKeivitt (2018) confirmed that psychological problems in stroke patients often result from a perception of poor health.



**Figure 6.** Distribution of the participants' self-assessment of health satisfaction

The correlation between social and demographic characteristics of the participants (elderly stroke patients) and their quality of life was analysed according to age, gender, level of education, and marital status.

The results of the Pearson Correlation Test show that there is no significant correlation between the participants' age and their overall results on the WHOQOL-BREF questionnaire ( $r = -0.17$ ,  $p < 0.23$ ; Table 3). From the perspective of the domains of the WHOQOL-BREF questionnaire (Table 3), it is evident that there is a moderately significant negative correlation between age and Domain 1 ( $r = -0.35$ ,  $p < 0.01$ ) and a moderately significant negative correlation between age and Domain 2 ( $r = -0.31$ ,  $p < 0.02$ ), which indicates a weakened physical and psychological condition in patients after a stroke. It can, therefore, be concluded that older age indicates poorer physical and psychological health as factors associated with the quality of life in elderly stroke patients. Reduced mobility after a stroke creates an increased dependence on other people, which can be associated with a diminished quality of life. Other studies examining a correlation between age, mobility, and quality of life reported similar results (Halley et al., 2011; Guajardo et al., 2015). According to Feigin et al. (2010), advanced age and greater dependence on other people in everyday life are related to reduced functionality and consequently poorer quality of life. The correlation between age and Domain 3 (Social relationships domain), as well as age and Domain 4 (Environment domain), and the age and the participants' overall results on the WHOQOL-BREF questionnaire has not yet been statistically proven.

**Table 3.** Results of the Pearson Correlation Test examining the association between the participants' age and their results in the domains of the WHOQOL-BREF questionnaire and the overall results on the WHOQOL-BREF questionnaire

WHOQOL-BREF	AGE	
	<i>r</i>	
Domain 1	<i>r</i>	0.35
	<i>p</i>	<b>0.01</b>
Domain 2	<i>r</i>	0.31
	<i>p</i>	<b>0.01</b>
Domain 3	<i>r</i>	0.18
	<i>p</i>	0.20
Domain 4	<i>r</i>	0.19
	<i>p</i>	0.18
WHOQOL-BREF overall	<i>r</i>	0.17
	<i>p</i>	0.23

Table 4 shows that the mean value of the results for male respondents in all domains and in the overall result on the WHOQOL-BREF questionnaire was higher than the mean value of the results for female respondents. Even though some papers indicate a poorer quality of life in female participants than male participants, this was not observed in the present study. Research conducted by Prlić & Kadojić (2012) confirmed a lower quality of life in women in a longitudinal study on the recovery of people after a stroke. Other papers on the correlation of the quality of life between men and women after a stroke report similar results (Bushnell et al., 2014; Gall et al., 2012).

**Table 4.** Descriptive statistics of the participants' results in the domains of the WHOQOL-BREF questionnaire and overall results on the WHOQOL-BREF questionnaire by gender

WHOQOL-BREF	GENDER	<i>M</i>	<i>SD</i>
Domain 1	Men	31.82	18.07
	Women	27.40	17.08
Domain 2	Men	25.91	13.36
	Women	24.66	13.08
Domain 3	Men	71.78	28.41
	Women	70.18	22.15
Domain 4	Men	21.91	7.07
	Women	19.11	8.89
WHOQOL-BREF overall	Men	59.53	18.35
	Women	54.96	16.88

Considering there were two variables, a dichotomous and a continuous variable, a Point-Biserial Correlation Coefficient was used to examine the relationship between men and women, i.e., the Pearson Correlation Test was applied. The significance of the Point-Biserial Correlation Coefficients shows that the participants' gender did not correlate significantly with the results in the WHOQOL-BREF questionnaire domains or the overall results on the WHOQOL-BREF questionnaire (Table 5). No significant correlation was observed between gender and the quality of life in stroke patients, and we assume that this was because of the small sample of participants from each gender (23 male and 27 female participants; Table 5).

**Table 5.** Results of the Pearson Correlation Test examining the relationship between gender of the participants and their results in the WHOQOL-BREF questionnaire domains and the overall results in the WHOQOL-BREF questionnaire

WHOQOL-BREF	GENDER	
	<i>r</i>	
Domain 1	<i>r</i>	0.12
	<i>p</i>	0.37
Domain 2	<i>r</i>	0.04
	<i>p</i>	0.74
Domain 3	<i>r</i>	0.03
	<i>p</i>	0.82
Domain 4	<i>r</i>	0.17
	<i>p</i>	0.22
WHOQOL-BREF overall	<i>r</i>	0.13
	<i>p</i>	0.36

The education variable represents a nominal variable and when we consider it as a clear hierarchical series, it can be treated as an ordinal variable. This is the reason why this hypothesis was tested using the Spearman's Rank-Order Correlation. The results of the Spearman's Rank-Order Correlation analysis indicate that there is no statistically significant correlation between the level of the respondents' education and their results in the WHOQOL-BREF questionnaire domains or the overall results on the WHOQOL-BREF questionnaire (Table 6). Although some studies have shown that a higher level of education is associated with being well informed, showing positive

health behaviour, and a strong demand for health care, and thus, a higher quality of life (Colet, Mayorga & Amador, 2010), the present study did not arrive at the same conclusion. In research carried out in the Republic of Croatia, Brajković et al. (2009) confirmed that the level of education is not a significant predictor of quality of life, which is consistent with the results of our research. The results obtained in the present study can indicate an insufficient number of respondents in each group of the examined variables (no education, primary school, secondary school, higher education – 2 to 4 years, master's or doctorate degree). However, these results can be interpreted by the fact that, regardless of the level of education, the effects of a stroke and disability, in terms of physical and mental functioning, social relationships, and other factors, can change the quality of a patient's life in comparison to their life before the stroke.

**Table 6.** Results of the Spearman's Rank-Order Correlation testing the relationship between the level of the participants' education and their results in the WHOQOL-BREF questionnaire domains and the overall results on the WHOQOL-BREF questionnaire

WHOQOL-BREF	LEVEL OF EDUCATION	
	<i>r</i>	
Domain 1	<i>r</i>	0.01
	<i>p</i>	0.90
Domain 2	<i>r</i>	0.01
	<i>p</i>	0.89
Domain 3	<i>r</i>	0.03
	<i>p</i>	0.80
Domain 4	<i>r</i>	0.09
	<i>p</i>	0.50
WHOQOL-BREF overall	<i>r</i>	0.10
	<i>p</i>	0.93

The Eta Coefficient Test is a measure of correlation between nominal and continuous variables.

Variance analysis was carried out because its significance also applies to the Eta coefficients, which showed no statistical significance in the present study this research (Table 7). Table 8 shows that none of the values met the significance criteria of  $p < 0.05$ . Therefore, we can conclude that there is no significant correlation between the respondents' marital status and their results in the

WHOQOL-BREF questionnaire (overall or by domains).

Marital status did not show a significant correlation with quality of life. Even though most participants were married or lived as married, our results are not consistent with previous studies, for example, Jun et al. (2015) and Haley et al. (2011) who found that the quality of life of married participants was higher than that of those who were single.

**Table 7.** *Eta Correlation Coefficient examining the relationship between marital status and the overall results on the WHOQOL-BREF questionnaire and results on the WHOQOL-BREF questionnaire by domains*

WHOQOL-BREF	N	Σ
Domain 1	50	0.31
Domain 2	50	0.30
Domain 3	50	0.30
Domain 4	50	0.24
WHOQOL-BREF overall	50	0.36

**Table 8.** *Results of the One-Way ANOVA testing the relationship between marital status and the overall results on the WHOQOL-BREF questionnaire and the results on the WHOQOL-BREF questionnaire by domains*

WHOQOL-BREF	F	p
Domain 1	1.72	0.17
Domain 2	1.52	0.22
Domain 3	1.57	0.20
Domain 4	0.95	0.42
WHOQOL-BREF overall	2.27	0.09

The analyses used to test the sub-hypotheses H1.1, H1.2, H1.3 and H1.4, as well as the overall hypothesis H1 show that there is no significant correlation between the sociodemographic variables and the quality of life in elderly stroke patients, except in the sociodemographic characteristic of age, and in the domains of physical health (Domain 1) and psychological health (Domain 2) of the WHOQOL-BREF questionnaire.

A stroke strongly affects the patients' quality of life even when the physical effects are not serious (Haley et al., 2011; Kjörk et al., 2016). An assessment of how independently a patient can

perform activities of daily living is one of the basic criteria for assessing their quality of life, but it can also be used to determine the patient's recovery expectations after a stroke (Kim, Kim, & Kim, 2014). The correlation between the level of functional independence and the quality of life in elderly stroke patients was determined using the FIM questionnaire. The FIM questionnaire results of our research showed  $M = 68.62$  ( $SD = 33.08$ ) out of 126 possible points (Table 9).

**Table 9.** *Distribution of the participants' results on the FIM questionnaire*

	M	SD
FIM overall	68.62	33.08

Spearman's Rank-Order Correlation Coefficient was used to determine the correlation between the participants' results on the FIM and WHOQOL-BREF questionnaires, since the FIM variable results were not distributed normally. There was a statistically significant correlation (moderate positive correlation) between the participants' overall result on the FIM questionnaire and the overall result on the WHOQOL-BREF questionnaire ( $r = 0.55$ ,  $p < 0.00$ ) and the results of the WHOQOL-BREF questionnaire in Domain 1 (strong positive correlation  $r = 0.77$  and  $p < 0.00$ ) and Domain 2 (moderate positive correlation  $r = 0.53$  and  $p < 0.00$ ) (Table 10).

**Table 10.** *Results of the Spearman's Rank-Order Correlation examining the relationship between the participants' results on the FIM questionnaire and the WHOQOL-BREF questionnaire*

WHOQOL-BREF	FIM	
	r	p
Domain 1	0.77	<b>0.00</b>
Domain 2	0.53	<b>0.00</b>
Domain 3	0.09	
	0.94	
Domain 4	0.06	
	0.68	
WHOQOL-BREF overall	0.56	<b>0.00</b>

Results of the correlation analysis examining the relationship between the functionality and

the quality of life indicate a statistically significant relationship between the FIM questionnaire and the participants' overall results on the WHOQOL-BREF questionnaire ( $r = 0.55, p < 0.00$ ). Two out of four domains in the WHOQOL-BREF questionnaire showed a statistically significant relationship with the FIM questionnaire: the Physical domain ( $r = 0.77, p < 0.00$ ) and the Psychological domain ( $r = 0.53, p < 0.00$ ; Table 10). These results suggest that the functional activity of the participants is relatively low in comparison to a possible maximum overall result (68.62 points out of 126). The participants' results also indicate a connection between the functionality and the overall quality of life on the WHOQOL-BREF, which can suggest that lower functionality means a lower quality of life. The correlation between the functional activity and the Physical domain in the WHOQOL-BREF questionnaire can be interpreted in the sense that better functionality results in better physical health, although it should be taken into consideration that this correlation can reflect the fact that both variables have the same object of measurement. Our assumption is that the correlation between the Physical domain in the WHOQOL-BREF questionnaire and functionality suggests that better functional activity can lead to better psychological functioning of the patient. Our findings are consistent with previous studies examining the relationship between functionality and quality of life in elderly stroke patients (Gunaydin et al., 2011; Lui & Nguyen, 2018; Jun et al., 2015). Psychological problems and dependence on other people (Ostwald, Swank & Khan, 2008) can considerably reduce the quality of patients' lives (Feigin et al., 2010; Kim et al., 2014), which was confirmed by the results of the present study. Based on the results of the correlation test, we have confirmed the H2 hypothesis and concluded that a higher level of functional independence indicates overall better quality of living and a better quality of life in the domains of physical and psychological health.

Additionally, this study attempted to understand whether there is a correlation between social support and the quality of life in elderly stroke patients. Factors such as lack of family support can

result in a slower recovery after a stroke (Ostwald et al., 2008). Patients who receive support from family show a speedier recovery than those who live in nursing homes or those who live with families providing adult foster care (Prlić & Kadojić, 2012).

Social support was tested using the Social Support Scale and the results showed that the mean value of the overall result of the social support questionnaire was 203.70 ( $SD = 34.00$ ). The mean value of the participants' results on the subscale of social support from family in the social support questionnaire was 147.30 ( $SD = 25.10$ ), while the mean value on the subscale of the social support from friends in the same questionnaire was 56.40 ( $SD = 10.16$ ; Table 11).

The distribution of participants in this research in the overall results on the Social Support Scale and on the subscales showed a noticeable difference between the results on social support from the family subscale ( $M = 147.30$ ;  $SD = 25.10$ ) and social support from friends subscale ( $M = 56.40$ ;  $SD = 10.16$ ), which indicates that older people receive relatively stronger support from their family after a stroke than from their friends (Table 11). Such a result, showing strong social support of the family, can be interpreted as the predominance of traditionally close family relationships that support older family members, particularly in sickness, despite the disappearance of the trend of living in an extended family in this part of the world.

**Table 11.** Distribution of the participants' results on the Social Support Scale, by subscales and overall

	Social support - family	Social support - friends	Social support - overall
<i>M</i>	147.30	56.40	203.70
SD	25.10	10.16	34.00

Since the social support variable results were not normally distributed, Spearman's Rank-Order Correlation was used to test the correlation between the participants' results on the Social Support Scale variable and the WHOQOL-BREF questionnaire.

The results of the Spearman's Rank-Order Correlation examining the relationship between the participants' results on the Social Support Scale (overall and on subscales) and the WHOQOL-BREF questionnaire (overall and by domains) show a statistically significant correlation between the participants' results on the subscale of social support from friends of the Social Support Scale and the results in Domain 3 (Social relationships domain) of the WHOQOL-BREF questionnaire (positive and moderate,  $r = 0.40$ ,  $p < 0.00$ ; Table 12), which can be interpreted in the sense that stronger social support from friends indicates better social relationships and probably better quality of life in elderly stroke patients. Furthermore, a statistically significant correlation was found between the respondents' results on the subscale of social support from friends of the Social Support Scale and results in Domain 4 of the WHOQOL-BREF questionnaire (positive and moderate,  $r = 0.45$ ,  $p < 0.00$ ; Table 12). Such results can suggest that stronger social support from friends motivates and helps elderly stroke patients to integrate into their social environment, which probably increases their quality of life.

A statistically significant correlation was found between the overall results on the Social Support Scale and the results in Domain 3 of the WHOQOL-BREF questionnaire (positive and moderate, Spearman's  $r = 0.29$ ,  $p < 0.04$ ). Stronger social support from both friends and family suggest better social relationships with the environment as an aspect of the quality of life in the elderly stroke patients. A statistically significant correlation was also found between the overall results on the Social Support Scale and the results in Domain 4 (positive and moderate,  $r = 0.35$ ,  $p < 0.01$ ; Table 12). The correlation between social support and the Environment domain in the quality of life questionnaire can be explained by mobility problems, transportation, or architectural barriers in the patients' living quarters, which possibly inhibits older patients from integrating into the society after a stroke. Unhindered mobility, adapted transportation, and spaces without architectural barriers are necessary if patients want to participate and reintegrate into society, take part in leisure

activities, and enjoy their free time. Such results can be interpreted in the way that stronger social support encourages elderly stroke patients to integrate and socially interact with the environment better, which potentially increases their quality of life in general. Our results are consistent with other studies on the correlation between social support and the quality of life of older people after a stroke. Mackenzie & Chang (2002) obtained similar results when testing the correlation between social support and quality of life after a stroke. Lynch et al. (2008) concluded in their qualitative study that a lack of social support is associated with changes in social roles. Jellema et al. (2016) found in their review of qualitative and quantitative papers that social support, especially from friends and family, encourages stroke patients to reintegrate into the society. The role of environment factors in the quality of life in stroke patients was described by Zhang et al. (2018), where they specified that inadequate transportation and traffic jams were major barriers to the social interaction of their participants.

**Table 12.** Results of the Spearman's Rank-Order Correlation examining the relationship between the participants' results in subscales of the social support questionnaire and overall results of the social support questionnaire and on the WHOQOL-BREF questionnaire, overall and by domains

WHOQOL-BREF	SOCIAL SUPPORT - FAMILY	SOCIAL SUPPORT - FRIENDS	SOCIAL SUPPORT - OVERALL
Domain 1	$r$ -0.08	$r$ -0.09	$r$ -0.10
	$p$ 0.53	$p$ 0.49	$p$ 0.48
Domain 2	$r$ -0.01	$r$ 0.05	$r$ 0.00
	$p$ 0.93	$p$ 0.70	$p$ 0.98
Domain 3	$r$ 0.21	$r$ 0.40	$r$ 0.29
	$p$ 0.13	$p$ <b>0.00</b>	$p$ <b>0.04</b>
Domain 4	$r$ 0.26	$r$ 0.45	$r$ 0.35
	$p$ 0.06	$p$ <b>0.00</b>	$p$ <b>0.01</b>
WHOQOL-BREF overall	$r$ 0.03	$r$ 0.15	$r$ 0.07
	$p$ 0.80	$p$ 0.28	$p$ 0.62

Hypothesis H3, which assumes that there is a significant correlation between social support and the quality of life in elderly stroke patients, was confirmed in the Social relationships and Environment domains of the WHOQOL-BREF question-

naire. Therefore, we conclude that better social relationships are associated with a higher assessment score in the Environment domain, which can in turn contribute to better overall quality of life in elderly stroke patients.

### Research limitations

One of the limitations of the present study was the number of participants, which, in some tested variables, resulted in a small number of participants owing to further classification into groups (gender, level of education, marital status). This can affect the results of the statistical analyses applied when processing the data collected on the tested variables. Furthermore, participants who were not able to fill in the questionnaire by themselves because of their physical condition may have been embarrassed to answer all the questions honestly, or they answered them in a socially acceptable way. Another limitation was the unavailability of certain members of the rehabilitation team (the speech therapist, the psychiatrist, the psychologist) when the participants were filling in the questionnaire, which was a decisive factor when excluding participants suffering from aphasia, and cognitive or mental problems. Although this research study provided a lot of useful data, some aspects of the quality of life would have been clearer if the questionnaire had been adapted for stroke patients, or if it included qualitative research methods.

### CONCLUSION

The Croatian population is rapidly ageing and the increasing incidence of disability in elderly stroke patients requires more attention from the society. Impairment caused by stroke, a loss of functional independence, and reintegration of older stroke patients into society in order to improve their quality of life are definitely becoming serious problems, not only for the gerontologists and geriatricians, but also for the entire society.

Our results confirm a statistically significant correlation between age and the quality of life of stroke patients with respect to physical and psychological health as factors of the overall quality

of life. These findings indicate that age can act as a predictor of the quality of life in elderly stroke patients. We confirmed that there is a significant relationship between functional activities in older people who have suffered a stroke and their overall quality of life, as well as between the respondents' physical and psychological health as factors of the quality of life and functional independence. A higher level of functionality indicates a better quality of life in elderly stroke patients, especially their physical and psychological health. The results of the present study can, therefore, suggest that functionality can be considered as one of the predictors of quality of life in older people after a stroke.

In this research study, a significant correlation was found between social support and the quality of life of elderly stroke patients. Social support from friends was significantly correlated to the Environment and Social relationships domains as aspects of the quality of life. Strong social support from family and friends can be of help to older people after they have experienced a stroke. Integrating into the environment and the society can improve their quality of life, suggesting that social support can be a predictor of the quality of life in elderly stroke patients.

The results of the present study provide a clearer picture of the vulnerability of older people after a stroke, as well as suggest the primary goals that the geriatric and gerontological rehabilitation team working with elderly stroke patients should focus on. Overall, improved functionality and stronger social support from family and friends can improve the patients' quality of life.

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