‘Specialization in ICTs and Special Education: Psychopedagogy of Integration’ Postgraduate Program
DEMOCRITUS UNIVERSITY OF THRACE Department of Greek Philology in collaboration with
NCSR DEMOKRITOS Informatics and Telecommunications Institute

ASSESSMENT OF PHYSICAL FITNESS AND PHYSICAL ACTIVITY OF INDIVIDUALS WITH AUTISM SPECTRUM DISORDERS

IRAKLEOUS - PALEOLOGOU ELENI

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ABSTRACT

In recent years, the modern way of life has removed people of all ages, from engaging in activities, while the sedentary lifestyle and inactivity are enhanced and characterize people of all ages. Not only the level of Physical Activity (PA) is low, but also the level of Physical Fitness (PF). This situation has serious implications for individuals' health, and especially for those who are facing disability. People with Autism Spectrum Disorder (ASD) belong to this category, as they face mobility deficits and difficulties in engaging in activities, which are intensified by sedentary lifestyle. The purpose of this investigation was to examine the PA and PF of adults with ASD. The sample of the study consist of 16 people with ASD (14 men, 2 women), 18-36 years old. The evaluation of PF was done using the Brockport Physical Fitness Test (Winnick & Short, 1999), while the evaluation of PA was done according to International Physical Activity Questionnaire (Craig et al., 2003). The results showed that participants had low level of PA, compared to the recommendations of World Health Organization (WHO, 2021). Regarding PF, participants scored low on muscle strength and endurance tests, while performed better on flexibility and cardiorespiratory tests. To sum up, it is crucial to improve the level of PA and PF of individuals with ASD, as earlier as possible, to ensure their health and quality of life.

References

Adam, C., Klissouras, V., Ravazzolo, M., Renson, R., & Tuxworth, W. (1988). *Eurofit: European test of physical fitness.* Rome, Italy: Council of Europe, Committee for the Development of Sport.

Adeogun, J. O., Adeyeye, A. E., Adefuye, M. A., & Adesanya, A. J. (2018). Effects of 8-week aerobics exercises on selected performance related physical fitness components of children with autism spectrum disorders. *Journal of Research and Contemporary Issues in Human Kinetics and Health Education, 6*(47), 1-12.

American College of Sports Medicine. (2013). *ACSM's guidelines for exercise testing and prescription.* Philadelphia, PA: Lippincott Williams & Wilkins.

Arnell, S., Jerlinder, K., & Lundqvist, L. O. (2018). Perceptions of physical activity participation among adolescents with autism spectrum disorders: a conceptual model of conditional participation. *Journal of Autism and Developmental Disorders, 48*(5),1792-1802.

Baecke, J. A., Burema, J., & Frijters, J. E. (1982). A short questionnaire for the measurement of habitual physical activity in epidemiological studies. *American Journal of Clinical Nutrition, 36,* 936-942.

Bandini, L. G., Gleason, J., Curtin, C., Lividini, K., Anderson, S. E., Cermak, S. A., Maslin, M., & Must, A. (2013). Comparison of physical activity between children with autism spectrum disorders and typically developing children. *Autism, 17*(1), 44-54.

Barak, S., Oz, M., Dagan, N., & Hutzler Y. (2019). The game of life soccer program: effect on skills, physical fitness and mobility in persons with intellectual disability and autism spectrum disorder. *Journal of Applied Research in Intellectual Disabilities, 32*(6), 1401-1411.

Baran, F., Ozer, D., Aktop, A., Nalbant, S., Aglamis, E., Barak, S., & Hutzler, Y. (2013). The effects of a Special Olympics unified sports soccer training program on anthropometry, physical fitness and skilled performance in Special Olympics soccer athletes and non-disabled partners. *Research in Developmental Disabilities, 34*(1), 695-709.

Bicer, A. H., & Alsaffar, A. A. (2015). Dietary intake of adolescents with autism spectrum

disorder (ASD) and normal to high body mass index (BMI) integrative food. *Nutrition and Metabolism, 2*(4), 231-238.

Borremans, E., Rintala, P., & Kielinen, M. (2009). Effectiveness of an exercise training program on youth with asperger syndrome. *European Journal of Adapted Physical Activity, 2*(2), 14-25.

Borremans, E., Rintala, P., McCubbin, J. A. (2010). Physical fitness and physical activity in adolescents with asperger syndrome: a comparative study. *Adapted Physical Activity Quarterly, 27*, 308-320.

Bricout, V. A., Pace, M., Dumortier, L., Baillieul, A. F. J., & Guinot, M. (2018). Reduced cardiorespiratory capacity in children with autism spectrum disorders. *Journal of Clinical Medicine, 7*(361), 2-10.

Bruininks, RH., & Bruininks, BD. (2005). *Bruininks –Oseretsky test of motor proficiency.* 2nd ed. Minneapolis, MN: NCS Pearson.

Bumpass, L., & Sweet, J. (1987). *A national survey of families and households. Madison, W. I.: center for demography and ecology*. University of Wisconsin-Madison.

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise and physical fitness: definitions and distinctions for health-related research. *Public Health Reports, 100*(2), 126-131.

Cha, J. Y., Min, S. K., Yoon, T. H., & Jee, Y. S. (2020). Gross motor function and health fitness in adults with autistic spectrum disorder and intellectual disability: single-blind retrospective trial. *Journal of Exercise Rehabilitation, 16*(3), 258-264.

Chien-Yu, P. (2008). Objectively measured physical activity between children with autism spectrum disorders and children without disabilities during inclusive recess settings in Taiwan. *Journal of Autism and Developmental Disorders, 38*, 1292-1301.

Chien-Yu, P. (2008). School time physical activity of students with and without autism spectrum disorders during PE and recess. *Adapted Physical Activity Quarterly, 25*, 308-321.

Chien-Yu, P. (2009). Age, social engagement, and physical activity in children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 3*, 22-31.

Chien-Yu, P. (2014). Motor proficiency and physical fitness in adolescent males with and

without autism spectrum disorders. *Autism, 18*(2), 156-165.

Chien-Yu, P., & Frey, C. G. (2005). Identifying physical activity determinants in youth with autistic spectrum disorders. *Journal of Physical Activity and Health, 2,* 412-422.

Chien-Yu, P., & Frey, C. G. (2006). Physical activity patterns in youth with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *36,* 597-606.

Chien-Yu, P., Chia-Liang, T., Chia-Hua, C., & Kai-Wen, H. (2011). Physical activity and self-determined motivation of adolescents with and without autism spectrum disorders in inclusive physical education. *Research in Autism Spectrum Disorders, 5*(2011), 733-741.

Chien-Yu, P., Chia-Liang, T., Chia-Hua, Ch., Ming-Chih, S., Wei-Ya, M., & Chu-Yang, H. (2016). Objectively measured physical activity and health-related physical fitness in secondary school-aged male students with autism spectrum disorders. *Physical Therapy, 96*(4),511-520.

Chien-Yu, P., Chia-Liang, T., Kai-Wen, H., Chia-Hua, C., Yu-Lin, L., & Shih-Tse, H. (2011). Accelerometer-determined physical activity among elementary school-aged children with autism spectrum disorders in Taiwan. *Research in Autism Spectrum Disorders, 5*, 1042-1052.

Chien-Yu, P., Chia-Liang, T., & Kai-Wen, H. (2011). Physical activity correlates for children with autism spectrum disorders in middle school physical education. *Research Quarterly for Exercise and Sport, 82*(3), 491-498.

Cochrane, D. J., & Stannard, S. R. (2005). Acute whole body vibration training increases vertical jump and flexibility performance in elite female field hockey players. *British Journal of Sports Medicine, 39*(11), 860-865.

Corbin, C. B., Welk, G. J., Corbin, R. W., & Welk, K. A. (2004). *Concepts of physical fitness: active lifestyle for wellness.* Boston: McGraw Hill Company.

Council of Europe. (1993). *Eurofit Tests of Physical Fitness* (2nd edition). Strasbourg: Council of Europe.

Craig, C., Marshall, A., Sjostrom, M., Bauman, A., Booth, M., Ainsworth, B., Pratt, M., Ekelund, U., Yngve, A., Sallis, J., & Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine & Science in Sports &*

Exercise, 35(8), 1381-1395.

Crocker, P. R., Bailey, D. A., Faulkner, R. A., Kowalski, K. C., & McGrath, R. (1997). Measuring general levels of physical activity: preliminary evidence for the physical activity questionnaire for older children. *Medicine Science in Sports and Exercise, 29*(10), 1344-1349.

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: a macrotheory of human motivation, development, and health. *Canadian Psychology, 49*(3), 182-185.

Dencker, M., Thorsson, O., Karlsson, M. K., Linden, C., Wollmer, P., & Andersen, L. B. (2012). Aerobic fitness related to cardiovascular risk factors in young children. *European Journal of Pediatrics, 171*(4), 705-710.

Diagnostic and Statistical Manual of Mental Disorders (2013). *American Psychiatric Association.*

Esposito, G., Venuti, P., Maestro, S., & Muratori, F. (2009). An exploration of symmetry in early autism spectrum disorders: analysis of lying. *Brain Development, 31*(2), 131-810.

Fournier, K. A., Kimberg, C. I., Radonovich, K. J., Tillman, M. D., Chow, J. W., Lewis, M. H., Bodfish, J. W., & Hass, C. J. (2010). Decreased static and dynamic postural control in children with autism spectrum disorders. *Gait Posture 32*(1), 6-9.

Frankel, F. D., Gorospe, C. M, Chang, Y., & Sugar, C. A. (2011). Mothers' reports of play dates and observation of school playground behavior of children having high-functioning autism spectrum disorders. *Journal of Child Psychology and Psychiatry, 52*(5), 571-579.

Gallahue, D. (2002). Developmental physical education for all children. *Human Kinetics,* 4th edition.

Garcia, A. W., George, T. R., Coviak, C., Antonakos, C., & Pender, N. J. (1997). Development of the child/adolescent activity log: a comprehensive and feasible measure of leisure-time physical activity. *International Journal of Behavioral Medicine, 4*(4), 323-338.

Godin, G. & Shephard, R. J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Science, 10*(3), 141-146.

Godin, G., & Shephard, R. (1997). Godwin leisure-time exercise questionnaire. *Medicine and Science in sports and exercise, 29,* 36-38.

Godin, G. (2011). The Godin-Shephard leisure-time physical activity questionnaire. *Health and Fitness Journal of Canada, 4,* 18-22.

Haegele,J. A., Zhu, X., & Kirk, T. N. (2018). Weekday physical activity and health-related fitness of youths with visual impairments and those with autism spectrum disorder and visual impairments. *Journal of Visual Impairment & Blindness, 110*(5), 372-384.

Hamm, J., & Yun, J. (2018). The motivational process for physical activity in young adults with autism spectrum disorder. *Disability and Health Journal, 11*(4), 644-649.

Hagstromer, M., Oja, P., & Sjostrom, M. (2006). The international physical activity questionnaire (IPAQ): a study of concurrent and construct validity. *Public Health Nutrition, 9*(6), 755-762.

Henderson S., Sugden D., & Barnett A. L. (2007). *Movement Assessment Battery for Children-2.* London: Pearson Assessment.

Hill, J., & Wyatt, H. (2005). Role of exercise in reducing the risk of diabetes and obesity. *Journal of Applied Physiology, 99*(2), 765-770.

Hillier, A., Buckingham, A., Schena, D. (2020). Physical activity among adults with autism: participation, attitudes, and barriers. *Perceptual and Motor Skills, 127*(5), 874-890.

Hviid, A., Hansen, J. V., Frisch, M., &Melbye, M. (2019). Measles, mumps, rubella vaccination and autism: a nationwide cohort study. *Annals of Internal Medicine, 170*(8), 513-520.

Kara, T., & Yilmaz, S. (2019). Theory of mind and related factors in parents of children diagnosed with autism spectrum disorders. *Turkish Journal of Clinical Psychiatry, 22*(2), 139-147.

Kerner, M. S., & Grossman, A. H. (2001). Scale construction for measuring attitude, beliefs, perception of control, and intention to exercise. *Journal of Sports Medicine and Physical Fitness, 41*(1), 124.

Kloubec, J. A. (2010). Pilates for improvement of muscle endurance, flexibility, balance and posture. *Journal of Strength and Conditioning Research, 24*(3), 661-667.

Lamonte, M., Blair, S., & Church, T. (2005). Physical activity and diabetes prevention.

Journal of Applied Physiology, 99(3), 1205-1213.

Leisure and Cultural Services Department, Hong Kong (2014). *Concept of physical fitness*. Online available https://www.lcsd.gov.hk/en/healt

Lloyd, M., Colley, R. C., & Tremblay, M. S. (2010). Advancing the debate on fitness testing for children: perhaps we're riding the wrong animal? *Pediatric Exercise Science, 22*(2), 176-182.

MacDonald, D., Esposito, P., & Ulrich, D. (2011). The physical activity patterns of children with autism. *BioMed Central Research Notes, 4*(422), 1-5.

Markland, D., & Tobin, V. (2004). A modification to the behavioural regulation in exercise questionnaire to include an assessment of amotivation. *Journal of Sport and Exercise Psychology, 26*(2), 191-196.

Martinez, M. A., Lopez-Fontana, C., Varo, J. J., Sanchez-Villegas, A., & Martinez, J. A. (2005). Validation of the Spanish version of the physical activity questionnaire used in the nurses' health study and the health professionals' follow-up study. *Public Health Nutrition, 8*(7), 920-927.

McCoy, S. M., Jakicic J. M., & Gibbs B. B. (2016). Comparison of obesity, physical activity and sedentary behaviors between adolescents with autism spectrum disorders and without. *Journal Autism Developmental Disorder, 46*(7), 2317-2326.

McCoy, S. M., & Morgan, K. (2019). Obesity, physical activity and sedentary behaviors in adolescents with autism spectrum disorder compared with typically developing peers. *Autism 24*(2), 387-399.

McWilliam, R. A. (1990). *The engagement check.* Chapel Hill, NC: Frank Porter Graham Child Development Center.

Memari, A. H., Ghaheri, B., Ziaee, V., Kordi, R., Hafizi, S., & Moshayedi, P. (2012). Physical activity in children and adolescents with autism assessed by triaxial accelerometry. *Pediatric Obesity. 8*(2), 150-158.

Memari, A. H., Panahi, N., Ranjbar, E., Moshayedi, P., Shafiei, M., Kordi, R., & Ziaee, V. (2015). Children with autism spectrum disorder and patterns of participation in daily physical and play activities. *Neurology Research International, 2015,* 1-7.

Ntoumanis, N. (2001). A self-determination approach to the understanding of motivation

in physical education. *British Journal of Educational Psychology, 71*, 225-242.

Oja, P., & Tuxworth, B. E. (1995). *Eurofit for adults: a test battery for the assessment of the health-related fitness of adults.* Council of Europe: Committee for the Development of Sport.

Orsmond, G. I., Krauss, W. M., & Seltzer, M. M. (2004). Peer relationships and social and recreational activities among adolescents and adults with autism. *Journal of Autism and Developmental Disorders, 34*(3), 245-256.

Orsmond, G. I., Kuo, H. Y. (2011). The daily lives of adolescents with an autism spectrum disorder. *Autism, 15*(5), 579-599.

Oyeyemi, A., Bello, U., Philemon, S., Aliyu, H., Majidadi, R., & Oyeyemi, A. (2014). Examining the reliability and validity of a modified version of the international physical activity questionnaire, long form (IPAQ-LF) in Nigeria: a cross-sectional study. *British Medical Journal, 4*(2), 58.

Panagiotakos, D., Pitsavos, C., Chrysohoou, C., Skoumas, I., & Stefanadis, C. (2008). Five-year incidence of cardiovascular disease and its predictors in Greece: the ATTICA study. *Vascular Medicine, 13*(2), 113-121.

Papathanasiou, G., Georgoudis, G., Papandreou, M., Spyropoulos, P., Georgakopoulos, D., Kalfakakou, V., & Evangelou, A. (2009). Reliability measures of the short international physical activity questionnaire (IPAQ) in Greek young adults. *The Hellenic Journal of Cardiology, 50*(4), 283-294.

Pitsavos, C., Kavouras, S., Panagiotakos, D., Arapi, S., Anastasiou, C., Zombolos, S., Stravopodis, P., Mantas, Y., Kogias, Y., Antonoulas, A., & Stefanadis, C. (2008). Physical activity status and acute coronary syndromes survival the GREECS (Greek study of acute coronary syndromes) study. *Journal of the American College of Cardiology, 51*(21), 2034-2039.

Place, M., Dickinson, K., & Reynolds, J. (2015). Do we need norms of fitness for children with autistic spectrum conditions? *British Journal of Special Education, 42*(2), 199-216.

Podsiadlo, D., & Richardson, S. (1991). The timed “up and go”: A test of basic functional mobility for frail elderly persons. *Journal American Geriatric Society, 39*(2), 142-

148.

Qu, N., & Li, K. (2004). Study on the reliability and validity of international physical activity questionnaire (Chinese vision, IPAQ). *Zhonghua Liu Xing Bing Xue Za Zhi, 25*(3), 265-268.

Rimmer, J. H., Rubin, S. S., & Braddock, D. (2000). Barriers to exercise in African American women with physical disabilities. *Archives of Physical Medicine and Rehabilitation, 81*(2), 182-188.

Wood, R. (2012). Sit and reach norms. *Topend Sports Website.* https://www.topendsports.com/testing/norms/sit-and-reach.htm

Wood, R. (2008). Beep test instructions. *Topend Sports Website.* https://www.topendsports.com/testing/tests/20mshuttle.htm

Sisson, S. B., Broyles, S. T., Baker, B. L., & Katzmarzyk, P.T. (2010). Screen time, physical activity, and overweight in U.S. youth: national survey of children's health 2003. *Journal of Adolescent Health, 47*(3), 309-311.

Soares-Miranda, L., Sandercock, G., Vale, S., Silva, P., Moreira, C., Santos, R., & Mota, J. (2011). Benefits of achieving vigorous as well as moderate physical activity recommendations: evidence from heart rate complexity and cardiac vagal modulation. *Journal of Sports Sciences, 29*(10), 1011-1018.

Stanish, H. I., Curtin, C., Must, A., Phillips, S., Maslin, M., & Bandini, L. G. (2017). Physical activity levels, frequency, and type among adolescents with and without autism spectrum disorder. *Journal Autism Developmental Disorder, 47*(3), 785-794.

Tyler, K., MacDonald, M., & Menear, K., (2014). Physical activity and physical fitness of school-aged children and youth with autism spectrum disorders. *Autism Research and Treatment, 2014*(4) 1-6.

U.S. Department of Health and Human Services (USDHHS). (2008). *Physical activity guidelines for Americans.* Hyattsville, MD: Authors.

Ulrich, D. (2000). *Test of gross motor development.* 2nd ed. *Autism*, TX: Pro-Ed.

Van der Mars, H. (1989). Basic recording tactics. In P. W. Darst, D. B. Zakrajsek, & V. H. Mancini (Eds.), *Analyzing physical education and sport instruction.* Champaign, IL: Human kinetics. 2, 19-52.

Vasheghani, F. A., Tahmasbi, M., Asheri, H., Ashraf, H., Nedjat, S., & Kordi, R. (2011). The Persian, last 7-day, long form of the international physical activity questionnaire: translation and validation study. *Asian Journal of Sports Medicine, 2*(2), 106-116.

Venetsanou, F., Kampas, A., & Giannakidou, D. (2015). Organized physical activity and health in preschool age: a review. *Central European Journal of Public Health, 23*(3), 200-207.

Volkmar, F. R., &McPartland, J. C. (2014). From Kanner to DSM-5:autism as an evolving diagnostic concept. *Annual Review of Clinical Psychology, 10*(2014), 193-212.

Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *Canadian Medical Association Journal, 174*(6), 801-809.

Wescheler, D. (1999). *Wechsler Abbreviated Scale of Intelligence (WASI).* San Antonio: TX Psychorp.

Wilson, P., Rogers, W. T., Rodgers W. M., & Wild, T. C. (2006). The psychological need satisfaction in exercise scale. *Journal of Sport and Exercise Psychology, 28*(3), 231.

Winnick, J. P., & Short, F. X. (2014). *The Brockport physical fitness test manual: a health-related assessment for youngsters with disabilities* (2nd Ed). Champaign, IL: Human Kinetics.

Winnick, J. P., Short, F. X. (1999). *The Brockport physical fitness test manual.* Champaign, IL: Human Kinetics.

World Health Organization POS. WHOQOL Measuring quality of life. World Health Organization (1997).

World Health Organization (WHO), (2021) https://www.who.int/news-room/fact-sheets/detail/physical-activity .

Wu, T. Y., & Pender, N. (2002). Determinants of physical activity among Taiwanese adolescents: an application of the health promotion model. *Research in Nursing and Health, 25*(1), 25-36.

Yilmaz, A., & Mirze, F. (2019). “Box box on the shelve! tell me!” : the effects of adapted plays on physical fitness in autism spectrum disorder. *Journal of Education and Learning, 9*(1), 110-118.

Yoon, T. H., Mun, Y. K., Lee, J. S., Min, S. K., & Jee, Y. S. (2019). Analysis for reliability and

validity of gross motor function and health fitness tests for children with developmental disabilities. *Journal of Exercise Rehabilitation, 15*(5), 667-675.

Yu, J., & Jee, Y. S. (2020). Educational exercise program affects to physical fitness and gross motor function differently in the severity of autism spectrum disorder. *Journal of Exercise Rehabilitation, 16*(5), 410-417.

Γκατζόγια, Δ., Ζάραγκας, Χ., Κούτρας, Β., & Κουτσούκη, Δ. (2018). Η συμβολή του παιχνιδιού και της φυσικής δραστηριότητας στην κοινωνική ανάπτυξη παιδιών με διαταραχή αυτιστικού φάσματος. *Έρευνα στην Εκπαίδευση, 7*(1), 100-108.

Καμπάς, Α. (2004). *Εισαγωγή στην κινητική ανάπτυξη*. Αθήνα: Αθλότυπο.

Μακαβέλου, Π., Μιχαλοπούλου, Μ., Μακαβέλου, Σ., Υφαντίδου, Γ., Κουρτέσης, Θ., & Ζέτου, Ε. (2005). Επιδράσεις ηλικίας και φύλου στη φυσική δραστηριότητα ενηλίκων στην Ελλάδα. *Αναζητήσεις στη Φυσική Αγωγή & τον Αθλητισμό, 3*(2), 176-186.

Παπαδοπούλου, Ι., & Συριοπούλου, Χ. (2016). *Η φυσική δραστηριότητα και ο αθλητισμός στη ζωή των παιδιών με διαταραχή φάσματος αυτισμού*. Πανελλήνιο Συνέδριο Επιστημών Εκπαίδευσης, 2016, 1036-1056.

Τσιριγκάκης, Σ., Μιχαλοπούλου, Μ., Αγγελούσης, Ν., & Φατούρος, Ι. (2008). *Εγκυρότητα του ερωτηματολογίου IPAQ στην εκτενή του μορφή σε Έλληνες ενήλικες.* Πρακτικά 16ου Διεθνούς Συνεδρίου Φυσικής Αγωγής και Αθλητισμού, Τ.Ε.Φ.Α.Α. Κομοτηνή: Δημοκρίτειο Πανεπιστήμιο Θράκης.