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, 2016.

University in Belgrade

Marija T. Trajkov, M. Sc.

**The effect of systematic programmed  
exercise on motor and cognitive  
abilities and quality of life of the elderly**

Doctoral Dissertation

Belgrade, 2016.

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( $p = 0,019$ ),

( $p = 0,007$ )

( $p = 0,007$   $p = 0,023$ ).

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: ( $p = 0,004$ ),

( $p = 0,002$ ),

( $p = 0,014$ ),

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# **THE EFFECT OF SYSTEMATIC PROGRAMMED EXERCISE ON MOTOR AND COGNITIVE ABILITIES AND QUALITY OF LIFE OF THE ELDERLY**

## **ABSTRACT**

One of the most important achievements of modern society is the life longevity. Europeans are living longer now than ever before, and this pattern is expected to continue due to the medical achievements and improvements of living standards. The aging of Europe is reducing mortality rates, higher life expectancy and a demographic phenomenon characterized by a decrease in the birth rate. By 2020, one-quarter of Europeans will be over 60 years of age. With an average age of 41.3 years of the population in its cities, the Republic of Serbia is one of the oldest countries in the world.

There are numerous recommendations and instructions aimed at healthy and successful aging that are promoted by the World Health Organization and many other institutions dealing with persons in old age. Physical activity, sport, and recreation are not the only recommendations for healthy aging but are an important resource to promote optimal mental health and well-being of the elderly. This research should indicate the importance and effects of the application of exercise in persons at old age. The aim was to examine differences in relation to the motor and cognitive abilities as well as in quality of life between persons in the older age who practiced and those who did not practice exercising. A non-experimental, descriptive and comparative cross-sectional study was selected for the purposes of research objective set. Examined sample consisted of 59 persons who practiced systematically programmed exercising and 39 persons who did not practice exercising. Tests for motor abilities (strength, speed, precision, and balance), cognitive abilities (concentration, memory, executive functions, speech, visual-constructional abilities, conceptualization, numeracy, and orientation), as well as a quality of life questionnaire and geriatric depression scale were used in the study. The results were analyzed in relation to the qualitative parameters of the tests as well as in terms of current knowledge in the scientific field dealing with the persons in old age. The results obtained suggest that the persons who practiced exercising have achieved better results on most applied tests for motor abilities compared to persons who did not practice exercising. The greatest differences between

the groups were observed in tests of balance and power (endurance). Furthermore, the results show that persons who practiced exercising were more successful on all performed tests for cognitive abilities assessment. Thus, persons who practiced exercising had a higher score on the test ( $p = 0.019$ ), then on the test of verbal learning ( $p = 0.007$ ), as well as on the test for the evaluation of short-term and long-term memory ( $p = 0.007$  and  $p = 0.023$ ). The results obtained indicate that the persons who practiced exercising have subjectively assessed their quality of life as better in most domains compared to persons who did not practice exercising. The domains that are improved in persons who practiced exercising are the following: *Overall life* ( $p = 0.004$ ), *Health* ( $p = 0.002$ ), *Psychological well-being* ( $p = 0.014$ ), *Finance* ( $p = 0.0035$ ), as well as the total score of quality of life ( $p = 0.036$ ). In addition, the results indicate a lower level of depression manifestation in persons who practiced exercising ( $p = 0.000$ ).

From the obtained results it can be concluded that the applied type of exercise has shown the differences between the elderly persons who practiced exercising and those elderly persons who did not practice exercising. Namely, participants who practiced exercising have achieved better results on tests of motor abilities assessment (balance and muscular endurance of hand flexors). In addition, they were more successful in the field of cognitive abilities, especially attention, memory, and concentration. At the end, they have subjectively assessed their quality of life as better than persons who did not practice exercising.

*Keywords: successful aging, physical activity, mental health, cognition*



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(Olson, 2013).

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(Bowling Dieppe, 2005). ,

” “ (Cosco ., 2014a).

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(Vasiljevi ., 2010).

(Li ., 2001).

(Kramer ., 2006).

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(WHO, 2003).

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(Smoli –Krkovi , 1974, Defilipis Havelka, 1984).

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(Spirduso ., 2005).

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(Lu anin, 2003).

(Marmot, 2005).

(Woo , 2016).

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(Braver West, 2008).

(Brajkovi , 2010).

Schaie, 2010).

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(Lakatta Levy, 2003).

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(Vlachopoulos, 2006, Laurent, 2006).

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(McEniery, 2005, Nichols O'Rourke, 2005).

., 2009).

### 1.1.2.

., 2009, Navaratnam, 2011). (Kohansal

., 2005, Raheison Girodet, 2009). (Sin

(Song .., 2011, Meyer, 2012, Faner .., 2012).

(Cohn Donoso, 1963)

(Pride, 2005).

( .., 1998). Copley (2009)

### 1.1.3.

(Saad .., 2014). 2010. 50.

6,6%, 80. 16,6% (Willson .., 2015).

„The National Osteoporosis Foundation“ 9,1

(Ji Yu, 2015).

(Freitas et al., 2016).

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Whiting, 2013). (Hanley

(Borgström et al., 2006, Borgström et al., 2007).

80%

(Zhang Jordan, 2010).

( , 2000).

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(Litwic Edwards, 2013).

(Cederholm et al., 2013). ( )

(Visser et al., 2005, Welch, 2014).

(Boirie et al., 2014).

(Hong et al., 2015).

, (Meng  
., 2015).

#### 1.1.4.

(Hindle, 2010).  
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, (Raz ., 2005, Peters, 2006),  
(Sowell ., 2003).  
(Brasnjevic  
., 2008).  
(Jessberger Gage, 2008).  
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(corpus amygdaloideum) (Owen ., 2011).  
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(Kalaria, 2010, Keage ., 2012).  
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(Lozano ., 2012).  
, (35,8%), (33,3%)  
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(Petrea, 2009, , 2015).

(Rabbitt ., 2001, Sametsky ., 2010).  
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(Lovell Markesbery, 2007).

(Hagemeier ., 2012).

### 1.1.5.

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(Kortlang ., 2016).

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(Dong ., 2014).

(Demeester ., 2010).

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(Wong ., 2014).

(Kuroda ., 2016).

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(Mönestam Wachmeister, 2004).

### 1.1.6.

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(Wallace ., 2004).

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(Caligiuri, 2008).

(Solana ., 2006).

(De Giorgio ., 2015),

(Del Val, 2011)

(Furuta ., 2012).

(Ferlay et al., 2010, Jemal et al., 2010).  
70% 70.  
(McVary, 2006). , 60.  
9–39% (Buckley Lapitan, 2010).

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**2.3.** – ( )

(Yancosek Howell, 2009).

(Weintraub ., 2010).

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(Shumway-Cook Woollacott, 2001).

(Heebner ., 2015).

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(centre of gravity–COG)

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( , 2014).

(center of gravity–COG)

(center of pressure–COP).

(Schilling , 2009).

(postural sway) (Danna-Dos-Santos

, 2008).

(Pavol, 2005).

(Era , 2006, Patel , 2008, Tsutsumi , 2010).

## 2.5.

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(Wu

Hallett, 2005).

(Seidler, 2010).

(corpus callosum),

(Hoffstaedter, 2015).

(Seidler, 2010).

(Raz, 2005, Goble, 2009).

(Mozolic, 2012).

(Bullock-Saxton, 2001).

(Ribeiro Oliveira, 2007).

(Rowan, 2012).

(Goldspink, 2012).

(Nieuwenhuizen .., 2010). 30. 3–8%

(English Paddon-Jones, 2010).

(Goodpaster .., 2006).

(Caserotti .., 2008).

(Cederholm .., 2013).

(Kawao Kaji, 2015).

30% ” “

(Svejme .., 2013).

## 2.6.

65.

29%

75. (Roos  
Dingwell, 2013).

(Sit-to-Stand–STS)  
(Sit-to-Walk–STW) (Chen Chou, 2013).

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(Novak Deshpande,  
2014).

40. (Kujawa Liberman, 2006).

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(Wall  
Kentala, 2005).

(Portegijs ., 2006, English Paddon-Jones, 2010),  
(Sawa ., 2014), (McGibbon  
Krebs, 2001) (Goldberg Neptune, 2007)

(Scheffer et al., 2008).

(Roos & Dingwell, 2013).

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, (Riddle, 2007).  
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(Riddle, 2007).

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(Perry ., 2000).

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(Puckett Reese, 1993).

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(Baddeley, 2012). Baddeley Hitch (1974)

(Missonnier ., 2004).

(Luck

Vogel, 2013).

(Wager Smith, 2003).



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(, 1994).

(Peters, 2006).

(Riddle, 2007).

(Squire, 2009).

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Tulving

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Tulving

(Tulving, 2002, Riddle, 2007).

### 3.3.

(Bredesen, 2014).

(Ruzzoli ., 2012).

(Peters, 2006).

(Cabeza, 2002).

(Owen, 2011).

(Videbech, 2004, Mortimer, 2004).

(Jessberger Gage, 2008).

(Dearly, 2009).

(DeCarli, 2003, Abrahamson, 2012).

(Rajan, 2013).

(Dearly, 2009).

(Ayalon, 2016),

(Quadri, 2005),

(Breteler, 1994),

(Elias, 2006)

(Berr, 1998)

(Lindenberger, 2013, Fandakova, 2015).

(Papenberg, 2015).

(Peters, 2006, Riddle, 2007).

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(Riddle, 2007).

Craik (1983)

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Hartley

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Hasher Zacks (1988)

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(Cabeza Nyberg 1997, Moran Desimone

1985),

(Gazzaley Nobre 2012, Rutman ., 2010).

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(Clapp ., 2011).

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(Vestergren Nilsson, 2011).

, (Harada ., 2013).

a (Park ., 2002).

(Luis ., 2015).

, (Riddle, 2007).

(Squire ., 2009).

. (Nyberg ., 2012).

(Lustig Buckner, 2004).

(Squire ., 2009).

(Peters, 2006).

(Riddle, 2007).

), (Riddle, 2007, Squire, 2009).

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(Sithara Balan Devi, 2015).

(Diener, 1985).

Depp, 2006.

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Rowe Kahn

(Rowe Kahn, 1987).

” “ (Cosco ., 2014a).

(Fahey ., 2004).

(Pernambuco ., 2012).

” “ (Rejeski Mihalko, 2001).

“ ("Health-Related Quality of Life"-HRQoL).

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(WHOQOL Group, 1988).

(2014)

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(WHO, 1948).

(Backovi , 2010).

(Kvamme ., 2011).

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(Maiden Peterson, 2002).

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(Pudrovska, 2010, Hollingshaus Utz, 2013).

(Holmes ., 2013).

(diabetes mellitus). (Das-Munshi, 2007).

(Gayman, 2008). (Bhat, 2005).

(Sedi, 2006).

(Ng, 2011).

(Im Lee, 2014). (Woo, 2016).

(Uysal, 2012). (Kahng, 2008).

(Christmas Andersen, 2000)



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(WHO, 2012).

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(Muray Lopez, 1997).

( 1992. )

(Kim ., 2015).

(Seligman ., 2001).

(Hua ., 2015).

MEDLINE Psychinfo

Djernes 2006.

(Djernes, 2006,

Blay ., 2007, Taqui ., 2007, Imran ., 2009).

(Chung, 2008).

(Choi Kim, 2007).

(Fulbright,

2010).

(Roh et al., 2015).

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50%  
(Ostoji et al., 2003).

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(WHO, 2003).

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(WHO, 2010).

(Galperin et al., 2006, Haskell et al., 2007, Irwin et al., 2008)

(Yamada et al., 2013). (WHO, 2006)

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(Lee Skerritt, 2001).

(Krivokapi Popovi , 2011).

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(LaMonte ., 2005). „ “ (Jolliffe ., 2001)

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(Bohannon, 2002).

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(Bautmans ., 2011, Swift ., 2012).

69, ) 70–74, ) 75–79, ) 80–84 ) 85. . : ) 65–

(Massy-Westropp ., 2011).

65. 70. 421 N, 284 N (Werle ., 2009). 343 N, 223 N (Seino ., 2014), 404 N, 240 N (Jansen ., 2008).

(Bohannon, 2002).

( ),

(The Senior Fitness Test).

: (Chair Stand Test– ), (Arm Curl Test– ), (Chair Sit and Reach Test– ), (Back Scratch Test– ), „ “ (8–Foot Up and Go Test– ) (Step in Place Test– ) (Rikli Jones, 1999).

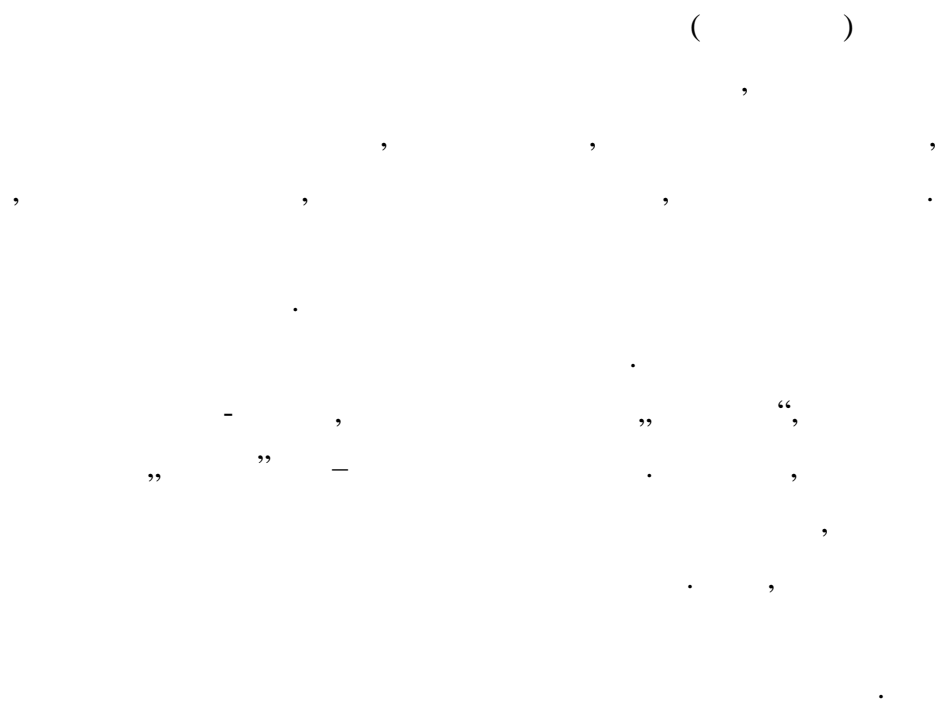
7.1.2.

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(Hollman ., 2008).  
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(Hardy ., 2007).  
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( ) Delaware  
(The University of Delaware) Yancosek Howell (2009)  
( )  
: Box and Block Test, Crawford Small Parts  
Dexterity Test, Functional Dexterity Test, Grooved Pegboard Test, Jebsen-Taylor Test  
of Hand Function, *Minnesota Manual Dexterity Test*, Minnesota Rate of Manipulation  
Test, Moberg Pick-up Test, Nine-hole Peg Test, O'Connor Finger Dexterity Test,  
Purdue Pegboard Test, Sequential Occupational Therapy Dexterity Assessment Wolf  
Motor Function Test.

(Gallus Mathiowetz, 2003).

### 7.1.3.



(Guskiewicz Perrin 1996).

“( , , 2015 ).”

(Błaszczyk , 2014).  
(COP)

(COM) (Błaszczyk, 2008).

(Visser , 2008).

: Chattecx Balance System, Force Plate, Pro Balance Master, Smart Balance Master, *Neuro om Balance Master*.

: Biodex Stability System, Chattecx Balance System, Kinesthetic Ability Trainer i *Neuro om Balance Master*.

## 7.2.

),  
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(Woodford George, 2007).

### 7.2.1.

(  
2013).

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( , 2015).

(The Wechsler Adult Intelligence Scale–WAIS The Wechsler Adult Intelligence Scale-revised–WAIS-R ). Halstead-Reitan

Trail Making Test ( ). Wechsler Memory Scale (WMS-R) ( , 2013).

„ “ (span test).  
(forward digit span, Wechsler, 1981), (letter span, Taub, 1975) (word span, Baddeley,



2012).

( , , )

(Bopp Verhaeghen, 2005).

( ),

, 2013).

Wechsler- (Wechsler Memory Scale–WMS).

(Adrados, 2001)

2000).

(The Boston Naming Task, Animal Naming, Controlled Oral Word Association Test ).

**7.3.**

(Thorgrimsen ., 2003).

(Egan ., 2008).

( .).

( ., 2011),

( aksimovi ., 2005),

(Ražnjatovi ., 2012),

(Ran i ., 2011).

(Paschoal ., 2007).

: Older People's Quality of Life Questionnaire (OPQOL), Control, Autonomy, Self-realisation and Pleasure (CASP-19), World Health Organization Quality of Life (WHOQOL-Old), Euro-QoL (EQ-5D-3L) .

**7.4.**

Scale for Depression (HAM-D), Zung Self-Rating Depression Scale (SDS)  
Montgomery-Asberg Depression Rating Scale (MADRS).

(The Geriatric Depression Scale)

(Cornell Scale for Depression in Dementia–CSDD)

(Rahman, 2005).

**8.**

„mind–body“

. j (2002)

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Yu Yang (2012)

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55. 65.

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: Finger choice RT test (

), Sit-and-reach flexibility (

(Medicaptours, Balma,

French)

Colcombe Kramer (2003)

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, (Matthews

Williams, 2008, Taylor-Piliae ., 2010).

Man (2010)

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 108“.  
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 : Chinese Version of Mini-Mental Status Examination  
 (CMMSE), Geriatric Depression Scale  
 (GDS) Modified Barthel Index (MBI)  
 Color Trails Test (CTT),  
 Chinese version of the Rivermead Behavioral Memory Test (RBMT-  
 CV) Hong Kong List Learning Test (HKLLT).

(Middleton ., 2012).  
 ., 2008, Geda Etgen-  
 ., 2010, Buchman (2010)  
 ., 2007, Liu 55.

Rejeski Mihalko (2001)

. Acree (2006)

. Bankar (2013)

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Pittsburgh sleep quality index (PSQI)

QOL Leiden-Padua (LEIPAD) Questionnaire

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(WHO, 2010)

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**9.2.4.**

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„Internacional martial arts association of Serbia“ (IMAAS),

„ 50+“.

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„Extra-Statisti

Team“, )

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### 9.2.5.

NeuroCom Balance Master  
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- . (Older  
People’s Quality of Life Questionnaire–OPQOL).



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– (Dopsaj et al., 2009, et al., 2011).

(Bohannon, 2001).

(Taekema et al., 2010).

(Massy-Westropp et al., 2011).

(ASHTs)

(Fess, 1992).

( et al., 2015 ).

(RFD),

( ).

:

1)  $F_{\max}^-$  ( $F_{\max}L$   $F_{\max}D$ ) (N),

2)  $tF_{\max}^-$  ( $tF_{\max}L$   $tF_{\max}D$ ), (s),

3)  $RFDF_{\max}^-$  ( $RFDF_{\max}L$   $RFDF_{\max}D$ ) (N/s),

4)  $RFD_{max}$  (N/s),  $(RFD_{maxL} RFD_{maxD})$ ,

5)  $tRFD_{max}$  (s),  $(tFRD_{maxL} tRFD_{maxD})$ ,

6)  $tF50\%_{max}$  (s),  $(tF50\%_{maxL} tF50\%_{maxD})$ , 50%



1.

7)  $F30\%_{teor}$  (N),  $(F30\%_{teorL} F30\%_{teorD})$ , 30%

8)  $F30\%_{real}$  (N),  $(F30\%_{realL} F30\%_{realD})$ , 30%

9)  $aps F30\%$  (N),  $(aps F30\%L aps F30\%D)$ , 30%

10)  $rel F30\%$  (%),  $(rel F30\%L rel F30\%D)$ , 30%

11)  $F70\%_{teor}$  (N),  $(F70\%_{teorL} F70\%_{teorD})$ , 70%

- 12)  $F_{70\%\_real}$  " " 70%  
 $(F_{70\%\_real}L$   
 $F_{70\%\_real}D)$ , (N),
- 13)  $aps F_{70\%}$  70%  
 $(aps F_{70\%}L \quad aps F_{70\%}D)$   
(N),
- 14)  $rel F_{70\%}$  70%  
 $(rel F_{70\%}L \quad rel F_{70\%}D)$ ,  
(%) ,
- 15)  $ImpF_{50\%}$  50%  
 $(ImpF_{50\%}L$   
 $ImpF_{50\%}D)$ , (N/s).

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( cm) ( , 2006).

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**(MMD)**

(Minnesota Manual Dexterity Test, Desrosiers ., 1997).



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**-Neuro om Balance Master**

(Neuro om Balance Master). The Balance Master System





**(WBS)**

(Weight Bearing Squat–WBS)

30°, 60° 90 ).

**(mCTSIB)**

„ “ ( odified Clinical Test of Sensory Interaction on  
Balance–mCTSIB) ( )

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( )

( ).

) Mean COG Sway Velocity–

**(US)**

(Unilateral Stance–US)

:  
) an COG Sway Velocity-

( ) (LOS)

( ) (Limits of stability-LOS) o

) Reaction Time (RT)-

) Movement Velocity (MV)-

(deg/sec),

) Endpoint Excursion (EPE)-

LOS

) Maximum Excursion (MXE)-

) Directional Control (DCE)-

( ) ” “

( ).

” “(STS)

” “(Sit to Stand Test-STST)

) Weight Transfer (WT)– ,  
 ) Rising Index (RI)– ,  
 ) Cog Sway Velocity (CSV)–  
 5 (deg/sec).

” “ (TW)

” “ (Tandem Walk–TW)

) Step Width (SW)– –  
 ) Speed (S)– (cm/s),  
 ) End Sway (ES)– –  
 (deg/s), 5 ,

” “ (SUO)

” “ (Step Up/Over–SUO)

) Lift–Up Index (LUI)– ( )  
 ) Movement Time (MW)–

) Impact Index (IMI)–

” “(WA)

” “ (Walk Across–WA)

) Step Width (SW)–

) Step Length (SL)–

) Speed (S)–

(cm/s),

) Step Length Symmetry (SLS)–

( ).

” “(TUG)

and Go“–TUG, Podsiadlo and Richardson, 1991)

( , , ).

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13,5

” “ („Timed Up



**(MoCA)**

(Montreal Cognitive

Assessment–MoCA, Nasreddine ., 2005).

Ziad Nasreddine.

(Mini Mental State Examination, MMSE)

(Kljajevi , 2009). :

(Mild Cognitive Impairment, MCI)

. , ( ) , , 30, 26 (“user friendly”) , , 28 , .

**(RAVLT)**

(Rey Auditory-Verbal Learning Test–RAVLT)

(Rey, 1964)

. , , , . 15 ( ) 15. 15 ( ) ( , 2013).

**(ROCF)**

(Rey-Osterrieth Complex Figure Test–  
ROCF) (Rey, 1941, Osterrieth,  
1944).  
( 20 ).  
( )  
22.  
( , 2013).



**(OPQOL)**

(Older  
People’s Quality of Life Questionnaire–OPQOL, Bowling .., 2010).  
35 ( ; ; ;  
) ; , ; ,  
; ; j  
35 ( ;  
) 175 ( ).  
( ..  
2013).

**(GDS)**

(Yesavage .., 1982-1983)  
(Geriatric

Depression Scale–GDS).

GDS–SF 15

5

10

( , 2013).

### 9.3.

(*Statistical Package for the Social*

*Sciences*–SPSS™ for Windows, version 23.0, 2015).

95%

2

2 x 2

(0,1),

(0,3)

(0,5).

V,

(0,1),

(0,3)

(0,5).

$t$ -<sup>2</sup>  
 (0,01), (0,06)  
 (0,14). , -  
*U*-  
*r.* , ,  
 (0,10-0,29), (0,30-0,49) (0,50-  
 1,00).



10.

10.1.

98 . 65. .  
 . - 59  
 . ( ) 39  
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1.

					<sup>2</sup>	df	p	
	n	%	n	%				
	7	11,86	9	23,08	1,418	1	0,234	-0,15
	52	88,14	30	76,29				
	59	100,00	39	100,00				

: - (n=39). (n=59); -

2 ( )  
 )  
 ( <sup>2</sup> = 1,418, df = 1, p = 0,234, = -0,15).

2.

	Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
					LL	UL	
	65	85	69,05 (5,19)	0,68	67,70	70,40	67,00 (7,00)
	65	81	67,67 (3,34)	0,53	66,59	68,75	66,00 (4,00)

: - (n=39); Min- (n=59); -  
 ; SE- ; CI- ; Max- ; -  
 ; LL- ; UL-

2. - U-  
 (p = 0,566, r = 0,06). (Mdn = 67,00)  
 Mdn = 66,00) ( 3).

3.

	n	Mdn (IQR)		- U-
	59	67,00 (7,00)	50,81	U = 1073,5, z = -0,57, p = 0,566, r = 0,06
	39	66,00 (4,00)	47,51	

: - (n=59); -  
 (n=39).

4 (BMI)

4.

	Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
					LL	UL	
	20,17	35,56	25,95 (2,98)	0,39	25,17	26,72	25,72 (4,06)
	17,93	38,58	28,95 (4,80)	0,77	27,40	30,51	28,84 (6,95)

: - (n=59); -  
 (n=39); Min- ; Max- ; -  
 ; SE- ; CI- ; LL- ; UL-

(BMI)

t- BMI  
 (M = 28,95, SD = 4,80) (M = 25,95, SD = 2,98), t = -3,50, df  
 = 57,38, p = 0,001 ( ). -3,01 (95% CI: -  
 4,73-1,28) ( <sup>2</sup> = 0,04),  
 BMI ( 5).

5.

	M (SD)	t (df)	p		SE	95% CI		<sup>2</sup>
						LL	UL	
	25,95 (2,98)	-3,50						
	28,95 (4,80)	(57,38)	<b>0,001</b>	-3,01	0,86	-4,73	-1,28	0,04

: - (n=39); - (n=59); - ; SE- ; - ; UL- ; SE- ; CI- ; LL-

6.

6.

					<sup>2</sup> (df)	p	V
	n	%	n	%			
	0	0,00	3	7,69			
	24	40,68	24	61,54			
	10	16,95	4	10,53			
	24	40,68	8	10,26			
	1	1,69	0	0,00	12,463 (4)	<b>0,027</b>	0,33

: - (n=39). (n=59); - .

2

(<sup>2</sup> =

12,463, df = 4, p = 0,027).

(V = 0,33).

7.

2

(<sup>2</sup> = 1,340, df = 3, p = 0,720, V = 0,12).

7.

					$\chi^2$ (df)	p	V
	n	%	n	%			
	29	49,15	18	46,15	1,340 (3)	0,720	0,12
	3	5,08	1	2,56			
	10	16,95	5	12,82			
	17	28,81	15	38,46			

: - (n=39). (n=59); -

8.

2015.

8.

					$\chi^2$ (df)	p	V
	n	%	n	%			
	6	10,17	13	33,33	8,109 (2)	<b>0,017</b>	0,29
	21	35,59	11	28,21			
	32	54,24	15	38,46			

: - (n=39). (n=59); -

2

( $\chi^2 = 8,109$ ,  $df = 2$ ,  $p = 0,017$ ). ( $V = 0,29$ ).

9.

2

( $\chi^2 = 1,628$ ,  $df = 2$ ,  $p = 0,443$ ,  $V = 0,13$ ).

T 9.

					$\chi^2$ (df)	p	V
	n	%	n	%			
	58	98,31	37	94,87	1,628 (2)	0,443	0,13
	0	0,00	1	2,56			
	1	1,69	1	2,56			

: - (n=39). (n=59); -

65.

10.

10.

					$\chi^2$ (df)	p	V
	n	%	n	%			
(2 3 )	17	28,81	11	28,21	19,731 (4)	<b>0,001</b>	0,45
(2 3 )	24	40,68	3	7,69			
( )	5	8,47	5	12,82			
( ) ( )	4	6,78	1	2,56			
	9	15,25	19	48,72			

: - (n=39). (n=59); -

4,  $p = 0,001$ ). ( $\chi^2 = 19,731$ ,  $df =$   
( $V = 0,45$ ).

11.  $\chi^2$

18,102,  $df = 3$ ,  $p = 0,000$ ). ( $\chi^2 =$   
( $V = 0,43$ ).

11.

					$\chi^2$ (df)	p	V
	n	%	n	%			
	26	44,07	8	20,51	18,102 (3)	<b>0,000</b>	0,43
	14	23,73	6	15,38			
	4	6,78	16	41,03			
	15	25,42	9	23,08			

: - (n=39). (n=59); - .

- . :  
, , ,

12.

„mind-body“

( ) 57,62%,  
(81,36%),

(88,14%).

(62,71%).

12.

(n=59)

	<i>n</i>	%
– ,	44	74,57
–	15	25,42
– 6	2	3,39
–	9	15,25
–	48	81,36
–	52	88,14
–	7	11,86
– 60	30	50,85
– 90	29	49,15
–	12	20,34
–	37	62,71
–	9	15,25
–	1	1,69

10.2.

13.

13.

QoL			
	36	0,845	0,181
:			
-	4	0,729	0,457
-	4	0,145	0,010
-	8	0,770	0,313
-	5	0,337	0,150
-	4	0,789	0,507
-	4	0,730	0,437
-	4	0,641	0,318
-	3	0,759	0,497

: QoL - ; -

( 13).

0,845.



**10.3.**

( 14).

( 14).

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 , .

14.

	<b>M</b>	<b>Mdn</b>	<b>Var</b>	<b>SD</b>	<b>Sk</b>	<b>Ku</b>	<b>KS</b>	<b>df</b>	<b>p</b>
	143,18	144,00	193,74	13,92	-0,30	-0,40	0,060	98	0,200
<b>:</b>									
-	16,11	16,00	6,74	2,60	-0,18	-0,52	0,098	98	0,021
-	13,72	13,00	5,54	2,35	1,13	1,27	0,202	98	<b>0,000</b>
-	32,87	33,00	20,34	4,51	-0,46	-0,23	0,080	98	0,132
-	19,84	20,00	6,03	2,46	-0,03	-0,30	0,109	98	<b>0,006</b>
-	17,82	18,00	4,56	2,14	-0,76	-0,20	0,173	98	<b>0,000</b>
-	17,93	18,00	3,72	1,93	-0,43	-1,16	0,201	98	<b>0,000</b>
-	13,95	14,00	12,15	3,49	-0,49	-0,12	0,140	98	<b>0,000</b>
-	11,20	12,00	7,03	2,65	-0,42	-0,45	0,179	98	<b>0,000</b>

: Sk- ; Ku- ; KS- - .

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**10.4.**

15 15

*t-*

:  $F_{\max}L$ ,  $tF_{\max}L$ ,  $RFDF_{\max}L$ ,  $RFD_{\max}L$ ,  $tRFD_{\max}L$ ,  
 $F_{30\%\_teor}L$ ,  $F_{70\%\_teor}L$   $F_{70\%\_real}L$ .

,  $tF_{50\%_{\max}L}$  ( $p =$   
 0,022),  $tF_{50\%_{\max}L}$  17,43  
 (95% CI: 23,53 32,33) ( $\chi^2 = 0,054$ ) ( $n =$   
 16 ).

,  $F_{30\%_{real}L}$  ( $p =$   
 0,022),  $F_{30\%_{real}L}$  -34,04 (95% CI: -  
 63,13 -4,95) ( $\chi^2 = 0,056$ ) ( $n =$  16 ).

,  $aps F_{30\%L}$  ( $p =$   
 0,013),  $aps F_{30\%L}$  -32,20 (95% CI: -  
 57,56 -6,84) ( $\chi^2 = 0,063$ ) ( $n =$  16 ).

,  $rel F_{30\%L}$  ( $p =$   
 0,016),  $rel F_{30\%L}$  -38,25 (95% CI: -  
 69,23 -7,27) ( $\chi^2 = 0,060$ ) ( $n =$  16 ).

,  $aps F_{70\%L}$  ( $p =$   
 0,041),  $aps F_{70\%L}$  -24,41 (95% CI: -  
 47,82 -1,01) ( $\chi^2 = 0,044$ ) ( $n =$  16 ).

, rel F<sub>70%</sub> (p = 0,045), -12,91 (95% CI: -25,51 -0,31) (  $\chi^2 = 0,042$ ) ( 16 ).

, ImpF<sub>50%</sub> (p = 0,036), 2230,40 (95% CI: 149,66 4311,14) (  $\chi^2 = 0,040$ ) ( 16 ).

17 17

t-

: F<sub>max</sub>D, tF<sub>max</sub>D, RFDF<sub>max</sub>D, RFD<sub>max</sub>D, tRFD<sub>max</sub>D, tF50%<sub>max</sub>D, F30%<sub>teor</sub>D, F70%<sub>teor</sub>D, aps F<sub>70%</sub>D, rel F<sub>70%</sub>D, F70%<sub>real</sub>D ImpF<sub>50%</sub>D ( 18 18 ).

, F30%<sub>real</sub>D (p = 0,010), -40,78 (95% CI: -71,75 -9,81) (  $\chi^2 = 0,071$ ) ( 18 ).

, aps F<sub>30%</sub>D (p = 0,005), -42,77 (95% CI: -72,33 -13,22) (  $\chi^2 = 0,084$ ) ( 18 ).

, rel F<sub>30%</sub>D (p = 0,002), -55,36 (95% CI: -89,26 -21,45) (  $\chi^2 = 0,105$ ) ( 18 ).

		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
F <sub>max</sub> L (N)		90,00	635,00	246,21 (83,81)	11,00	224,17	268,24	239,50 (76,75)
		149,00	440,00	252,89 (67,36)	10,93	230,75	275,04	244,50 (94,25)
RFDF <sub>max</sub> L (N/s)		69,56	1271,08	287,98 (189,93)	24,94	238,04	337,92	246,45 (154,39)
		81,96	951,57	291,00 (188,35)	30,55	229,09	352,91	255,99 (118,92)
RFD <sub>max</sub> L (N/s)		349,00	3601,00	1150,10 (550,32)	72,26	1005,40	1294,80	1129,50 (502,00)
		426,00	2052,00	1106,21 (395,01)	64,08	976,37	1236,05	1026,00 (566,75)
tF <sub>max</sub> L (s)		0,33	2,60	1,03 (0,43)	0,06	0,92	1,15	0,93 (0,59)
		0,32	2,55	1,11 (0,53)	0,09	0,94	1,28	1,02 (0,71)
tRFD <sub>max</sub> L (s)		0,28	1,29	0,58 (0,22)	0,03	0,52	0,64	0,54 (0,31)
		0,31	1,38	0,62 (0,24)	0,04	0,54	0,70	0,58 (0,29)
tF50% <sub>max</sub> L (s)		8,80	173,48	67,93 (39,06)	5,13	57,66	78,20	67,77 (64,85)
		4,53	160,11	50,50 (30,57)	4,96	40,45	60,54	48,64 (42,49)

: - (n=59); - (n=39); F<sub>max</sub>L (N)-  
; RFDF<sub>max</sub>L (N/s)- ; tF<sub>max</sub>L (s)-  
RFD<sub>max</sub>L (N/s)- ; tRFD<sub>max</sub>L (s)-  
; tF50%<sub>max</sub>L (s)- 50% ; Min- ; Max-  
; - ; SE- ; CI- ; LL- ; UL-

		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
F30% <sub>teor</sub> L (N)		27,00	190,50	73,86 (25,14)	3,30	67,25	80,47	71,85 (23,03)
		44,70	132,00	75,87 (20,21)	3,28	69,23	82,51	73,35 (28,28)
F30% <sub>real</sub> L (N)		27,00	452,50	130,39 (73,63)	9,84	110,67	150,11	122,50 (104,25)
		50,00	287,00	164,43 (61,62)	10,13	143,89	184,98	166,00 (86,00)
aps F <sub>30%</sub> L (N)		-87,00	261,50	52,03 (65,21)	8,56	34,59	69,18	45,75 (92,15)
		-78,60	186,80	84,14 (54,45)	8,83	66,34	102,14	92,40 (67,73)
rel F <sub>30%</sub> L (%)		-100,00	225,49	71,81 (80,02)	10,52	50,76	92,87	76,90 (134,15)
		-100,00	206,55	110,07 (65,71)	10,66	88,47	131,66	114,57 (85,36)
F70% <sub>teor</sub> L (N)		63,00	444,50	172,34 (58,67)	7,70	156,92	187,77	167,65 (53,72)
		104,30	308,00	177,03 (47,15)	7,65	161,53	192,53	171,15 (65,98)
F70% <sub>real</sub> L (N)		76,00	564,00	193,45 (83,23)	11,12	171,16	215,74	172,00 (89,25)
		67,00	427,00	221,70 (74,31)	12,22	196,93	246,48	203,00 (88,00)
aps F <sub>70%</sub> L (N)		-203,0	119,50	14,43 (58,25)	7,65	-0,89	29,75	21,90 (58,85)
		-183,40	232,70	38,84 (53,64)	8,70	21,21	56,47	46,00 (48,13)
rel F <sub>70%</sub> L (%)		-100,00	53,15	8,37 (30,94)	4,06	0,23	16,50	15,37 (34,99)
		-100,00	71,43	21,28 (29,54)	4,79	11,57	30,99	26,07 (27,24)
I <sub>imp</sub> F <sub>50%</sub> L (N/s)		691,00	24538,00	8810,69 (6033,57)	792,25	7224,24	10397,13	7670,00 (10255,50)
		426,00	14875,00	6580,29 (4227,97)	685,87	5190,59	7969,99	6113,50 (7107,00)

: - (n=59); - (n=39); F30%<sub>teor</sub>L (N)-  
 ( ) 30% ; F30%<sub>real</sub>L (N)- 30%  
 " " ; aps F<sub>30%</sub>L (N)- 30%  
 ; rel F<sub>30%</sub>L (%) - 30% ; F70%<sub>teor</sub>L  
 (N)- ( ) 70% ; F70%<sub>real</sub>L (N)-  
 70% " " ; aps F<sub>70%</sub>L (N)- 70%  
 ; rel F<sub>70%</sub>L (%) - 70%  
 ; I<sub>imp</sub>F<sub>50%</sub>L (N/s)- 50% ;  
 Min- ; Max- ; - ; SE- ; CI- ; LL- ; UL- .

	M (SD)	t (df)	p			95% CI		2
					SE	LL	UL	
F <sub>max</sub> L (N)	246,21 (83,81)	-0,41 (94)	0,681	-6,69	16,23	-38,91	25,53	0,002
	252,89 (67,36)							
RFDF <sub>max</sub> L (N/s)	287,98 (189,93)	-0,08 (94)	0,939	-3,02	39,51	-81,47	75,43	0,000
	291,00 (188,35)							
RFD <sub>max</sub> L (N/s)	1150,10 (550,32)	0,43 (94)	0,672	43,89	103,32	-161,25	249,03	0,002
	1106,21 (395,01)							
tF <sub>max</sub> L (s)	1,03 (0,43)	-0,76 (94)	0,451	-0,07	0,10	-0,27	0,12	0,006
	1,11 (0,53)							
tRFD <sub>max</sub> L (s)	0,58 (0,22)	-0,78 (94)	0,440	-0,04	0,05	-0,13	0,06	0,006
	0,62 (0,24)							
tF50% <sub>max</sub> L (s)	67,93 (39,06)	2,32 (94)	<b>0,022</b>	17,43	7,50	23,53	32,33	0,054
	50,50 (30,57)							

: - (n=59); - (n=39); F<sub>max</sub>L (N)-  
; RFDF<sub>max</sub>L (N/s)- ; tF<sub>max</sub>L (s)-  
RFD<sub>max</sub>L (N/s)- ; tRFD<sub>max</sub>L (s)-  
; tF50%<sub>max</sub>L (s)- 50% ; SE-  
; SE- ; CI- ; LL- ; UL-

		M (SD)	t (df)	p	95% CI		2		
					SE	LL UL			
F30% <sub>teor</sub> L (N)		73,86 (25,14)	-0,41 (94)	0,681	-2,01	4,87	-11,67	7,66	0,002
		75,87 (20,21)							
F30% <sub>real</sub> L (N)		130,39 (73,63)	-2,32 (94)	<b>0,022</b>	-34,04	14,65	-63,13	-4,95	0,056
		164,43 (61,62)							
aps F <sub>30%</sub> L (N)		52,03 (65,21)	-2,52 (94)	<b>0,013</b>	-32,20	12,77	-57,56	-6,84	0,063
		84,14 (54,45)							
rel F <sub>30%</sub> L (%)		71,81 (80,02)	-2,45 (94)	<b>0,016</b>	-38,25	15,60	-69,23	-7,27	0,060
		110,07 (65,71)							
F70% <sub>teor</sub> L (N)		172,34 (58,67)	-0,41 (94)	0,681	-4,68	11,36	-27,24	17,87	0,002
		177,03 (47,15)							
F70% <sub>real</sub> L (N)		193,45 (83,23)	-1,67 (91)	0,098	-28,16	16,91	-61,85	5,33	0,030
		221,70 (74,31)							
aps F <sub>70%</sub> L (N)		14,43 (58,25)	-2,07 (94)	<b>0,041</b>	-24,41	11,79	-47,82	-1,01	0,044
		38,84 (53,64)							
rel F <sub>70%</sub> L (%)		8,37 (30,94)	-2,04 (94)	<b>0,045</b>	-12,91	6,34	-25,51	-0,31	0,042
		21,28 (29,54)							
ImpF <sub>50%</sub> L (N/s)		8810,69 (6033,57)	2,13 (93,53)	<b>0,036</b>	2230,40	1047,89	149,66	4311,14	0,040
		6580,29 (4227,97)							

(n=59); (n=39); F30%<sub>teor</sub>L (N)-30% ; F30%<sub>real</sub>L (N)-30% ; aps F<sub>30%</sub>L (N)-30% ; rel F<sub>30%</sub>L (%) -70% ; F70%<sub>teor</sub>L (N)-70% ; F70%<sub>real</sub>L (N)-70% ; aps F<sub>70%</sub>L (N)-70% ; rel F<sub>70%</sub>L (%) -50% ; ImpF<sub>50%</sub>L (N/s)-50% ; SE- ; SE- ; CI- ; LL- ; UL-

–

		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
F <sub>max</sub> D (N)		142,00	651,00	270,21 (78,72)	10,43	249,32	291,10	261,00 (79,00)
		88,00	465,00	276,89 (83,23)	13,50	249,54	304,25	253,50 (112,00)
RFDF <sub>max</sub> D (N/s)		69,56	1271,08	287,98 (189,93)	24,94	238,04	337,92	246,45 (154,39)
		81,96	951,57	291,00 (188,35)	30,55	229,09	352,91	255,99 (118,92)
RFD <sub>max</sub> D (N/s)		349,00	3601,00	1150,10 (550,32)	72,26	1005,40	1294,80	1129,50 (502,00)
		426,00	2052,00	1106,21 (395,01)	64,08	976,37	1236,05	1026,00 (566,75)
tF <sub>max</sub> D (s)		0,28	2,49	1,02 (0,50)	0,07	0,89	1,14	0,94 (0,63)
		0,32	1,83	0,01 (0,38)	0,06	0,89	1,14	1,02 (0,62)
tRFD <sub>max</sub> D (s)		0,31	1,38	0,57 (0,26)	0,03	0,50	0,64	0,52 (0,34)
		0,32	1,31	0,55 (0,23)	0,04	0,48	0,63	0,50 (0,34)
tF50% <sub>max</sub> D (s)		9,85	158,83	71,95 (35,33)	4,68	62,58	81,33	65,63 (55,41)
		8,91	248,10	58,22 (40,07)	6,50	45,05	71,39	57,52 (41,71)

: – (n=59); – (n=39); F<sub>max</sub>D (N)–  
; RFDF<sub>max</sub>D (N/s)– ; tF<sub>max</sub>D (s)–  
; tRFD<sub>max</sub>D (s)– ; tF50%<sub>max</sub>D (s)–  
; Max- ; SE- ; CI- ; LL- ; UL- ; Min-



		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
F30% <sub>-teor</sub> D (N)		42,60	195,30	81,06 (23,61)	3,13	74,80	87,33	78,30 (23,70)
		26,40	139,50	83,07 (25,00)	4,05	74,86	91,28	76,05 (33,60)
F30% <sub>-real</sub> D (N)		42,00	412,00	144,76 (74,89)	10,10	124,52	165,01	124,00 (111,00)
		64,00	342,00	185,54 (70,88)	11,65	161,91	209,17	184,00 (90,50)
aps F <sub>30%</sub> D (N)		-108,30	216,70	56,87 (69,61)	9,30	38,23	75,51	44,65 (101,78)
		-100,20	212,10	99,64 (69,69)	11,62	76,06	123,22	104,30 (95,40)
rel F <sub>30%</sub> D (%)		-100,00	197,30	71,40 (79,92)	10,68	50,00	92,80	61,11 (137,81)
		-100,00	246,73	126,76 (79,84)	13,31	99,74	153,77	138,55 (111,79)
F70% <sub>-teor</sub> D (N)		99,40	455,70	189,15 (55,10)	7,30	174,53	203,77	182,70 (55,30)
		61,60	325,50	193,83 (58,26)	9,45	174,68	212,98	177,45 (78,40)
F70% <sub>-real</sub> D (N)		45,00	637,00	209,69 (89,96)	12,13	185,37	234,01	192,00 (95,00)
		70,00	390,00	229,68 (81,41)	13,38	202,53	256,82	217,00 (106,00)
aps F <sub>70%</sub> D (N)		-252,71	181,30	12,17 (71,32)	9,53	-6,93	31,27	26,30 (74,70)
		-233,80	110,40	29,86 (62,67)	10,44	8,66	51,06	39,45 (78,30)
rel F <sub>70%</sub> D (%)		-100,00	45,50	6,20 (33,45)	4,47	-2,76	15,16	14,07 (42,72)
		-100,00	51,55	15,80 (30,25)	5,04	5,57	26,03	24,05 (40,69)
I <sub>imp</sub> F <sub>50%</sub> D (N/s)		0,00	25912,00	9640,79 (5660,66)	743,28	8152,40	11129,19	8456,50 (9826,75)
		1269,00	17216,00	7589,84 (4075,35)	661,11	6250,31	8929,38	7451,87 (6745,75)

: - (n=59); - (n=39); F30%<sub>-teor</sub>D (N)-  
 ( ) 30% ; F30%<sub>-real</sub>D (N)- 30%  
 " " ; aps F<sub>30%</sub>D (N)- 30%  
 ; rel F<sub>30%</sub>D (%) - 30% ;  
 F70%<sub>-teor</sub>D (N)- ( ) 70% ; F70%<sub>-real</sub>D (N)-  
 70% " " ; aps F<sub>70%</sub>D (N)-  
 70% ; rel F<sub>70%</sub>D (%) - 70%  
 ; I<sub>imp</sub>F<sub>50%</sub>D (N/s)- 50%  
 ; Min- ; Max- ; - ; SE- ; CI- ; LL- ; UL-

		<b>M (SD)</b>	<b>t (df)</b>	<b>p</b>			95% CI		<b>2</b>
						<b>SE</b>	<b>LL</b>	<b>UL</b>	
F <sub>max</sub> D (N)		270,21 (78,72)	-0,41 (94)	0,681	-6,69	16,23	-38,91	25,53	0,002
		276,89 (83,23)							
RFD <sub>max</sub> D (N/s)		1150,10 (550,32)	0,53 (93)	0,601	22,06	41,99	-61,32	105,45	0,003
		1106,21 (395,01)							
RFD <sub>max</sub> D (N/s)		1,02 (0,50)	0,42 (93)	0,679	42,87	103,22	-162,10	247,83	0,002
		0,01 (0,38)							
tF <sub>max</sub> D (s)		287,98 (189,93)	0,04 (93)	0,972	0,00	0,10	-0,19	0,19	0,000
		291,00 (188,35)							
tRFD <sub>max</sub> D (s)		0,57 (0,26)	0,29 (93)	0,772	0,02	0,05	-0,09	0,12	0,001
		0,55 (0,23)							
tF50% <sub>max</sub> D (s)		71,95 (35,33)	1,76 (93)	0,082	13,73	7,81	-1,77	29,24	0,032
		58,22 (40,07)							

: - (n=59); - (n=39); F<sub>max</sub>D (N)-  
 ; RFD<sub>max</sub>D (N/s)- ; RFD<sub>max</sub>D (N/s)-  
 ; tF<sub>max</sub>D (s)-  
 ; tRFD<sub>max</sub>D (s)- 50%  
 ; tF50%<sub>max</sub>D (s)- ; -  
 ; SE- ; SE- ; CI- ; LL-  
 ; UL- .

	M (SD)	t (df)	p	95% CI		2	
				SE	LL UL		
F30% <sub>teor</sub> D (N)	81,06 (23,61)	-0,40 (93)	0,693	-2,01	5,06	-12,05 8,04	0,002
	83,07 (25,00)						
F30% <sub>real</sub> D (N)	144,76 (74,89)	-2,62 (90)	<b>0,010</b>	-40,78	15,59	-71,75 -9,81	0,071
	185,54 (70,88)						
aps F <sub>30%</sub> D (N)	56,87 (69,61)	-2,86 (90)	<b>0,005</b>	-42,77	14,88	-72,33 -13,22	0,084
	99,64 (69,69)						
rel F <sub>30%</sub> D (%)	71,40 (79,92)	-3,24 (90)	<b>0,002</b>	-55,36	17,07	-89,26 -21,45	0,105
	126,76 (79,84)						
F70% <sub>teor</sub> D (N)	189,15 (55,10)	-0,40 (93)	0,693	-4,68	11,81	-28,13 18,77	0,002
	193,83 (58,26)						
F70% <sub>real</sub> D (N)	209,69 (89,96)	-1,08 (90)	0,281	-19,98	18,42	-56,58 16,61	0,013
	229,68 (81,41)						
aps F <sub>70%</sub> D (N)	12,17 (71,32)	-1,22 (90)	0,227	-17,69	14,54	-46,59 11,20	0,016
	29,86 (62,67)						
rel F <sub>70%</sub> D (%)	6,20 (33,45)	-1,39 (90)	0,167	-9,60	6,89	-23,28 4,08	0,021
	15,80 (30,25)						
ImpF <sub>50%</sub> D (N/s)	9640,79 (5660,66)	1,93 (94)	0,057	2050,95	1063,52	-60,70 4162,60	0,038
	7589,84 (4075,35)						

(n=59); (n=39); F30%<sub>teor</sub>D (N)–30% ; F30%<sub>real</sub>D (N)–30% ; aps F<sub>30%</sub>D (N)–30% ; rel F<sub>30%</sub>D (%)–30% ; F70%<sub>teor</sub>D (N)–70% ; F70%<sub>real</sub>D (N)–70% ; aps F<sub>70%</sub>D (N)–70% ; rel F<sub>70%</sub>D (%)–70% ; ImpF<sub>50%</sub>D (N/s)–50% ; SE– ; SE– ; CI– ; LL– ; UL–

a ( ).

19.

		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
		0,00	27,00	17,56 (5,56)	0,72	16,11	19,01	19,00 (6,00)
		0,00	27,00	17,33 (6,09)	0,97	15,36	19,31	18,00 (6,00)
		0,00	30,00	19,42 (6,26)	0,82	17,79	21,06	19,00 (11,00)
		0,00	27,00	18,87 (6,14)	0,98	16,88	20,86	21,00 (6,00)

: - ; - (n=59);  
 - (n=39); - ; - ; Min-  
 ; Max- ; - ; SE-  
 ; CI- ; LL- ; UL- .  
 ( )  
 t- .

( 20).

20.

		M (SD)	t (df)	p	95% CI		2		
					SE	LL		UL	
		17,56 5,56)	0,19 (96)	0,850	0,23	1,19	-2,14	2,59	0,000
		17,33(6,09)							
		19,42(6,26)	0,43 (96)	0,668	0,55	1,28	-1,99	3,10	0,002
		18,87(6,14)							

: - ; - (n=59);  
 - (n=39); - ; - ; -  
 ; SE- ; - ;  
 SE- ; CI- ; LL- ; UL- .

” “ .

21.

” “

T		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
		10,00	27,00	15,98 (3,46)	0,45	15,08	16,89	15,00 (4,00)
		10,00	20,00	14,95 (2,32)	0,37	14,20	15,70	15,00 (2,00)
		11,00	30,00	17,34 (3,88)	0,51	16,33	18,35	16,00 (4,00)
		10,00	22,00	16,03 (2,72)	0,44	15,14	16,91	16,00 (2,00)

: –,, “ ; – (n=39); – ; – ; Min– ; Max– ; – ; SE– ; CI– ; LL– ; UL– .

” “

t-

( 22).

22.

” “

T		M (SD)	t (df)	p	95% CI		2		
					SE	LL		UL	
		15,98 (3,46)	1,64 (96)	0,105	1,03	0,63	-0,22	2,29	0,027
		14,95 (2,32)							
		17,34 (3,88)	1,97 (95,64)	0,052	1,31	0,67	-0,01	2,64	0,034
		16,03 (2,72)							

: –,, “ ; – (n=39); – ; – ; – ; SE– ; – ; SE– ; CI– ; LL– ; UL– .

23

23.

	Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
					LL	UL	
	237,00	318,16	278,85 (19,48)	2,54	273,77	283,93	280,97 (25,97)
	226,00	373,41	288,48 (29,36)	4,70	278,96	298,00	287,62 (33,94)

: - (n=39); Min- (n=59); Max- ; - ; SE- ; CI- ; LL- ; UL-

( 24).

24.

	M (SD)	t (df)	p			95% CI		2
					SE	LL	UL	
	278,85 (19,48)	-1,80 (60,01)	0,077	-9,63	5,34	-20,31	1,06	0,038
	288,48 (29,36)							

: - (n=39); - (n=59); SE- ; - ; SE- ; CI- ; LL- ; UL-

NeuroCom Balance Master.

(Weight Bearing Squat-WBS)

( (0°), 30°, 60° 90 ).

25.

WBS		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
<b>0</b>								
		41,00	61,00	48,97 (4,85)	0,63	47,70	50,23	49,00 (9,00)
		37,00	61,00	49,67 (3,34)	0,81	48,02	51,31	49,00 (6,00)
		39,00	59,00	51,02 (4,83)	0,63	49,76	52,27	51,00 (9,00)
		39,00	63,00	50,33 (5,07)	0,81	48,69	51,98	51,00 (6,00)
<b>30</b>								
		35,00	64,00	47,05 (5,69)	0,74	45,57	48,53	47,00 (6,00)
		29,00	63,00	47,33 (7,03)	1,13	45,05	49,61	49,00 (10,00)
		36,00	65,00	52,95 (5,69)	0,74	51,47	54,43	53,00 (6,00)
		37,00	71,00	52,62 (7,01)	1,12	50,34	54,89	51,00 (10,00)
<b>60</b>								
		32,00	58,00	47,10 (5,61)	0,73	45,64	48,56	47,00 (8,00)
		38,00	71,00	47,97 (6,87)	1,10	45,75	50,20	47,00 (9,00)
		42,00	68,00	52,90 (5,61)	0,73	51,44	54,36	53,00 (8,00)
		29,00	62,00	52,03 (6,87)	1,10	49,80	54,25	53,00 (9,00)
<b>90</b>								
		31,00	67,00	48,02 (6,90)	0,93	46,22	49,81	48,00 (10,00)
		37,00	64,00	48,38 (5,69)	0,91	46,54	50,23	48,00 (6,00)
		33,00	69,00	51,85 (7,16)	0,90	49,98	53,71	52,00 (10,00)
		36,00	63,00	51,62 (5,69)	0,91	49,77	53,46	52,00 (6,00)

: WBS–Weight Bearing Squat; – (n=59); – (n=39); – ; – ; Min– ; Max– ; – ; SE– ; CI– ; LL– ; UL– .

26.

WBS		M (SD)	t (df)	p			95% CI		2
						SE	LL	UL	
<b>0</b>									
		48,97 (4,85)							
		49,67 (3,34)	-0,69 (96)	0,493	-0,70	1,02	-2,72	1,32	0,005
		51,02 (4,83)							
		50,33 (5,07)	0,67 (96)	0,503	0,68	1,02	-1,33	2,70	0,005
<b>30</b>									
		47,05 (5,69)							
		47,33 (7,03)	-0,22 (96)	0,827	-0,28	1,29	-2,85	2,28	0,000
		52,95 (5,69)							
		52,62 (7,01)	0,26 (96)	0,796	0,33	1,29	-2,23	2,89	0,001
<b>60</b>									
		47,10 (5,61)							
		47,97 (6,87)	-0,69 (96)	0,493	-0,87	1,27	-3,39	1,64	0,005
		52,90 (5,61)							
		52,03 (6,87)	0,69 (96)	0,493	0,87	1,27	-1,64	3,39	0,005
<b>90</b>									
		48,02 (6,90)							
		48,38 (5,69)	-0,28 (96)	0,783	-0,37	1,33	-3,01	2,27	0,001
		51,85 (7,16)							
		51,62 (5,69)	0,17 (96)	0,865	0,23	1,37	-2,48	2,94	0,000

: WBS–Weight Bearing Squat; – (n=59); – (n=39); – ; – ; SE– ; SE– ; CI– ; LL ; UL– .

(Weight Bearing Squat–WBS)  $t$ - ( 26).



mCTSIB		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
FEO		0,10	0,90	0,31 (0,16)	0,02	0,27	0,35	0,30 (0,10)
		0,10	1,50	0,38 (0,27)	0,04	0,30	0,47	0,30 (0,30)
FEC		0,10	0,70	0,31 (0,12)	0,02	0,28	0,34	0,30 (0,20)
		0,10	0,80	0,34 (0,16)	0,03	0,29	0,39	0,30 (0,20)
FOEO		0,10	1,20	0,52 (0,18)	0,02	0,47	0,57	0,50 (0,20)
		0,32	1,16	0,60 (0,16)	0,03	0,55	0,65	0,63 (0,10)
FOEC		0,10	1,50	0,68 (0,29)	0,04	0,60	0,75	0,70 (0,30)
		0,01	1,53	0,82 (0,36)	0,06	0,70	0,93	0,83 (0,24)

: mCTSIB– odified Clinical Test of Sensory Interaction on Balance; –  
 (n=59); –  
 (n=39); FEO– ; FEC– ;  
 FOEO– ; FOEC– ; Min–  
 ; Max– ; – ; SE–  
 ; CI– ; LL– ; UL– .

e  
 „ “ ( odified Clinical Test of Sensory Interaction on  
 Balance mCTSIB).  
 : (firm surface with the eyes open–  
 FEO); (firm surface with the eyes closed–  
 FEC), –  
 (foam surface with the eyes open–FOEO)  
 – (foam surface with the eyes closed–FOEC).  
 (Mean COG Sway Velocity).  
 mCTSIB

e  
 ( odified Clinical Test of Sensory Interaction on  
 Balance–mCTSIB) t- .

FOEO FOEC (

28).

FOEO ( $p = 0,024$ ).

-0,08 (95% CI: -0,15 -0,01)

FOEO

( $\eta^2 = 0,052$ ).

28.

mCTSIB		M (SD)	t (df)	p	95% CI				$\eta^2$
						SE	LL	UL	
FEO		0,31 (0,16)	-1,71 (96)	0,091	-		-		0,029
		0,38 (0,27)			0,07	0,44	0,16	0,01	
FEC		0,31 (0,12)	-1,14 (96)	0,256	-		-		0,013
		0,34 (0,16)			0,03	0,03	0,09	0,02	
FOEO		0,52 (0,18)	-2,30 (96)	<b>0,024</b>	-		-		0,052
		0,60 (0,18)			0,08	0,04	0,15	-0,01	
FOEC		0,68 (0,29)	-2,11 (96)	<b>0,038</b>	-		-		0,044
		0,82 (0,36)			0,14	0,07	0,27	-0,01	

: mCTSIB– odified Clinical Test of Sensory Interaction on Balance; (n=59);

(n=39); FEO–

FOEO–

; SE–

SE–

(n=59);

, FEC–

; FOEC–

; CI–

; LL–

; UL–

FOEC ( $p = 0,038$ ).

-0,14 (95% CI: -0,27 -0,01)

FOEC

( $\eta^2 =$

0,044).

(Unilateral

Stance–US).

(

– an

COG Sway Velocity)

29.

US		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
		0,80	6,80	1,68 (0,91)	0,12	1,44	1,92	1,40 (0,50)
		0,90	3,80	2,05 (0,77)	0,12	1,80	2,30	2,00 (1,20)
		0,40	2,90	1,30 (0,41)	0,05	1,19	1,41	1,40 (0,50)
		0,50	3,20	1,71 (0,67)	0,11	1,50	1,93	1,70 (1,20)

: US–Unilateral Stance; – (n=59);  
 – (n=39); – ; –  
 ; *Min*– ; *Max*– ; – ; *SE*–  
 ; *CI*– ; *LL*– ; *UL*– .

(Unilateral Stance–US)

*t*- ( 30).

, (p = 0,037), (p = 0,001) .

US -0,37 (95%

CI: -0,72 -0,02) ( <sup>2</sup> = 0,045).

US -0,41 (95% CI: -0,65 -0,17)

( <sup>2</sup> = 0,128).

30.

US	.	M (SD)	t (df)	p			95% CI		2
						SE	LL	UL	
		1,68 (0,91)			-			-	
		2,05 (0,77)	-2,12 (96)	<b>0,037</b>	0,37	0,18	-0,72	0,02	0,045
		1,30 (0,41)			-			-	
		1,71 (0,67)	-3,42 (57,28)	<b>0,001</b>	0,41	0,12	-0,65	0,17	0,128

: US–Unilateral Stance; . – ; – (n=59); – ; – ; SE– ; SE– ; CI– ; LL– ; UL– (n=39); – ; –

(Limits of stability–LOS).

31

(LOS– ).

(LOS– )

t-

RT MVL ( 32).

EPE (p = 0,004)

EPE

18,12 (95% CI: 6,04 30,19)

( 2 = 0,085).

, MXE ( $p = 0,002$ )  
 DCL ( $p = 0,000$ ) .  
 MXE 19,42 (95% CI: 7,27 31,56)  
 ( $\chi^2 = 0,111$ ). DCL  
 25,01 (95% CI: 12,38 37,65). ( $\chi^2 = 0,174$ )  
 ( 32).

31.

( )

		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
<b>RT</b>		0,00	33,00	1,85 (4,18)	0,54	0,76	2,94	1,22 (0,96)
		0,00	2,67	1,31 (0,71)	0,11	1,08	1,54	1,31 (0,72)
<b>MVL</b>		0,00	119,00	26,00 (23,53)	3,06	19,87	32,13	23,00 (32,00)
		0,00	81,00	21,05 (22,55)	3,61	13,74	28,36	17,00 (24,40)
<b>EPE</b>		0,00	124,12	67,40 (30,33)	3,95	59,50	75,30	68,44 (48,72)
		0,00	110,00	49,28 (28,14)	4,51	40,16	58,40	54,00 (44,00)
<b>MXE</b>		0,00	116,00	87,44 (22,35)	2,91	81,62	93,27	93,00 (17,00)
		0,00	119,00	68,03 (33,29)	5,33	57,23	78,82	77,00 (32,00)
<b>DCL</b>		0,00	94,00	77,63 (18,40)	2,40	72,83	82,42	82,00 (14,00)
		0,00	93,00	52,62 (36,35)	5,82	40,83	64,40	68,00 (84,00)

: - (n=59); -  
 (n=39); RT–Reaction Time; MVL–Movement Velocity; EPE–Endpoint  
 Excursion; MXE– ximum Excursion; DCL–Directional Control; *Min*– ; *Max*–  
 ; - ; *SE*– ; *CI*– ;  
*LL*– ; *UL*– .

32.

( )

	.	M (SD)	t (df)	p	95% CI				2
					SE	LL	UL		
RT		1,85 (4,18)	0,80 (96)	0,426	0,54	0,68	-0,80	1,88	0,007
		1,31 (0,71)							
MVL		26,00 (23,53)	1,04 (96)	0,302	4,95	4,78	-4,53	14,44	0,011
		21,05 (22,55)							
EPE		67,40 (30,33)	2,98 (96)	<b>0,004</b>	18,12	6,08	6,04	30,19	0,085
		49,28 (28,14)							
MXE		87,44 (22,35)	3,20	<b>0,002</b>	19,42	6,07	7,27	31,56	0,111
		68,03 (33,29)	(60,51)						
DCL		77,63 (18,40)	3,97	<b>0,000</b>	25,01	6,29	12,38	37,65	0,174
		52,62 (36,35)	(51,01)						

: .- ; - (n=59); - (n=39); RT–Reaction Time; MVL–Movement Velocity; EPE–Endpoint Excursion; MXE– ximum Excursion; DCL–Directional Control; - ; SE- ; - ; SE- ; CI- ; LL- ; UL- .

33

(LOS- ).

33.

( )

	.	Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
<b>RT</b>		0,21	3,86	1,37 (0,90)	0,12	1,13	1,60	1,19 (1,14)
		0,00	3,19	1,47 (0,83)	0,13	1,20	1,73	1,54 (1,40)
<b>MVL</b>		0,29	8,90	3,54 (1,82)	0,24	3,07	4,01	3,10 (2,10)
		0,00	7,70	3,64 (1,77)	0,28	3,06	4,21	3,10 (3,00)
<b>EPE</b>		26,40	122,10	89,14 (22,97)	2,99	83,15	95,12	93,50 (24,20)
		0,00	104,00	72,64 (23,97)	3,84	64,87	80,41	77,00 (22,00)
<b>MXE</b>		56,00	113,00	95,93 (11,49)	1,50	92,94	98,93	98,00 (11,00)
		0,00	104,00	87,13 (17,83)	2,85	81,35	92,91	93,00 (17,00)
<b>DCL</b>		0,00	114,66	95,03 (16,47)	2,14	90,73	99,32	98,28 (17,55)
		0,00	95,00	81,03 (17,46)	2,80	75,37	86,69	86,00 (12,00)

: .- ; - (n=59); - (n=39); RT–Reaction Time; MVL–Movement Velocity; EPE–Endpoint Excursion; MXE– ximum Excursion; DCL–Directional Control; *Min*– ; *Max*– ; - ; SE– ; CI– ; *LL*– ; *UL*– .

(LOS– )

t-

RT MVL ( 34).

, EPE (p = 0,001) . EPE 16,50 (95% CI: 6,92 26,07) ( <sup>2</sup> = 0,109).

, MXE (p = 0,004) . MXE 8,80 (95% CI: 2,93 14,68) ( <sup>2</sup> = 0,084). , DCL (p = 0,000) . DCL

14,00 (95% CI: 7,09 20,91) ( <sup>2</sup> = 0,144).

34.

( )

	.	M (SD)	t (df)	p			95% CI		<sup>2</sup>
						SE	LL	UL	
<b>RT</b>		1,37 (0,90)	-0,55	0,583	-0,10	0,18	-0,46	0,26	0,003
		1,47 (0,83)	(96)						
<b>MVL</b>		3,54 (1,82)	-0,26	0,798	-0,10	0,37	-0,83	0,64	0,001
		3,64 (1,77)	(96)						
<b>EPE</b>		89,14 (22,97)	3,42	<b>0,001</b>	16,50	4,82	6,92	26,07	0,109
		72,64 (23,97)	(96)						
<b>MXE</b>		95,93 (11,49)	2,98	<b>0,004</b>	8,80	2,96	2,93	14,68	0,084
		87,13 (17,83)	(96)						
<b>DCL</b>		95,03 (16,47)	4,02	<b>0,000</b>	14,00	3,48	7,09	20,91	0,144
		81,03 (17,46)	(96)						

: .- ; - (n=59); - (n=39); RT–Reaction Time; MVL–Movement Velocity; EPE–Endpoint Excursion; MXE– ximum Excursion; DCL–Directional Control; - ; SE– ; CI– ; LL– ; UL– .

35

(LOS– ).



35.

( )

	.	Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
<b>RT</b>		0,13	2,70	1,32 (0,66)	0,09	1,15	1,49	1,33 (0,97)
		0,00	3,01	1,34 (0,82)	0,13	1,07	1,60	1,12 (1,35)
<b>MVL</b>		1,40	12,40	4,23 (2,28)	0,30	3,63	4,82	3,50 (2,00)
		0,00	45,00	5,10 (7,04)	1,13	2,82	7,38	3,00 (2,70)
<b>EPE</b>		20,52	117,72	81,53 (21,21)	2,76	76,00	87,06	85,32 (24,84)
		0,00	101,00	67,72 (24,40)	3,91	59,81	75,63	73,00 (41,00)
<b>MXE</b>		54,00	109,00	91,78 (12,12)	1,58	88,62	94,94	94,00 (14,00)
		0,00	118,00	84,46 (20,41)	3,27	77,84	91,08	91,00 (28,00)
<b>DCL</b>		56,68	99,19	87,05 (8,58)	1,12	84,82	89,29	87,20 (13,08)
		0,00	94,00	77,26 (18,18)	2,91	71,36	83,15	82,00 (13,00)

: .- ; - (n=59); - (n=39); RT–Reaction Time; MVL–Movement Velocity; EPE–Endpoint Excursion; MXE– ximum Excursion; DCL–Directional Control; *Min*– ; *Max*– ; - ; *SE*– ; CI– ; *LL*– ; *UL*– .

(LOS– )

*t*-

RT MVL ( 36).

, EPE (*p* = 0,004) EPE ( <sup>2</sup> = 0,084). 13,81 (95% CI: 4,59 23,04)

, MXE (*p* = 0,049) MXE ( <sup>2</sup> = 0,049). 7,32 (95% CI: 0,05 14,59)

36.

( )

		M (SD)	t (df)	p	95% CI				2
					SE	LL	UL		
RT		1,32 (0,66)	-0,12	0,906	-0,02	0,15	-	0,28	0,000
		1,34 (0,82)	(96)				0,31		
MVL		4,23 (2,28)	-0,88	0,379	-0,87	0,98	-	1,08	0,008
		5,10 (7,04)	(96)				2,82		
EPE		81,53 (21,21)	2,97	<b>0,004</b>	13,81	4,65	4,59	23,04	0,084
		67,72 (24,40)	(96)						
MXE		91,78 (12,12)	2,02	<b>0,049</b>	7,32	3,63	0,05	14,59	0,049
		84,46 (20,41)	(55,80)						
DCL		87,05 (8,58)	3,14	<b>0,003</b>	9,80	3,12	3,53	16,06	0,118
		77,26 (18,18)	(49,32)						

: - (n=59); - (n=39); RT- Reaction Time; MVL- Movement Velocity; EPE- Endpoint Excursion; MXE- Maximum Excursion; DCL- Directional Control; - ; SE- ; CI- ; LL- ; UL- .

, DCL (p = 0,003) . DCL ( 2 = 0,118). 9,80 (95% CI: 3,53 16,06)

” “ (Sit to Stand est-STs).

37.

”

“

STS		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
WT		0,02	1,64	0,39 (0,30)	0,04	0,32	0,47	0,29 (0,32)
		0,17	5,50	0,56 (0,86)	0,14	0,28	0,84	0,36 (0,33)
RI		9,00	54,00	23,53 (9,07)	1,18	21,17	25,90	23,00 (15,00)
		13,00	68,00	25,30 (10,14)	1,62	22,01	28,58	23,00 (12,00)
CSV		0,52	6,50	3,79 (1,33)	0,17	3,44	4,14	4,00 (1,80)
		1,20	6,70	3,90 (1,17)	0,19	3,52	4,28	3,90 (1,80)

: STS–Sit to Stand; – (n=59); – (n=39); WT–Weight Transfer; RI–Rising Index; CSV–Cog Sway Velocity; Min–; Max–; SE–; CI–; LL–; UL–.

37

”

“

(Sit to Stand–STS).

38.

”

“

STS	.	M (SD)	t (df)	p	95% CI				2
					SE	LL	UL		
WT		0,39 (0,30)	-1,36 (96)	0,176	-0,17	0,12	-0,41	0,08	0,019
		0,56 (0,86)							
RI		23,53 (9,07)	-0,90 (96)	0,371	-1,77	1,96	-5,66	2,13	0,008
		25,30 (10,14)							
CSV		3,79 (1,33)	-0,44 (96)	0,662	-0,11	0,26	-0,64	0,41	0,002
		3,90 (1,17)							

: STS–Sit to Stand; –; – (n=59); – (n=39); WT–Weight Transfer; RI–Rising Index; CSV–Cog Sway Velocity; –; SE–; CI–; LL–; UL–.

„ „ (Sit to Stand–STS)  
 $t$  .  
 WT, RI CSV ( 38).

39. „ andem“

TW		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
SW		3,60	18,30	7,08 (2,21)	0,29	6,50	7,66	6,80 (2,20)
		5,30	13,00	8,27 (2,14)	0,34	7,58	8,97	8,50 (3,50)
S		16,40	49,80	27,42 (6,41)	0,83	25,75	29,09	27,80 (8,10)
		7,80	52,30	27,23 (7,84)	1,25	24,69	29,77	26,80 (10,00)
ES		1,50	30,60	4,96 (4,72)	0,61	3,73	6,20	3,30 (2,60)
		0,90	15,90	5,39 (2,64)	0,42	4,53	6,25	4,80 (2,20)

: TW–Tandem Walk; – (n=59);  
 – (n=39); SW–Step Width; S–Speed; ES–End Sway;  
 Min– ; Max– ; – ; SE–  
 ; CI– ; LL– ; UL– .

„ ” (Tandem Walk–TW).

39

„ ” (Tandem Walk–TW).

„ ” (Tandem Walk–TW)

$t$  .

S ES ( 40). ,

SW ( $p = 0,009$ )

SW -1,20 (95%

CI: -2,09 -0,30) ( $t^2 = 0,068$ ).

TW	.	M (SD)	t (df)	p	95% CI				2
					SE	LL	UL		
SW		7,08 (2,21)	-2,65 (96)	0,009	-1,20	0,45	-2,09	-0,30	0,068
		8,27 (2,14)							
S		27,42 (6,41)	0,14 (96)	0,893	0,20	1,45	-2,68	3,17	0,000
		27,23 (7,84)							
ES		4,96 (4,72)	-0,51 (96)	0,610	-0,43	0,83	-2,08	1,22	0,003
		5,39 (2,64)							

: TW–Tandem Walk; .– ; – (n=59); – (n=39); SW–Step Width; S–Speed; ES–End Sway; – ; SE– ; – ; SE– ; CI– ; LL– ; UL–

K

” “ (Step Up/Over–SUO).

41

” “ (Step Up/Over–SUO).

”

t-

LUI-L, LUI-R, MW-L, MW-R IMI-R (

42).

, IMI-L (p = 0,040) IMI-L

6,16 (95% CI: 0,29 12,03)

( 2 = 0,043) ( 42).

41.

”

“

SUO		Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
LUI-L		5,00	67,00	40,88 (11,69)	1,52	37,84	43,93	42,00 (17,00)
		19,00	72,00	40,38 (12,01)	1,92	36,49	44,28	41,00 (13,00)
LUI-R		21,00	88,00	42,98 (13,16)	1,71	39,55	46,41	40,00 (16,00)
		16,00	173,00	44,72 (24,93)	3,99	36,64	52,80	42,00 (16,00)
MW-L		0,17	3,43	1,49 (0,47)	0,06	1,37	1,62	1,43 (0,39)
		0,85	4,00	1,70 (0,56)	0,09	1,52	1,88	1,55 (0,39)
MW-R		0,97	3,91	1,65 (0,53)	0,07	1,51	1,79	1,52 (0,44)
		1,10	4,82	1,88 (0,67)	0,11	0,66	2,10	1,72 (0,63)
IMI-L		19,00	83,00	48,08 (14,54)	1,89	44,30	51,87	48,00 (23,00)
		12,00	75,00	41,92 (14,01)	2,24	37,38	46,46	40,00 (20,00)
IMI-R		20,00	89,00	43,22 (14,37)	1,87	39,48	46,96	40,00 (18,00)
		12,00	90,00	40,59 (15,15)	2,43	35,68	45,50	38,00 (15,00)

: SUO–Step Up/Over;

–

(n=59);

–

(n=39); LUI-L–Lift-Up Index-left; LUI-R–Lift-Up

Index-right; MW-L–Movement Time-left; MW-R–Movement Time-right; IMI-L–Impact Index-left;

IMI-R–Impact Index-right; *Min*–

; *Max*–

; –

; SE–

; CI–

; LL–

; UL–

42.

”

“

SUO	M (SD)	t (df)	p	95% CI		2	
				SE	LL UL		
LUI -L	40,88 (11,69)	0,20	0,839	0,50	2,44	-4,34 5,34	0,000
	40,38 (12,01)	(96)					
LUI -R	42,98 (13,16)	-0,45	0,654	-1,73	3,86	-9,40 5,93	0,002
	44,72 (24,93)	(96)					
MW-L	1,49 (0,47)	-1,96	0,053	-0,20	0,10	-0,41 0,00	0,038
	1,70 (0,56)	(96)					
MW-R	1,65 (0,53)	-1,88	0,063	-0,23	0,12	-0,47 0,01	0,035
	1,88 (0,67)	(96)					
IMI-L	48,08 (14,54)	2,08	<b>0,040</b>	6,16	2,96	0,29 12,03	0,043
	41,92 (14,01)	(96)					
IMI-R	43,22 (14,37)	0,868	0,387	2,63	3,03	-3,38 8,65	0,008
	40,59 (15,15)	(96)					

: SUO–Step Up/Over; – (n=59);  
 – (n=39); LUI-L–Lift-Up Index-left; LUI-R–Lift-Up  
 Index-right; MW-L–Movement Time-left; MW-R–Movement Time-right; IMI-L–Impact Index-left; IMI-  
 R–Impact Index--right; – ; SE– ; – ;  
 ; SE– ; CI– ; LL–  
 ; UL– .

” “ (Walk Across–WA).

43

”

“ (Walk Across–WA).

43.

”

“

WA	.	Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
SW		4,00	19,00	12,38 (3,39)	0,44	11,50	13,26	12,50 (5,40)
		2,90	21,30	13,84 (3,59)	0,57	12,68	15,00	14,90 (4,10)
SL		26,90	119,90	65,56 (16,30)	2,12	61,31	69,80	63,10 (20,80)
		35,70	87,80	60,86 (13,03)	2,09	56,63	65,08	58,50 (19,60)
S		22,70	861,00	88,57 (103,60)	13,49	61,57	115,57	76,90 (19,90)
		37,80	100,00	73,84 (12,76)	2,04	69,70	77,97	73,40 (17,90)
SLS		-153,00	101,00	-5,49 (45,73)	5,95	-17,41	6,43	-9,00 (64,00)
		-159,00	140,00	-4,77 (45,23)	7,24	-19,43	9,89	-4,00 (45,00)

: WA–Walk Across; . – ; – (n=59); – (n=39); SW–Step Width; SL–Step Length; S–Speed; SLS–Step Length Symmetry; Min– ; Max– ; – ; SE– ; CI– ; LL– ; UL– .

”

“ (Walk Across–WA)

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SL, S SLS (

44).

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SW (p = 0,044)

SW

-1,46 (95% CI: -2,88 -0,04)

(<sup>2</sup> = 0,042).



44.

“

”

WA	.	M (SD)	t (df)	p	95% CI		2		
					SE	LL		UL	
SW		12,38 (3,39)	-2,04 (96)	<b>0,044</b>	-1,46	0,72	-2,88	-0,04	0,042
		13,84 (3,59)							
SL		65,56 (16,30)	1,51 (96)	0,134	4,70	3,11	-1,48	10,88	0,023
		60,86 (13,03)							
S		88,57 (103,60)	0,88 (96)	0,380	14,74	16,70	18,42	47,89	0,008
		73,84 (12,76)							
SLS		-5,49 (45,73)	-0,08 (96)	0,939	-0,72	9,40	19,37	17,93	0,000
		-4,77 (45,23)							

: WA–Walk Across; .– ; – (n=59); – (n=39); SW–Step Width; SL–Step Length; S–Speed; SLS–Step Length Symmetry; – ; SE– ; – ; LL– ; UL– .

“ (Timed Up and Go–TUG).

45

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45.

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	Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
					LL	UL	
	6,99	13,93	9,43 (1,48)	0,19	9,15	9,82	2,18 (1,63)
	7,57	14,80	10,26 (1,57)	0,25	9,75	10,77	10,22 (2,25)

: – (n=59); – (n=39); Min– ; Max– ; – ; SE– ; CI– ; LL– ; UL

46.

“

	M (SD)	t (df)	p	95% CI				$\chi^2$
					SE	LL	UL	
	9,43 (1,48)							
	10,26 (1,57)	-2,65 (96)	<b>0,010</b>	-0,83	0,31	-1,46	-0,20	0,068

: - (n=39); - (n=59); - ; SE- ; LL- ; UL- ; CI- ;

“ (Timed Up and Go-TUG)  
 $t$ -  
 ( 46). TUG ( $p = 0,010$ )  
 TUG -  
 0,83 (95% CI: -1,46 -0,20) ( $\chi^2 = 0,068$ ).

**10.5.**

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 : , , , ( )  
 , , , ,  
 . 47  
 .  
 ( )  
 $t$ - ( 48).  
 ( $p = 0,019$ ). ,  
 MoCa .  
 MoCa 1,56 (95% CI: 0,26 2,86)  
 ( $\chi^2 = 0,056$ ).

47.

	Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
					LL	UL	
	16,00	31,00	24,61 (1,17)	0,44	23,72	25,50	25,00 (5,00)
	15,00	29,00	23,05 (2,76)	0,44	22,16	23,95	24,00 (3,00)

: - (n=39); Min- (n=59); Max- ; - ; SE- ; CI- ; LL- ; U-

48.

	M (SD)	t (df)	p	95% CI				<sup>2</sup>
				SE	LL	UL		
	24,61 (1,17)	2,39 (96)	<b>0,019</b>	1,56	0,65	0,26	2,86	0,056
	23,05 (2,76)							

: - (n=39); - (n=59); SE- ; - ; SE- ; CI- ; LL- ; UL-

(RAVLT). 49

(RAVLT)

t-

( 50).

(p = 0,007).

RAVLT

1,53 (95% CI:

0,43 2,63)

(<sup>2</sup> = 0,073).

49.

( )

	Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
					LL	UL	
	9,00	32,00	14,92 (3,13)	0,41	14,10	15,73	15,00 (3,00)
	8,00	16,00	13,38 (1,83)	0,29	12,79	13,98	14,00 (3,00)

: - (n=39); Min- (n=59); Max- ; - ; SE- ; CI- ; LL- ; UL-

50.

( )

	M (SD)	t (df)	p	95% CI				2
				SE	LL	UL		
	14,92 (3,13)	2,76 (96)	<b>0,007</b>	1,53	0,55	0,43	2,63	0,073
	13,38 (1,83)							

: - (n=39); - (n=59); SE- ; - ; SE- ; CI- ; LL- ; U-

(ROCF). 51

51.

ROCF	.	Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
		21,00	36,00	34,11 (2,70)	0,35	33,41	34,81	35,00 (3,00)
		8,00	36,00	31,32 (5,75)	0,92	29,46	33,18	33,00 (7,00)
		9,00	55,00	21,04 (8,02)	1,04	18,95	23,13	22,00 (11,50)
		5,00	75,00	16,38 (11,94)	1,91	12,51	20,26	15,00 (7,00)

: ROCF-Rey-Osterrieth Complex Figure; .- ; -  
 (n=59); - (n=39); Min-  
 ; Max- ; SE-  
 ; CI- ; LL- ; UL- .  
 (ROCF)

t-

( 52).

ROCF -

(p = 0,007).

52.

ROCF	.	M (SD)	t (df)	p	95% CI		2		
					SE	LL		UL	
		34,11 (2,70)	2,83	<b>0,007</b>	2,79	0,98	0,81	4,77	0,098
		31,32 (5,75)	(49,18)						
		21,04 (8,02)	2,31	<b>0,023</b>	4,66	2,02	0,66	8,66	0,053
		16,38(11,94)	(96)						

: ROCF-Rey-Osterrieth Complex Figure; .- ; -  
 (n=59); - (n=39); -  
 ; SE- ;  
 SE- ; CI- ; LL - ; UL- .

ROCF-

2,79 (95% CI: 0,81 4,77)

( 2 = 0,098).

ROCF-

( $p = 0,023$ ).

4,66 (95% CI: 0,66 – 8,66)

ROCF–

( $\chi^2 = 0,053$ ).

**10.6.**

**e**

( $\chi^2$  lder

People’s Quality of Life Questionnaire–OPQOL).

53

$t$ -

( $\chi^2 = 54$ ).

( $p = 0,035$ )

1,62 (95% CI:

0,12 – 3,12)

( $\chi^2 = 0,052$ ).

( $p = 0,004$ )

1,37 (95% CI: 0,45 – 2,30)

( $\chi^2 = 0,083$ ).

( $p = 0,002$ )

1,46 (95% CI: 0,55 – 2,37)

( $\chi^2 = 0,115$ ).

( $p =$

0,014)

0,87 (95% CI: 0,18

1,56)

( $\chi^2 = 0,062$ ).

53.

QoL	.	Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
						LL	UL	
		11,00	20,00	17,07 (2,02)	0,26	16,54	17,59	17,00 (4,00)
		9,00	20,00	15,69 (2,60)	0,42	14,85	16,53	16,00 (3,00)
		13,00	19,00	15,46 (1,52)	0,20	15,06	15,85	15,00 (2,00)
		11,00	20,00	14,00 (2,55)	0,41	13,17	14,83	13,00 (4,00)
		20,00	40,00	32,64 (4,89)	0,64	31,37	33,92	33,00 (8,00)
		24,00	40,00	33,21 (3,91)	0,63	31,94	34,47	34,00 (6,00)
		13,00	24,00	19,73 (2,49)	0,32	19,08	20,38	20,00 (4,00)
		15,00	25,00	20,00 (2,43)	0,39	19,21	20,79	20,00 (4,00)
		12,00	20,00	18,02 (2,19)	0,29	17,45	18,59	19,00 (4,00)
		12,00	20,00	17,51 (2,04)	0,33	16,85	18,17	18,00 (3,00)
		15,00	20,00	18,64 (1,53)	0,20	18,25	19,04	19,00 (3,00)
		14,00	20,00	17,77 (1,90)	0,30	17,15	18,38	18,00 (3,00)
		7,00	20,00	14,59 (2,93)	0,38	13,83	15,36	15,00 (4,00)
		4,00	20,00	12,97 (4,04)	0,65	11,66	14,28	13,00 (5,00)
		6,00	15,00	11,46 (2,59)	0,34	10,78	12,13	12,00 (5,00)
		4,00	15,00	10,82 (2,73)	0,44	9,93	11,71	12,00 (3,00)
		116,00	169,00	147,61 (12,81)	1,67	144,27	150,95	150,00 (20,00)
		117,00	175,00	142,31 (12,56)	2,01	138,24	146,38	142,00 (16,00)

: QoL- ; - ; - (n=59); - - ; Min- ; Max- ; - ; SE- ; CI- ; LL- ; UL- .

, - (p = 0,036)

2,64 (95% CI: 0,39 10,89) ( <sup>2</sup> = 0,045)

( 54).

54.

QoL	.	M (SD)	t (df)	p			95% CI		2
						SE	LL	UL	
		17,07 (2,02)	2,94 (96)	<b>0,004</b>	1,37	0,49	0,45	2,30	0,083
		15,69 (2,60)							
		15,46 (1,52)	3,21 (55,94)	<b>0,002</b>	1,46	0,45	0,55	2,37	0,115
		14,00 (2,55)							
		32,64 (4,89)	-0,60 (96)	0,549	-0,56	0,93	-2,41	1,29	0,004
		33,21 (3,91)							
		19,73 (2,49)	-0,53 (96)	0,595	-0,27	0,51	-1,28	0,74	0,003
		20,00 (2,43)							
		18,02 (2,19)	1,15 (96)	0,255	0,50	0,44	-0,37	1,38	0,013
		17,51 (2,04)							
		18,64 (1,53)	2,52 (96)	<b>0,014</b>	0,87	0,35	0,18	1,56	0,062
		17,77 (1,90)							
		14,59 (2,93)	2,16 (63,84)	<b>0,035</b>	1,62	0,75	0,12	3,12	0,052
		12,97 (4,04)							
		11,46 (2,59)	1,17 (96)	0,246	0,64	0,55	-0,45	1,72	0,014
		10,82 (2,73)							
-		147,61 (12,81)	2,13 (96)	<b>0,036</b>	5,64	2,64	0,39	10,89	0,045
		142,31 (12,56)							

: QoL- ; - ; - (n=59);  
 - (n=39); - - ; - ;  
 SE- ; - ; SE- ;  
 CI- ; LL- ; UL- .

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55.

	Min	Max	M (SD)	SE	95% CI		Mdn (IQR)
					LL	UL	
	0,00	6,00	0,64 (1,17)	0,15	0,34	0,95	0,00 (1,00)
	0,00	10,00	2,85 (2,81)	0,45	1,93	3,76	2,00 (3,00)

: - (n=39); Min- ; Max- ; -  
 ; SE- ; CI- ; LL- ; UL- .

t- ( 56).  
 (p = 0,000). ,

-  
 - -2,20 (95% CI: -3,16 -1,24)  
 ( <sup>2</sup> = 0,230).

56.

	M (SD)	t (df)	p	95% CI				<sup>2</sup>
				SE	LL	UL		
	0,64 (1,17)	-4,63 (46,79)	<b>0,000</b>	-2,20	0,48	-3,16	-1,24	0,230
	2,85 (2,81)							

: - (n=39); - ; SE- ; -  
 ; SE- ; CI- ; LL- ;  
 UL- .

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(Rowe Kahn, 1987, Lupien Wan, 2004). 28

” “ (Depp Jeste, 2006).

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(Rowe Kahn, 1987). Rowe Kahn-

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” , Bowling Iliffe (2006) (

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(Park Connon, 2012).

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2012. Salehi (2010)  
 74,5%,  
 80,7%,  
 Su (2014) 56,6%.

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 69,05 , 67,67 .  
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( 1) ( 3).



(BMI)

( 5).

2014. Azemati  
 240 63.  
 79. ( , , )  
 BMI



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Salehi 2010.

,  
, Shaw Spokane 2008.

( 8).



2015).

(Manzoli ., 2007).

(2009)

(ADL)

ADL

(Lehmann .,

49,15%, 46,15%), (7).

(98,31% 94,87%)  
(9).



(Sun ., 2013).

(Rotter, 1954).

(Brdari Gavrilov- Jerkovi , 2008).

50' ( )

(Drentea, 2005).

(1968)

(Brajkovi , 2010).

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. Finchum Weber (2000)

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12).

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(48,72%)

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(88,14%,

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(Chang ., 2010).



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(Chang ., 2014).

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(Madanmohan ., 1992).

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„mind-body“

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(Cramer ., 2013). (

) 60. 20. ,

- ( ) -

( ).

(Nangia Malhotra, 2012).

12

(25,4%)

(74,57%)

„mind-body“

(Novak Vute, 2013).

(Hutchinson Marshall, 2000).

., 2008).

(Roley

(Stiggelbout ., 2008).

(Adamson Parker 2006).

(Novak Vute, 2013).

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## 11.2.

2006).

(Dopsaj ., 2007, Dopsaj ., 2011, Kljaji ., 2012, ., 2015 ),

2014).

$F_{\max}$

Ross Rosblad, 2002). , 10% (Hager-  
 9,7% ,  
 8,3% . ,  
 $F_{max}$  . ,  
 (Kljaji ., 2012)  
 ( 20 )  
 . ,  
 314,79 N,  
 270,21 N, 276,89 N. , (2015 )  
 35 38  
 353,1 N

(Massy-Westropp ., 2011).

( $F_{max}$ )  
 ( 16  
 18 ). ,  
 246,21 N 252,89 N  
 ( 15 ). ,  
 ( 270,21 N, 276,89 N, 17 ).  
 ( $F_{max}$ )

( $RFDF_{max}$   $RFD_{max}$ ). ,

30% 70% ( $F_{real}$ ,  $aps$   $F$   
 $rel$   $F$ ). ,  
 (Force endurance) 50%  
 ( $I_{mp}F_{50\%}$ ). ,

50% (tF<sub>max</sub>) (tF50%<sub>max</sub>).

(Hand Grip Strength Test— ),

(F<sub>max</sub>) ( ),

(RFDF<sub>max</sub> RFD<sub>max</sub>,

) , .

50%

(I<sub>mp</sub>F50%).

tF50%<sub>max</sub>L (p = 0,022) ( 16 ). , (p =

0,036 ( 16 ).

70% (aps F70%L

rel F70%L), ( 16 ).

( 70% )

(30% ),

(aps F30%L (p = 0,013)

rel F30%L (p = 0,016), 16 ).

30% " " (F30%<sub>real</sub>D),

30%

(aps F30%D) 30%

(rel F30%D) ( 18 ). 18

aps F30%D (p = 0,005)

rel  $F_{30\%D}$

( $p = 0,002$ ).

(30%

)

$F_{max}$

(Laurentani

., 2003)

(Doherty,

2003),

(Borges

., 2015).

(Nikolay Walker, 2005; Dopsaj

., 2011).

(Lunsford, 1978).

(Aniansson ., 1978).

1997).

50%

(Desrosiers

.,

(  
)

(F<sub>max</sub>),  
(F<sub>real</sub>, aps F<sub>rel</sub> F)

(RFD<sub>max</sub>),  
(ImpF<sub>50%</sub>).



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19  
19,42cm 18,87  
cm. ,

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21 22

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23 24

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(Neuro om Balance Master)

” “ (The Timed Up and Go Test–TUG).

Neuro om Balance Master

(Zouita Ben Moussa ., 2009).

(Weight Bearing Squat–WBS).

( 30°, 60° 90°).

25

Weight Bearing

( ). ,

51%

30

52%

90



51,85%.

50%,

90

51,62 ( 25).

“ ( odified Clinical Test of Sensory Interaction on Balance–mCTSIB).

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(Mean COG Sway Velocity).

Rahal (2015)

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mCTSIB,

(Unilateral Stance), ”

“ (Walk Across Test) ”

“ (Sit-to-Stand est).

mCTSIB

(

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(Mean COG Sway Velocity).

( , 28).

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( ),

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(Unilateral Stance–US).

( an COG Sway Velocity)

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29.

( $p = 0,037$ ),

( $p = 0,001$ )

( 30).

29

(Chyu ., 2010).



) , , (Chong, 2008).

“ ” “ ” “ ” “ ” “ ”

(COG).

(o ) :

100%

(Reaction Time–RT)

(Movement Velocity–MVL)

Endpoint Excursion–EPE),  
(Maximum Excursion–MXE).  
(Directional Control–DCL)

(COP)

EPE MXE

( 32).

( 34 36).

(Li .., 2001).

(Stevens .., 2014).

Jahnke (2010)

SW (Step Width- ) (p = 0,009) ( 40). ” “ IMI-L (p = 0,040) ( 42). ” “ ( 38).



” “ (Timed Up and Go-TUG).

(Podsiadlo Richardson 1991).

TUG

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60. 69. 8,1 (Bohannon, 2006).

TUG

TUG

(p = 0,010)

( 46).

9,43

( 45).

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(Gillespie ., 2003).

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 ( , )  
 (Rubenstein ., 2000, Barnett ., 2003, Nitz Choy,  
 2004). ( )  
 (Li ., 2005). Wolf (2003)  
 ( 47%)

### 11.3.

(Kirk-Sanchez McGough, 2014).



( ), (RAVLT) - :  
 (ROCF).  
 . ,  
 (p = 0,019)  
 48. , - (RAVLT)  
 ( 50). ,  
 ROCF  
 . 51  
 ( ) 34,11  
 36 .  
 21,04 .  
 31,32,  
 16,38 . t-  
 ( ). ,  
 ROCF- (p = 0,007). ,  
 ROCF- (p =  
 0,023) ( 52).  
 1975.  
 (Spirduso, 1975). 4  
 .  
 , ,  
 (Paillard, 2015).

. , Carvalho 2014.

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. , Chodzko-Zajko Moore 1994.

. , Koo Moon 2012.

. , Antunes 2015.

2015.

Young



2006. . , Oken  
65. 85. , Man  
(2010) . , Hariprasad 2013.

. Talwadkar 2014. trataka (  
) .

) . , (

, („mind-body“ )

body“ , „mind-  
body“ ,

#### 11.4.



(dello Buono .., 1988, Browne .., 1994),

(Katz, 1987).

( , , , , )

(Older People's Quality of Life Questionnaire-OPQOL).

( - ). ,

( 53).

: (  $p = 0,004$  ), (  $p = 0,002$ ),

(  $p = 0,014$ ), (  $p = 0,035$ )

( - ) (  $p = 0,036$  ) ( 54).

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( 54).

. , Choi 2013.

1,926

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. , Wanderley 2011.

(41,03%)

(Chapman Perry, 2008).

(Hybels ., 2010),

(Nelson ., 2007, Chodzko-Zajko ., 2011).

- ( 56).

(Kritz-Silverstein ., 2001).

(Stella ., 2002).

-  
BEAST (Behaviour, Emotion, Activity, Situation and Thoughts) (Gilson  
., 2009).

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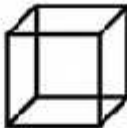
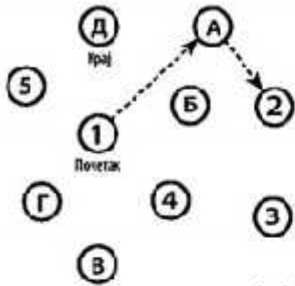
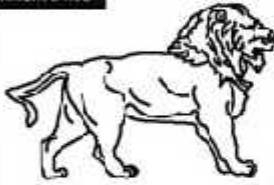
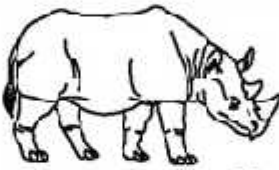
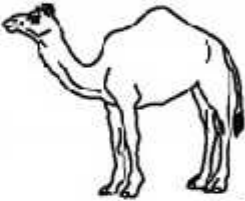
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		© Z.Nasreddine MD Верзија 7.1 www.mocatest.org Нормални резултат ≥ 26/30												укупно ___/30	
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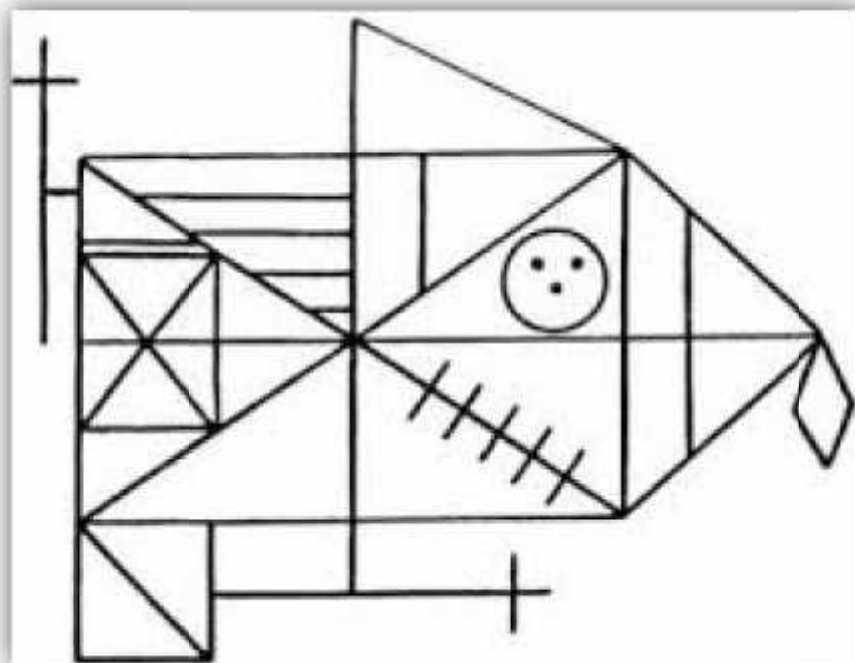
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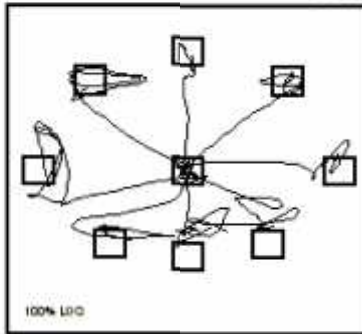
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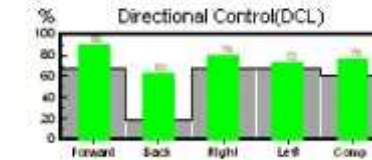
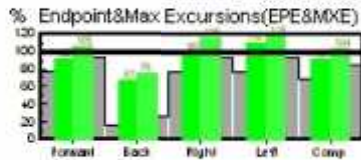
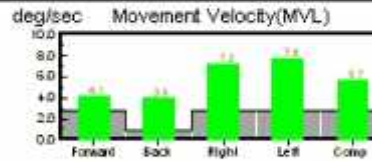
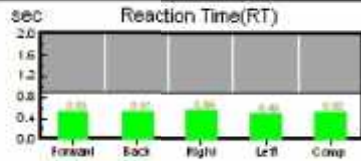
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Limits Of Stability



Transition	RT (sec)	MVL (deg/sec)	EPE (%)	MKE (%)	DCL (%)
1 (F)	0.48	2.6	80	107	95
2 (RF)	0.64	4.2	103	108	90
3 (R)	0.52	6.7	84	107	83
4 (RB)	0.47	8.1	83	99	60
6 (B)	0.56	3.4	75	89	60
6 (LB)	0.43	5.7	113	113	70
7 (L)	0.51	8.8	85	107	70
8 (LF)	0.51	6.8	114	114	76



Data Range Note: NeuroCom Data Range: 20--39  
 PostTestComment



**Изјава о истоветности штампане и електронске верзије  
докторског рада**

Име и презиме аутора Марија Трајков

Број индекса

Студијски програм

Наслов рада Утицај систематског програмираног вежбања на моторичке и когнитивне способности и квалитет живота особа у старијем животном добу

Ментори проф. др Фадил Еминовић

др Саша Радовановић

Изјављујем да је штампана верзија мог докторског рада истоветна електронској верзији коју сам предао/ла ради похрањена у **Дигиталном репозиторијуму Универзитета у Београду**.

Дозвољавам да се објаве моји лични подаци везани за добијање академског назива доктора наука, као што су име и презиме, година и место рођења и датум одбране рада.

Ови лични подаци могу се објавити на мрежним страницама дигиталне библиотеке, у електронском каталогу и у публикацијама Универзитета у Београду.

**Потпис аутора**

У Београду, 12.09.2016.

Трајков М.

## Изјава о ауторству

Име и презиме аутора Марија Трајков

Број индекса

### Изјављујем

да је докторска дисертација под насловом

Утицај систематског програмираног вежбања на моторичке и когнитивне способности и квалитет живота особа у старијем животном добу

- резултат сопственог истраживачког рада;
- да дисертација у целини ни у деловима није била предложена за стицање друге дипломе према студијским програмима других високошколских установа;
- да су резултати коректно наведени и
- да нисам кршио/ла ауторска права и користио/ла интелектуалну својину других лица.

У Београду, 12.09.2016.

Потпис аутора

Трајков М.

## Изјава о коришћењу

Овлашћујем Универзитетску библиотеку „Светозар Марковић“ да у Дигитални репозиторијум Универзитета у Београду унесе моју докторску дисертацију под насловом:

Утицај систематског програмираног вежбања на моторичке и когнитивне способности и квалитет живота особа у старијем животном добу

која је моје ауторско дело.

Дисертацију са свим прилозима предао/ла сам у електронском формату погодном за трајно архивирање.

Моју докторску дисертацију похрањену у Дигиталном репозиторијуму Универзитета у Београду и доступну у отвореном приступу могу да користе сви који поштују одредбе садржане у одабраном типу лиценце Креативне заједнице (Creative Commons) за коју сам се одлучио/ла.

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Кратак опис лиценци је саставни део ове изјаве).

Потпис аутора

У Београду, 12.09.2016.

