STUDIA UBB EDUCATIO ARTIS GYMN., LXVI, 4, 2021, pp. 85 – 101
(RECOMMENDED CITATION)
DOI:10.24193/subbeag.66(4).35

THE IMPORTANCE OF CARDIORESPIRATORY FITNESS AND PHYSICAL ACTIVITY AMONG ADULTHOOD STAGES—REVIEW

DAN ALEXANDRU SZABO[1]

ABSTRACT. Introduction: Adulthood is a period of development and transformation, though it may not be as dramatic as childhood and adolescence. Physical changes, for example, from youth to adolescence, are transformative. The body proliferates and develops secondary sexual characteristics as adolescence progresses. Exercise training for the elderly has been linked to a variety of health benefits, including a reduction in cardiovascular mortality. Changes in the balance of the cardiac autonomic nerves result in an increase or relative innervation of the vagus nerve, an explanatory mechanism that may be involved after exercise. Regular physical activity has also been linked to improving mental health (for example, reducing stress, anxiety, and depression). Mental health is critical for preventing and managing cardiovascular disease, but it also impacts other chronic diseases (such as diabetes, osteoporosis, hypertension, obesity, cancer, and depression). **Conclusions:** Finally, this review unifies the relationship between physical activity, cardiorespiratory health, and adulthood across the life span. In adulthood, changes in daily physical activity have a significant impact on overall health and well-being. As people's corporeal and psychological health care deteriorates with age, regular physical activity becomes crucial for well-being.

Key words: *Physical activity, Cardiorespiratory fitness, adulthood.*

REZUMAT. ***Importanța fitness-ului cardiorespirator și a activității fizice în rândul adulților—review.*** **Introducere:** Vârsta adultă este o perioadă de maturizare și schimbare, deși poate să nu fie la fel de dramatică precum copilăria și adolescența. Schimbările fizice, de exemplu, de la copilărie la adolescență, sunt transformatoare. Antrenamentul pentru vârstnici a fost legat de o varietate de beneficii pentru sănătate, inclusiv o reducere a mortalității din cauza bolilor cardiovasculare. Modificările în echilibrul nervilor autonomi cardiaci au ca rezultat o creștere sau o inervație relativă a nervului vag, un

[1] *George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Targu Mures, Romania, E-mail: dan-alexandru.szabo@umfst.ro*

mecanism explicativ care poate fi implicat după efort. Activitatea fizică regulată a fost, de asemenea, legată de îmbunătățirea sănătății mintale (de exemplu, reducerea stresului, anxietății și depresiei). Sănătatea mintală este esențială pentru prevenirea și gestionarea bolilor cardiovasculare, dar are un impact și asupra altor boli cronice (cum ar fi diabetul, osteoporoza, hipertensiunea, obezitatea, cancerul și depresia). **Concluzii:** În cele din urmă, această recenzie unifică relația dintre activitatea fizică, sănătatea cardiorespiratorie și vârsta adultă de-a lungul ontogenezei. La vârsta adultă, schimbările în activitatea fizică zilnică au un impact semnificativ asupra sănătății și bunăstării generale. Pe măsură ce sănătatea fizică și mentală a oamenilor se deteriorează odată cu vârsta, activitatea fizică regulată devine crucială pentru obținerea bunăstării.

Cuvinte cheie: *Activitate fizică, Fitness cardiorespirator, vârsta adultă.*

Introduction

An emerging theory and research line show that thriving growth is essential for successful adolescent development and transition to adulthood. A thriving orientation can be defined as a positive process—internal promotion and relationship support—individuals shaping and participating in their development environment, no matter what environment they live in, to develop the life trajectory of the list of abilities, skills (Szabo et al., 2020a; Szabo et al., 2020b; Szabo et al., 2020c; Tulbure et al., 2020), and behaviors. At the identical moment, it is appropriate for self and society (Benson & Scales, 2009; Benson et al., 2006; Lerner, 2004; Scales et al., 2000; Scales et al., 2015).

Due to the significant impact on adult socioeconomic achievements, family life, and health, the changeover to maturity has recently received much scholarly attention (Shanahan, 2000; Settersten et al., 2005; Benson & Furstenberg, 2007; Settersten & Ray 2010; Waters et al., 2011; Booth et al., 2012). This transformation in the US is characterized by its long-term nature and increasingly personalized quality, making it more unstable and uncertain than the previous queue (Shanahan, 2000). Higher education increases youth's living and financial dependence on their parents and delays full-time employment and people establishment (particularly parenting). The loose institutional link among university and job (Schneider & Stevenson 1999; Kerckhoff, 2002; Shanahan et al., 2002) is accompanied by a general increase in non-standard employment relationships, which reduces the remuneration for dynasty establishment in obtaining and maintaining the ability to provide sufficient work (Kalleberg et al., 2000; Kalleberg, 2011; Eliason et al., 2015).

The stage of development from adolescence to adulthood is itself a necessary stage of life, but it is also important because it lays the foundation for later adulthood (Arnett, 2000; George, 1993; Hogan & Astone, 1986; Shanahan, 2000). Think of young or emerging adulthood as the period among 19 and 26 phases of age. It is also believed that emerging adulthood can last until 29 (Arnett et al., 2011). The worldwide adolescent advancement discipline generally believes that youth refers to the phase from premature youth to 30 years of age or later (United States Agency for International Development, 2012). However, the age range is not an entirely satisfactory sign because it has been found that different people in the same age range consider themselves to be real adults. For example, the "emerging" label applies to people who do not think they are fully grown-ups, while "young adult" applies to people of the same age who think they are adults. (Blinn-Pike et al. 2008; Scales et al., 2015).

The adulthood stages

The early/emerging adulthood stage

Teenage maturity is a period of maturity and alteration, even though the level of transformation might not be as dramatic as childhood and adolescence. For instance, the corporeal transformations from childhood to adolescence are transformative. As adolescence progresses, the body proliferates and develops secondary sexual characteristics. As an adolescent's transition from adolescence to manhood, corporeal transformations occur, but gradually. Individuals begin to gain a steady weight, which will define adulthood, but the transformations appear not as sudden as when puberty begins (Cole, 2003; Zagorsky & Smith, 2011; Committee Improving the Health, Safety and Well-Being of Young Adults, 2015).

Except for infancy, no other life stage will experience such energetic and challenging transformations at the private, societal, sentimental, neuroanatomical, and educational levels. Most emerging adults have changed their living conditions, significant relationships, complete education or career preparation, marriage, childbirth, and transition from adolescent/dependent roles to adult/independent roles in the ten years between 20 and 30. Emerging adults usually depend on others at the commencement of a phase, are between 17 and 18, live by their begetters or caregivers, establish romantic relationships, and go to high school. In the mid to succeeding 20-s, particularly evolving grown-ups are self-sufficient, have long-run friendships, and enjoy a clear career path at the close of this phase. When they penetrate this phase of existence, their private, relative, and societal resources, the dynamics and interactions between emerging adults and their surroundings, and their assistance will affect how they pass a phase of existence. Therefore, at this stage, young people and young people can take a variety of ways to achieve stable adulthood (Wood et al., 2018).

Arnett defines emerging adulthood as the life stage between adolescence and mature adulthood and is characterized by unique demographic, social and subjective psychological characteristics (Arnett, 2000; Arnett, 2010). This stage of life applies to people among 19 and 26 seasons of age, during which time they gain financial independence through training and education. Previously, psychodynamic theoretician Erik Erikson pinpointed a phase of teenage individuals in industrialized communities called prolonged puberty or psychosocial suspension (Erikson, 1968). Hopwood and colleagues investigated the congenital and ecological consequences of the personality development of same-sex male and female monozygotic and fraternal twins evaluated during late adolescence (approximately 17 years), adulthood (approximately 24 years), and adult adolescence. (Approximately 29 years old) (Hopwood et al., 2011). Their genetic information research outcomes endorse a lifestyle program point of view on temperament growth through adolescents' transition to adulthood (Hochberg et al., 2020).

Emerging adulthood, also known as early adulthood, is critical for transition and life-long health protection. Despite some positive factors, the main pattern of teenage grown-ups nowadays is decreasing health care, as evidenced by healthy behaviors and related health conditions (listed below), (Committee Improving the Health, Safety and Well-Being of Young Adults, 2015), (Figure 1):

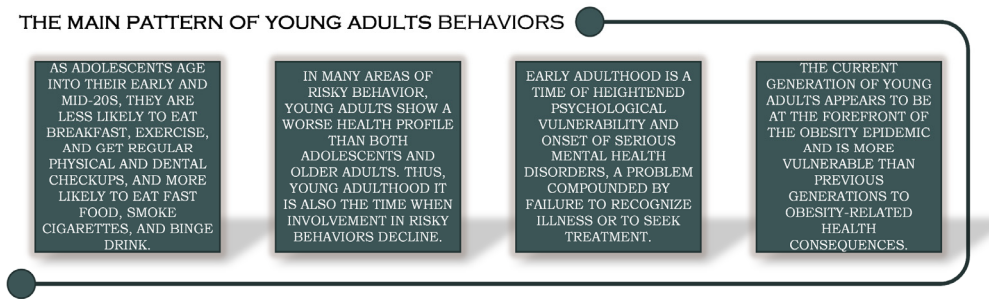

Figure 1. The pattern of young adults behaviors (Committee Improving the Health, Safety and Well-Being of Young Adults, 2015)

The mid-adulthood stage

The term mid-adulthood is neither well defined nor well understood. The dictionary defines it as a period between youth and old age, a state of vagueness and no difference. According to one author (Cohen, 2012), the concept of middle age was invented about 150 years ago. Nevertheless, the image of middle age can

be found in the artistic expression of the life cycle as early as the 16th century. The Middle Ages were not given a special place in the artistic conception of life courses in the 13-th, 14-th, and 15-th centuries. They usually depict circular representations of the life cycle, or in some cases, linear or even seemingly random positions represent individuals of different ages (Lachman et al., 2015).

Middle age or mid-adulthood only appeared in the 20th century as an era of explanatory development in the existence trajectory (Moen & Wethington, 1999). The current longitudinal middle-aged development research is entering a new stage because, for the first time, data on actual life span development across middle-age and old age has been obtained from the critical resources of life-long development such as brain plasticity, cognition, personality, health, and subjective representation. Related evaluations are now available (Widaman, 2008). In this case, it was evident that to understand better the development of middle age and its functional significance to the development of later years, and it is necessary to go beyond the traditional average-oriented age development norms and the assumption that middle age is regarded as a sound stage (Willis & Martin, 2005; Willis et al., 2010).

A key goal of promoting our understanding and narrowing the middle-aged/mid-adulthood research gap is to create philosophical and observational designs of the development process, including the middle-aged. We use mid-period as a crucial time frame in the life course as an illustration that can mentor prospective analysis (Lachman et al., 2015). The dictionary's definition of a key is "a bridge between the young and old" (Lachman et al., 2015) "is essential in order to the evolution or accomplishment of other things, very important or critical." We regard middle age as the critical pivotal in terms of (Figure 2):

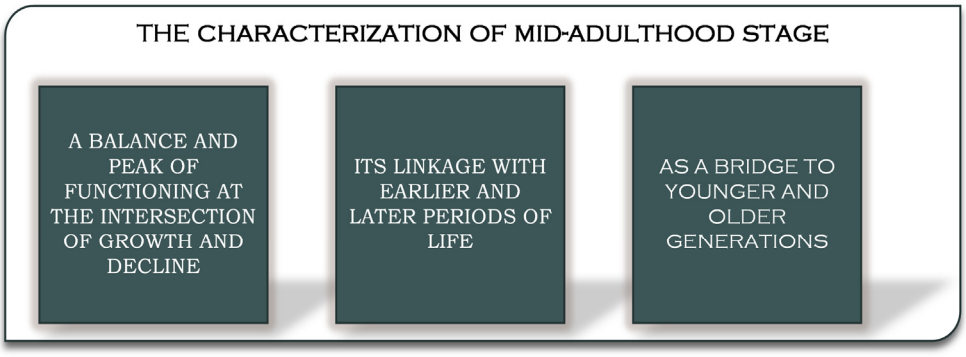

Figure 2. The characterization of the mid-adulthood stage (Lachman et al., 2015)

The late-adulthood stage

According to lifespan development theorists, development continues into late adulthood. Well-known theorists (Carstensen et al., 2003; Charles, 2010; Erickson, 1982; Tornstam, 2005) have shown that older adults face significant challenges in later adulthood, which can be achieved by promoting their mental health and well-being. Ways to solve these challenges. In particular, in her integrated prototype of toughness and vulnerability, Charles suggested that elderly grown-ups are more likely to participate in strategies limiting negative experiences. Eriksson proposed that the developmental stages of integrity and despair occur in old age and include regrets about missed opportunities, unachieved goals, or lack of productivity (i.e., despair), or the sense of meaning, continuity, and satisfaction of life (i.e., completeness). Tornstam's Gerotranscendence theory believes that as people age, they become less self-centered, more other-oriented, and transcend their viewpoints. Carstensen proposed in the theory of social-emotional selectivity that as people age, they will emphasize constructive objectives and speculate in partnerships and individuals systematically that provide positive emotional results (Toussaint et al., 2021).

The current generations of seniors are expected to age, maintain bodily and psychological welfare and improve the quality of their old age (Montross et al., 2006). Although the necessary drivers for successful aging are not yet fully understood, the characteristics of population aging are apparent. Accomplished maturing completes not only mean longevity or independence from disorder and impairment; it requires health, physical functioning, and mental health (Bowling & Iliffe, 2011; Musich et al., 2018). Since then, long-term prospective studies have documented the benefits of middle-aged physical activity and healthy lifestyle behaviors as reliable predictors of disease onset and disability in later life (Fries, 1980; Daviglus et al., 1998). With the development of successful aging models, more in-depth research has been conducted on the impact of mental health on physical health (Bowling & Iliffe, 2011; Musich et al., 2018).

This review aims to briefly summarize the effects and advantages of physical behavior among the adult population. Given our articles that are being published, where we have created a "whole" from a chronological point of view, where we have managed to stage the period of childhood and adolescent development chronologically, as we propose here, from the perspective of adulthood as it follows (Figure 3):

Figure 3. The adulthood development stages

The benefits of cardiorespiratory fitness and physical activity

"All parts of the body, if used moderately and exercised in the labor that everyone is accustomed to, will become healthy, develop well, and age slowly; but if they are not used and left unused, they will be prone to illness and growth defects, and will age rapidly," Hippocrates wrote during the 5-th C, BC. However, by the 21st century, people's perception of the value of exercise for health has weakened, so that lack of exercise has now become a significant public health problem (Booth et al., 2012). Similarly, lack of exercise has been identified as the direct cause of chronic illness and death in adults (Mokdad et al., 2004; Ruegsegger & Booth, 2018).

Physical activity or physical fitness? —Physical fitness is a physical state of health that enables people to meet the needs of daily life or as the basis for sports performance, or both. Physical fitness components (Sopa & Pomohaci, 2021; Szabo et al., 2021) related to health statuses, such as cardiovascular health, musculoskeletal health, body composition, and metabolism, are all included in health-related physical fitness. The terms *physical behavior* and *bodily fitness* are frequently used interchangeably in a wide range of epidemiological studies, and physical fitness is often seen as a more precise (albeit incidental) indicator of bodily behavior than self-reporting (Williams, 2001; Warburton et al., 2006).

Cardiorespiratory fitness (usually measured by the maximum oxygen uptake, VO2max) is arguably the most crucial health indicator (Blair et al., 1989). In favor of, Myers et al. (2002) found that for every metabolic equivalent (1 MET) in exercise test performance, the survival rate would increase by 12%. They pointed out that "compared with other established cardiovascular disease (CVD) risk factors, the maximum oxygen uptake is a more effective predictor of male mortality. "Low cardiorespiratory fitness is also an autonomous threat element for T2D and CVD sickness and fatality (Booth et al., 2002; Kodama et al.,

2009; Gupta et al., 2011)". Similarly, other researchers (Kokkinos et al., 2010) commented that males which enhanced their cardiorespiratory health from soft to supreme reduced the risk of death within eight years; On the other hand, men with high-to-low cardiorespiratory health have an increased risk of death by 50%. (Ruegsegger & Booth, 2018).

Recent studies use standardized exercise regimens to assess cardiorespiratory health. Such agreements are designed to gradually increase the workload until the maximal core frequency predicted by the participant's age is reached, or the participant cannot continue. This level of aerobic workload is called peak exercise capacity and is measured in metabolic equivalents (MET). One MET equals 3.5 mL of O2/kg/min, which is the amount of energy consumed per kilo of corpse load during one minute of rest. Any activity that requires more oxygen consumption than rest will result in higher MET levels (Kokkinos, 2010; Kokkinos, 2012). Since this exercise test is designed to exhaust participants, this health assessment method is more objective than questionnaires. The following are selected studies whose results support vocational and recreation moment research and, more importantly, enrich our understanding of the relationship between exercise or increased physical activity and health benefits (Kokkinos, 2012).

Exercise training for the elderly is correlated through health care assistance such as reduced cardiovascular mortality (Laukkanen et al., 2004). Changes in the balance of the cardiac autonomic nerves lead to an increase or relative innervation of the vagus nerve, which is an explanatory mechanism that may be involved after exercise. In addition, endurance exercise training can reduce the relaxing and sub-maximal workout core rate, systolic and diastolic bloodstream strain of the elderly, and increase thrombosis quantity (Eynon et al., 2008). This is most pronounced during maximum effort when thrombosis quantity, cardiological productivity, contractile force, and oxygen uptake increase while complete peripheral insurgency and systolic and diastolic bloodstream strain decline (Langhammer et al., 2018).

Regular physical exercise is also associated with improving mental health (for example, reducing stress, anxiety, and depression) (Warburtonet al., 2001; Dunn et al., 2001). Mental health is essential for preventing and managing cardiovascular disease, but it also impacts other chronic diseases (such as diabetes, osteoporosis, hypertension, obesity, cancer, and depression) (Warburtonet al., 2006).

21–60 years old. Physical activities include leisure or leisure-time sports activities, transportation, profession (i.e., work), housework, play, games, sports, or planned exercise in everyday, group, and population behaviors.

Adults of different ages. The following activities are recommended to enhance cardio-respiratory and muscle health, skeleton health care and decrease the threat of non-communicable diseases and depression (World Health Organization, 2010; Yang, 2019) (Figure 4):

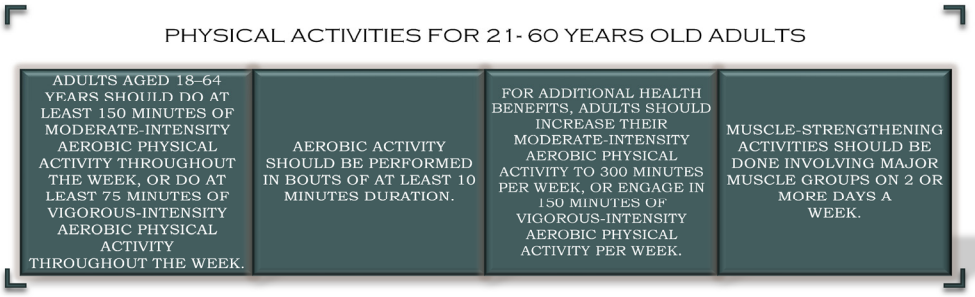

Figure 4. Physical Activities for 21–60 years old adults (World Health Organization, 2010; Yang, 2019)

60 years old and above. Physical activity includes physical activity during recreation or leisure time, transportation, housework, interplay, events, athletics or in daily life, family, and adults of that age community activities. The following activities are recommended to enhance cardio and muscle health, bone and functional health, as well as lowering the risk of non-communicable diseases, depression, and cognitive decline (World Health Organization, 2010; Yang, 2019) (Figure 5):

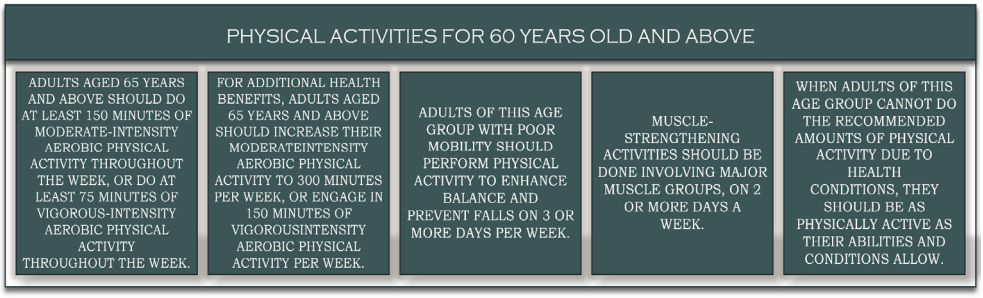

Figure 5. Physical Activities for 60 years old and above (World Health Organization, 2010; Yang, 2019)

In general, for people of all ages, the benefits of following the above recommendations and doing physical exercise outweigh the risks. Musculoskeletal injuries seem to be uncommon at the suggested degree of 150 minutes of mild-hardness activity per week. To reduce the possibility of musculoskeletal injury, in a community-founded strategy, it is appropriate to encourage a moderate start and gradually increase to a higher level of physical activity (World Health Organization, 2010; Yang, 2019).

Some researchers (Maher et al., 2013) found in two independent samples of emerging adults that emerging adults' days of participation in the *physical movement pyramid* (Figure 6) were more significant than their typical situation (i.e., interpersonal association). This model is recreated while employing instant evaluations of physical behavior (i.e., accelerometer) (Maher et al., 2014). Even though this relationship has not been studied in-depth, later adulthood, it seems that the inherent process of linking daily changes in life satisfaction with physical activity seems to be applicable through maturity since the rejuvenating consequence of sharp physical behavior might assist stimulate goal pursuit and life satisfaction Degree, has nothing to do with age (Puetz et al., 2006; Maher et al., 2015).

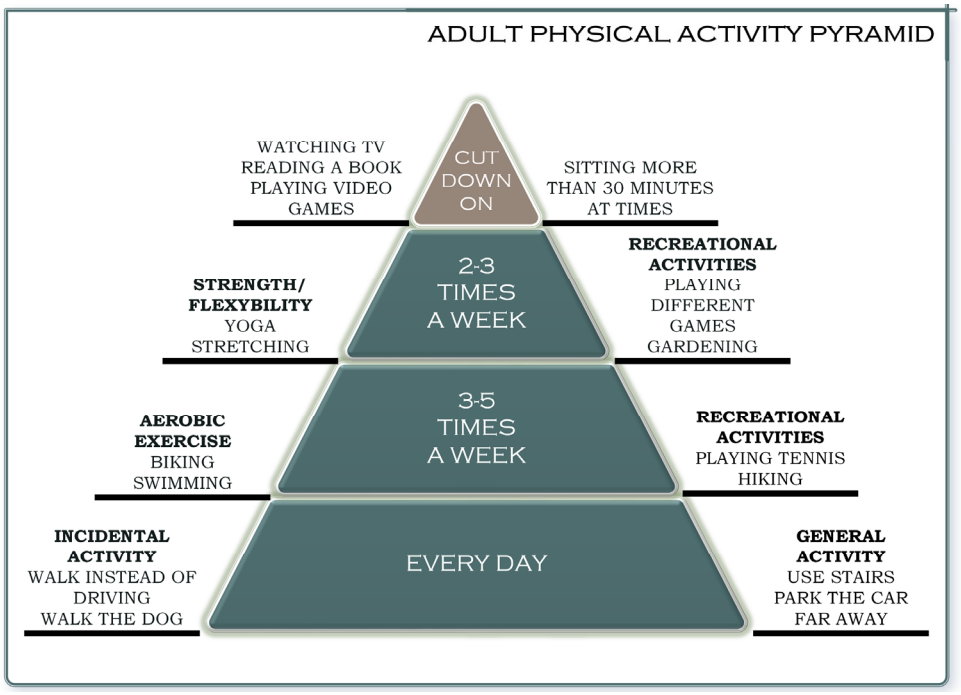

Figure 6. Adult physical activity pyramid
(https://theworldbook.org/physical-activity/)

Conclusive scientific evidence from a wide range of well-developed studies shows that, compared with inactive adults, physically active adults 60 years of age and older have a higher level of cardiorespiratory fitness and have a lower risk of a variety of disabling diseases. Chronic non-communicable diseases are also lower (World Health Organization, 2010).

Conclusions

Finally, this review harmonizes the relationship between physical activity, cardiorespiratory health, and adulthood throughout the life cycle. Changes in daily physical activity have a significant impact on overall health and well-being in adulthood. As age-related decline affects people's physical and mental health, regular physical activity is becoming more and more important for well-being.

One of the secondary conclusions from this review is that physical activity has consistent and robust effects on the brain, which mediate improvements in cognitive performance at various stages of adulthood.

The equilibrium and advancement of communities depend on the collective performance of any group of young people. Of course, this is true for every group of youngsters and youths, but the switchover to maturity marks the end of the trial period and the commencement of some meaningful action. Young people's successful transition to independent and healthy adulthood, entry into the workforce, sustained productivity, and successful parenting can contribute to the security and well-being of the country.

REFERENCES

Arnett, J.J., Kloep, M., Hendry, L.B., & Tanner, J.L. (2011). *Debating emerging adulthood: Stage or process?* Oxford, UK: Oxford University Press.

Arnett, J.J. (2000). Emerging adulthood. A theory of development from the late teens through the twenties. *The American psychologist*, *55*(5), 469–480.

Arnett, J.J. (2010). Emerging adulthood (s). In: L.A Jensen (ed.) *Bridging Cultural and Developmental Approaches to Psychology: New Syntheses in Theory, Research, and Policy. (*p. 255–75), Oxford University Press.

Benson, J.E., Jr. Furstenberg, F.F., (2007). Entry into Adulthood: Are Adult Role Transitions Meaningful Markers of Adult Identity? *Advances in Life Course Research,.*11:199—224.

Benson, P.L., & Scales ,P.C. (2009). The definition and preliminary measurement of thriving in adolescence. *Journal of Positive Psychology*, 4(1), 85–104. doi:10.1080/17439760802399240

Benson, P.L., Scales, P.C., Hamilton, S.F., & Sesma, A. Jr. (2006). Positive youth development: Theory, research and applications In Damon W. & Lerner R. M. (Eds.), *Handbook of child psychology: Human development theory* (6th ed., Vol. 1, pp. 894–941) New York, NY: John Wiley & Sons.

Blair, S.N., Kohl, H.W., 3rd, Paffenbarger, R.S., Jr, Clark, D.G., Cooper, K.H., & Gibbons, L.W. (1989). Physical fitness and all-cause mortality. A prospective study of healthy men and women. *JAMA*, *262*(17), 2395–2401. https://doi.org/10.1001/jama.262.17.239.

Booth A., Brown S.L., Landale N., Manning W., McHale S.M., editors. (2012). *Early Adulthood in a Family Context.* New York: Springer.

Booth, F.W., Chakravarthy, M.V., Gordon, S.E., & Spangenburg, E.E. (2002). Waging war on physical inactivity: using modern molecular ammunition against an ancient enemy. *Journal of applied physiology (Bethesda, Md.: 1985)*, *93*(1), 3–30. https://doi.org/10.1152/japplphysiol.00073.2002

Booth, F.W., Roberts, C.K., & Laye, M.J. (2012). Lack of exercise is a major cause of chronic diseases. *Comprehensive Physiology*, *2*(2), 1143–1211. https://doi.org/10.1002/cphy.c110025

Bowling, A., & Iliffe, S. (2011). Psychological approach to successful ageing predicts future quality of life in older adults. *Health and quality of life outcomes*, *9*, 13. https://doi.org/10.1186/1477-7525-9-13.

Carstensen, L.L., Fung, H.H., Charles, S.T. (2003). Socioemotional selectivity theory and the regulation of emotion in the second half of life. *Motiv. Emot.* 27, 103–123. 10.1023/A:1024569803230

Charles, S.T. (2010). Strength and vulnerability integration: a model of emotional well-being across adulthood. *Psychological bulletin*, *136*(6), 1068–1091. https://doi.org/10.1037/a0021232

Cohen, P. (2012). *In Our Prime: The Invention of Middle Age.* New York, NY: Scribner.

Committee on Improving the Health, Safety and Well-Being of Young Adults; Board on Children, Youth, and Families; Institute of Medicine; National Research Council (2015). Investing in the Health and Well-Being of Young Adults. Washington (DC): National Academies Press (US). 35-401. Retrieved from: https://www.ncbi.nlm.nih.gov/books/NBK284782/

Daviglus, M.L., Liu, K., Greenland, P., Dyer, A.R., Garside, D.B., Manheim, L., Lowe, L.P., Rodin, M., Lubitz, J., & Stamler, J. (1998). Benefit of a favorable cardiovascular risk-factor profile in middle age with respect to Medicare costs. *The New England journal of medicine*, *339*(16), 1122–1129. https://doi.org/10.1056/NEJM199810153391606

Dunn, A.L., Trivedi, M.H., & O'Neal, H.A. (2001). Physical activity dose-response effects on outcomes of depression and anxiety. *Medicine and science in sports and exercise*, *33*(6 Suppl), S587—610. https://doi.org/10.1097/00005768-200106001-00027

Eliason, S.R., Mortimer, J.T., & Vuolo, M. (2015). The Transition to Adulthood: Life Course Structures and Subjective Perceptions. *Social psychology quarterly*, *78*(3), 205–227. https://doi.org/10.1177/0190272515582002

Erikson E.H. (1968). *Identity: Youth and Crisis*. New York, NY: Norton.

Erikson E.H. (1982). *The Life Cycle Completed: A Review*. New York, NY: Norton.

Eynon, N., Sagiv, M., Amir, O., Ben-Sira, D., Goldhammer, E., & Amir, R. (2008). The effect of long-term beta-adrenergic receptor blockade on the oxygen delivery and extraction relationship in patients with coronary artery disease. *Journal of cardiopulmonary rehabilitation and prevention*, *28*(3), 189–194. https://doi.org/10.1097/01.HCR.0000320070.81470.75

Fries J.F. (1980). Aging, natural death, and the compression of morbidity. *The New England journal of medicine*, *303*(3), 130–135. https://doi.org/10.1056/NEJM198007173030304

George L.K. (1993). Sociological perspectives on life transitions. *Annual Review of Sociology*, 19, 353–373.doi:10.1146/annurev.so.19.080193.002033

Gupta, S., Rohatgi, A., Ayers, C.R., Willis, B.L., Haskell, W.L., Khera, A., Drazner, M.H., de Lemos, J.A., & Berry, J.D. (2011). Cardiorespiratory fitness and classification of risk of cardiovascular disease mortality. *Circulation*, *123*(13), 1377–1383. https://doi.org/10.1161/CIRCULATIONAHA.110.003236

Hochberg, Z. E., & Konner, M. (2020). Emerging Adulthood, a Pre-adult Life-History Stage. *Frontiers in endocrinology*, *10*, 918. https://doi.org/10.3389/fendo.2019.00918

Hogan D.P., & Astone N.M. (1986). The transition to adulthood. *Annual Review of Sociology*, 12, 109–130.

Hopwood, C.J., Donnellan, M.B., Blonigen, D.M., Krueger, R.F., McGue, M., Iacono, W.G., & Burt, S.A. (2011). Genetic and environmental influences on personality trait stability and growth during the transition to adulthood: a three-wave longitudinal study. *Journal of personality and social psychology*, *100*(3), 545–556. https://doi.org/10.1037/a0022409

Kalleberg A. (2011). *Good Jobs, Bad Jobs. The Rise of Polarized and Precarious Employment Systems in the United States 1970's to 2000's.* New York: Russell Sage Foundation.

Kalleberg, A., Reskin, B.F., Hudson, K. (2000). Bad Jobs in America: Standard and Nonstandard Employment Relations and Job Quality in the United States. *American Sociological Review.* 65:256—278.

Kerckhoff, A. (2002). The Transition from School to Work. In: J.T. Mortimer, R . Larson (eds.). *The Future of Adolescent Experience: Societal Trends and the Transition to Adulthood.* (pp. 52–87), New York: Cambridge University Press.

Kodama, S., Saito, K., Tanaka, S., Maki, M., Yachi, Y., Asumi, M., Sugawara, A., Totsuka, K., Shimano, H., Ohashi, Y., Yamada, N., & Sone, H. (2009). Cardiorespiratory fitness as a quantitative predictor of all-cause mortality and cardiovascular events in healthy men and women: a meta-analysis. *JAMA*, *301*(19), 2024–2035. https://doi.org/10.1001/jama.2009.681

Kokkinos, P. (2012). Physical activity, health benefits, and mortality risk. *ISRN cardiology*, *2012*, 718789. https://doi.org/10.5402/2012/718789

Kokkinos, P. (2010). *Physical Activity and Cardiovascular Disease Prevention.* Ontario, Canada: Jones and Bartlett.

Kokkinos, P., Myers, J., Faselis, C., Panagiotakos, D.B., Doumas, M., Pittaras, A., Manolis, A., Kokkinos, J.P., Karasik, P., Greenberg, M., Papademetriou, V., & Fletcher, R. (2010). Exercise capacity and mortality in older men: a 20-year follow-up study. *Circulation*, *122* (8), 790–797. https://doi.org/10.1161/CIRCULATIONAHA.110.938852

Lachman, M.E., Teshale, S., & Agrigoroaei, S. (2015). Midlife as a Pivotal Period in the Life Course: Balancing Growth and Decline at the Crossroads of Youth and Old Age. *International journal of behavioral development*, *39*(1), 20–31. https://doi.org/10.1177/0165025414533223

Langhammer, B., Bergland, A., & Rydwik, E. (2018). The Importance of Physical Activity Exercise among Older People. *BioMed research international*, *2018*, 7856823. https://doi.org/10.1155/2018/7856823

Laukkanen, J.A., Kurl, S., Salonen, R., Rauramaa, R., & Salonen, J.T. (2004). The predictive value of cardiorespiratory fitness for cardiovascular events in men with various risk profiles: a prospective population-based cohort study. *European heart journal*, *25* (16), 1428–1437. https://doi.org/10.1016/j.ehj.2004.06.013

Lerner R.M. (2004). *Liberty: Thriving and civic engagement among America's youth*. Thousand Oaks, CA: Sage.

Maher, J.P., Doerksen, S.E., Elavsky, S., & Conroy, D.E. (2014). Daily satisfaction with life is regulated by both physical activity and sedentary behavior. *Journal of sport & exercise psychology*, *36*(2), 166—178. https://doi.org/10.1123/jsep.2013-0185

Maher, J.P., Doerksen, S.E., Elavsky, S., Hyde, A.L., Pincus, A.L., Ram, N., & Conroy, D.E. (2013). A daily analysis of physical activity and satisfaction with life in emerging adults. *Health psychology : official journal of the Division of Health Psychology, American Psychological Association*, *32*(6), 647–656. https://doi.org/10.1037/a0030129

Maher, J.P., Pincus, A.L., Ram, N., & Conroy, D.E. (2015). Daily physical activity and life satisfaction across adulthood. *Developmental psychology*, *51*(10), 1407–1419. https://doi.org/10.1037/dev0000037

Moen P., Wethington E. (1999). Midlife development in a life course context. In: S.L. Willis, J.D. Reid (Eds.). *Life in the middle.* San Diego: Academic Press, 3–23. https://doi.org/10.1016/B978-012757230-7/50020-1

Mokdad, A.H., Marks, J. S., Stroup, D. F., & Gerberding, J. L. (2004). Actual causes of death in the United States, 2000. *JAMA*, *291*(10), 1238—1245. https://doi.org/10.1001/jama.291.10.1238

Montross, L.P., Depp, C., Daly, J., Reichstadt, J., Golshan, S., Moore, D., Sitzer, D., & Jeste, D.V. (2006). Correlates of self-rated successful aging among community-dwelling older adults. *The American journal of geriatric psychiatry: official journal of the American Association for Geriatric Psychiatry*, *14* (1), 43–51. https://doi.org/10.1097/01.JGP.0000192489.43179.31

Musich, S., Wang, S.S., Kraemer, S., Hawkins, K., & Wicker, E. (2018). Purpose in Life and Positive Health Outcomes Among Older Adults. *Population health management*, *21* (2), 139–147. https://doi.org/10.1089/pop.2017.0063

Myers, J., Prakash, M., Froelicher, V., Do, D., Partington, S., & Atwood, J.E. (2002). Exercise capacity and mortality among men referred for exercise testing. *The New England journal of medicine*, *346*(11), 793–801. https://doi.org/10.1056/NEJMoa011858

Puetz, T.W., O'Connor, P.J., & Dishman, R.K. (2006). Effects of chronic exercise on feelings of energy and fatigue: a quantitative synthesis. *Psychological bulletin*, *132* (6), 866–876. https://doi.org/10.1037/0033-2909.132.6.866

Ruegsegger, G.N., & Booth, F.W. (2018). Health Benefits of Exercise. *Cold Spring Harbor perspectives in medicine*, *8*(7), a029694. https://doi.org/10.1101/cshperspect.a029694

Scales, P.C., Benson, P.L., Leffert, N., & Blyth, D.A. (2000). Contribution of developmental assets to the prediction of thriving among adolescents. *Applied Developmental Science*, 4 (1), 27–46. doi:10.1207/s1532480xads0401_3

Scales, P.C., Benson, P.L., Oesterle, S., Hill, K.G., Hawkins, J.D., & Pashak, T.J. (2015). The dimensions of successful young adult development: A conceptual and measurement framework. *Applied developmental science*, *20* (3), 150–174. https://doi.org/10.1080/10888691.2015.1082429

Schneider, B., Stevenson, D. (1999). *The Ambitious Generation. America's Teenagers, Motivated But Directionless.* New Haven, CT: Yale University Press.

Settersten, R.A., Jr. Furstenberg, F.F., Rumbaut, R. (eds.) (2005).*On the Frontier of Adulthood: Theory, Research, and Public Policy.* Chicago: University of Chicago Press.

Settersten, R.A., Ray, B. (2010). *Not Quite Adults.* New York: Bantam Books.

Shanahan Michael, J. (2000). Pathways to Adulthood in Changing Societies: Variability and Mechanisms in Life Course Perspective. *Annual Review of Sociology,* 26, 667—692.

Shanahan, M.J., Mortimer, J.T., Krueger, H. (2002). Adolescence and Adult Work in the Twenty-first Century. *Journal of Research on Adolescence,* 12, 99—120.

Shanahan, M.J. (2000). Pathways to adulthood in changing societies: Variability and mechanisms in life course perspective. *Annual Review of Sociology*, 26, 667–692.doi:10.1146/annurev.soc.26.1.667

Sopa, I.S., Pomohaci, M. (2021). Using coaching techniques in assessing and developing the static and dynamic balance level of young volleyball players. *Bulletin of the Transilvania University Brasov,* 14 (63), 89-100. https://doi.org/10.31926/but.shk.2021.14.63.1.12.

Szabo, D.A, Neagu, N., Teodorescu, S., Sop,a I.S. (2020a). Eye-hand relationship of proprioceptive motor control and coordination in children 10-11 years old. Health, Sports Rehabil Med., 21(3), 185-191. https://doi.org/10.26659/pm3.2020.21.3.185.

Szabo, D.A., Neagu, N., Sopa, I.S. (2020c). Research regarding the development and evaluation of agility (balance, coordination and speed) in children aged 9-10 years. *Health Sports Rehabil Med.*, 21 (1), 33-40. https://doi.org/10.26659/pm3.2020.21.1.33.

Szabo, D.A., Neagu, N., Teodorescu, S., Panait, C.M., Sopa, I.S. (2021). Study on the Influence of Proprioceptive Control versus Visual Control on Reaction Speed, Hand Coordination, and Lower Limb Balance in Young Students 14–15 Years Old. *International Journal of Environmental Research and Public Health*, 18 (19), 10356. https://doi.org/10.3390/ijerph181910356

Szabo, D.A., Sopa, I.S. (2020b). Study regarding the level of physical and functional development of children from primary school level. *J Phys Educ Sport*. 20 (3), 1497-1504.

Tornstam, L. (2005). *Gerotranscendence: A Developmental Theory of Positive Aging*. Berlin: Springer Publishing Company.

Toussaint, L., Cheadle, A., Dezutter, J., & Williams, D.R. (2021). Late Adulthood, COVID-19-Related Stress Perceptions, Meaning in Life, and Forgiveness as Predictors of Mental Health During the COVID-19 Pandemic. *Frontiers in psychology*, *12*, 731017. https://doi.org/10.3389/fpsyg.2021.731017

Tulbure, R.E., Neagu, N., Szabo, D.A. (2020). Comparative study on the development of the motor skill (strength) through the circuit method versus dynamic games in physical education classes. *Health Sports Rehabil Med.,* 1 (4), 223-230. https://doi.org/10.26659/pm3.2020.21.4.223.

United States Agency for International Development (USAID) (2012). Youth in development: Realizing the demographic opportunity. Washington, DC, 1-21. Retrieved from: https://www.usaid.gov/sites/default/files/documents/1870/Youth_in_Development_Policy_0.pdf

Warburton, D.E., Gledhill, N., & Quinney, A. (2001). Musculoskeletal fitness and health. *Canadian journal of applied physiology = Revue canadienne de physiologie appliquee*, *26* (2), 217—237. https://doi.org/10.1139/h01-013

Warburton, D.E., Nicol, C.W., & Bredin, S.S. (2006). Health benefits of physical activity: the evidence. *CMAJ* : *Canadian Medical Association journal = journal de l'Association medicale canadienne*, 174 (6), 801–809. https://doi.org/10.1503/cmaj.051351

Warburton, D.E., Nicol, C.W., & Bredin, S.S. (2006). Health benefits of physical activity: the evidence. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne*, *174*(6), 801–809. https://doi.org/10.1503/cmaj.051351

Waters, M.C., Carr, P.J., Kefalas, M.J., Holdaway, J. (2011). *Coming of Age in America: The Transition to Adulthood in the Twenty-first Century.* Berkeley: University of California Press.

Widaman, K.F. (2008). Integrative perspectives on cognitive aging: measurement and modeling with mixtures of psychological and biological variables. In: Hofer SM, Alwin DF, editors. *Handbook of cognitive aging: interdisciplinary perspectives.* Los Angeles: Sage; pp. 50–68.

Williams, P.T. (2001). Physical fitness and activity as separate heart disease risk factors: a meta-analysis. *Medicine and science in sports and exercise*, *33* (5), 754–761. https://doi.org/10.1097/00005768-200105000-00012

Willis, S.L., Martin, M., & Rocke, C. (2010). Longitudinal perspectives on midlife development: stability and change. *European journal of ageing*, *7* (3), 131–134. https://doi.org/10.1007/s10433-010-0162-4.

Willis, S.L., Martin, M. (eds.) (2005). *Middle adulthood: a lifespan perspective.* Thousand Oaks: Sage.

Wood, D, Crapnell T, Lau L, et al. (2018). Emerging adulthood as a Critical Stage in the Life Course. In: Halfon N, Forrest CB, Lerner RM, et al., editors. Handbook of Life Course Health Development [Internet]. Cham (CH): Springer. Retrieved from: https://www.ncbi.nlm.nih.gov/books/NBK543712/# doi: 10.1007/978-3-319-47143-3_7

World Health Organization (2010). Global recommendations on physical activity for health, WHO Press, Switzerland, 7-51. Retrieved from: http://whqlibdoc.who.int/publications/2010/9789241599979_eng.pdf

Yang, Y.J. (2019). An Overview of Current Physical Activity Recommendations in Primary Care. *Korean journal of family medicine*, *40* (3), 135–142. https://doi.org/10.4082/kjfm.19.0038

Zagorsky, J.L, Smith, P.K. (2011). The freshman 15: A critical time for obesity intervention or media myth. Social Science Quarterly, 92(5), 1389–1407.