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Effects of supervised physical activity program on functional performance and self-efficacy for adolescents: Pilot study.

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Abstract

Background: Regular physical activity is associated with enhanced health and wellness outcomes. This study aimed to evaluate the effectiveness of an 8-week virtually supervised home-based physical activity program on the functional performance and self-efficacy of healthy adolescents aged between 10 and 18 years.

Methods: Ten participants (five males and five females) were enrolled in the study. The participants underwent a daily 60-minute exercise program for duration of eight weeks. The participants also had weekly phone calls or virtual sessions with physical therapists to monitor their progress and respond to their questions. Functional performance and self-efficacy scores were recorded before and after the program.

Results: The 8-week intervention program had a statistically significant positive influence on timed Sit-To-Stand (STS) (p=0.027), the 6-Minute Walk Test (6-MWT) (p=<0.001), and the Timed-Up-and-Go (TUG) test (p=0.006) scores. Self-efficacy and Godin leisure-time exercise scores also showed substantial improvement (p=<0.001).

Conclusion: We conclude that the virtually supervised 8-week exercise program demonstrated the ability to improve functional performance in school-going adolescents.

Keywords: Physical activity, Functional performance, Adolescents, Self-efficacy, Home exercises.

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Introduction

Adolescence is a critical developmental period during which physical activity should be promoted. Regular physical activity has been associated with enhanced health (including enhancement of normal growth and development) and reduced risk for all-cause mortality or the development of chronic diseases in adulthood [1]. Physical activity is also beneficial for the promotion of psychological well-being, which includes reduced anxiety and anger, along with enhanced academic performance leading to a positive impact on cognitive development and psychosocial behavior [2]. The health benefits acquired during adolescence carry forward into adulthood. However, the level of physical activity declines with age and gender among adolescence [3].

Recent decades have witnessed social and cultural changes, primarily in the sphere of technology, whereby innovation has resulted in greater efficiency in the use of human time and energy and has influenced the habits of many adolescents, increasing the amount of time spent on sedentary environmental activities. This has led to a reduction in the regular practice of physical activity and the increased prevalence of obesity and other co-morbidities [4,5].

Home-based PA programs have been widely implemented and applied for all age groups during the current COVID-19 pandemic, such as aerobic and strength exercises, dancing, and/or functional gaming [6-8]. A recent study by Hammami et al. recommended that home-based physical activity programs be implemented for individuals of all age groups to maintain physical and mental well-being [7]. Moreover, Conwell et al. found that home-based PA could improve health indicators in children and adolescents with high Body Mass Index (BMI) [6].

Given growing body of evidence indicating that physical activity has a positive impact on adolescent behavioral and cognitive development, the World Health Organization's

(WHO) international recommendations and 2018 US guidelines advocate for moderate-to-vigorous-intensity physical activity for at least 60 minutes daily [9,10]. According to the results of the first global estimate based on an international compilation of adolescents' physical activity data using information from school-based surveys from 105 countries, 80.3% of school-going adolescents aged 13–15 years failed to meet the WHO's recommendations [11].

Physical fitness affects functional capacity and performance, which is an important component of adolescent health [12], which is an individual's ability to undertake daily activities that require sustained aerobic metabolism. An individual's functional capacity is dictated by integrated efforts and the health of many-body systems (including pulmonary, cardiovascular, and skeletal systems) [13]. However, most daily activities necessitate only sub-maximal effort. Consequently, tests such as the 6-Minute Walk Test (6MWT), the Timed Get-Up-and-Go (TUG) test, and the timed STS can be used to determine functional capacity and performance [14]. The STS is a measure of mobility-related function along with physical performance [15,16]. Meanwhile, the 6MWT addresses mobility-related functions, standing balance, and speed of walking [15].

This study focused on assessing the feasibility of home-based physical activity programs supervised virtually by physical therapists *via* a digital platform for improving physical performance and self-efficacy in adolescents. The study's main aim was to evaluate the effects of an 8-week physical activity program on healthy adolescents' functional performance, self-efficacy, and leisure time. A secondary aim was to assess the influence of functional performance tests and self-efficacy on gender and physical activity level.

Methods

Study design

An eight-week pre-post study was conducted between June and August 2021.

Participants

Ten school-attending adolescent participants (five males and five females) aged 10–18 years, capable of comprehending, writing, and reading English and with no existing medical conditions, were recruited using a convenient sampling method. Participants with any chronic condition, orthopedic abnormalities, previous orthopedic surgeries, fractures, mental disorders, cardiopulmonary conditions, significant musculoskeletal in-juries, type 1 or 2 diabetes, uncorrected visual problems, or any other health issues that might have interfered with their safety during exercise were excluded.

Socio-demographic questionnaire: This self-designed questionnaire was used to record data on age, gender, height (cm), weight (kg), BMI (kg/m^2), city, and current activity level.

Physical activity log: A log was sent daily for the participants to record the kind of activity they performed and the exercises' intensity and duration.

Godin leisure-time exercise questionnaire: Participants completed a self-report questionnaire to measure PA for the last seven days during their free time. Godin and Shephard developed this questionnaire in 1985 [17]. It consists of three parameters: strenuous, moderate, and light exercise items. The weekly leisure PA score was measured as (9 × strenuous)+(5 × moderate)+(3 × light). More than 24 points was considered active, and fewer than 14 points was considered insufficiently active [18].

Self-Efficacy Scale for Children and young adolescents (SEQ-C): The SEQ-C is intended to measure three domains of children's affective disorders: social, academic, and emotional self-efficacy. In Bandura and colleagues emphasized the necessity of examining children's ability to regulate their own emotions (*i.e.,* emotional self-efficacy) [19]. In Muris published the first study to examine adolescents' perceptions of their social, academic, and emotional skills [20]. This study used only emotional self-efficacy (8 items) the academic component was omitted as the study was conducted during the summertime. All items were scored on a 1–5 Likert scale [21].

STS test: A timer was set for one minute and the participants sat comfortably in the chair with both feet flat on the ground. They were then instructed to hold their hands close together loosely and to stand up from their chairs until their legs were completely straight, followed by sitting back down again (this counted as one round). The participants were then instructed to continue sitting up and down as many times as they could and their total number of sit-to-stands was recorded at the end of one minute [22].

6MWT: Two cones were placed at a distance of 30 meters apart in an unimpeded walkway, and the participants were instructed to walk as far as possible between the cones at a comfortable pace for six minutes (recorded on a timer), and every turnaround at the cones represented a brisk pivot. The total distance walked was recorded after 6 minutes [23,24].

TUG test: A chair was placed in a hallway, and a tape measure was used to mark 3 meters in front of the chair. The test commenced with the participants seated on the chair; the participants were then instructed to stand up from the chair on command, walk 3 meters, turn around, walk back to the chair, and sit down, while the therapist recorded the time taken from the child standing up from the chair to the point at which they sat back down [25].

Procedure

The experimental program was divided into three phases: The pre-measurements, the 8-week physical activity program, and the post-measurements. First, the pre-measurement phase included a questionnaire distributed *via* a digital platform to obtain consent and assent to participate in the study. In addition, the socio-demographic questionnaire, the Self-Efficacy Questionnaire for Children (SEQ-C), and the Godin lei-sure-time exercise questionnaire were completed by each contributing participant *via* the digital platform. Home visits were then made for each participant to record height, weight, BMI; timed Sit-To-Stand (STS) test scores, 6-Minute Walk Test (6MWT) scores, and TUG test scores.

The second phase consisted of one hour of physical activity performed six days per week for eight weeks. Each hour of physical activity included 10 minutes of warm-up followed by 40 minutes of exercise and ended with a cool-down period of 10 minutes. The 40 minutes of exercises included bone and muscle strengthening and aerobic exercises. Each participant's session was supervised remotely one-on-one weekly through either phone or virtual sessions with a physical therapist. Compliance with the PA sessions was ensured by a daily log reminder that was sent to the participants. After eight weeks, post-measurements were recorded during the study's third phase. The pre-and post-measurements were then compared.

Ethical consideration: The study approved by the institutional review board king Abdulaziz University (protocol code FMRS-EC2021-20 and March 25, 2021). Informed consent and assent were obtained from all participating adolescents and their guardians.

Statistical analysis

SPSS statistics software version (25) was used to analyse the data. First, descriptive statistics for categorical variables were obtained using mean +SD. Next, pre-post inferential statistics were obtained using paired sample t-tests.

Within-group comparisons were then calculated using an independent sample t-test. Finally, the association among variables was assessed using the Pearson correlation. The level of significance was set to a p-value less than or equal to 0.05.

Results

A total of 10 healthy adolescents five male and five female were recruited for the study. The male participants' mean age was 13.8 ± 2.59 years, whereas the female participants' mean age was 13.60 ± 1.95 years.

The BMI was slightly higher for male participants than for females. Table 1 presents the detailed descriptive analysis.

Variables	Male	Female	Total
Subjects	5 (50%)	5 (50%)	10
Age (years)	13.80 ± 2.59	13.60 ± 1.95	13.70 ± 2.16
BMI	23.10 ± 6.60	22.28 ± 29.77	22.72 ± 6.18

Table 1. Descriptive analysis.

The pre and post intervention data were compared using a paired sample t-test. The results revealed statistically significant differences in the STS (p=0.027), 6-minute walk test (p=<0.001), and Timed-Up-And-Go (TUG) test (p=0.006) scores, indicating improvement in the adolescents' functional performances in Table 2.

Parameters	Pre-Intervention	Post-Intervention	t-value	P-value
Weight	58.10 ± 24.12	57.05 ± 23.57	1.798	0.106
BMI	22.72 ± 6.18	22.31 ± 6.11	1.804	0.105
Sit-to-stand	25.60 ± 4.12	29.40 ± 7.37	-2.646	0.027*
6MWT	503.37 ± 43.35	549.91 ± 55	-7.418	<0.001*
Timed-up-and-go	7.56 ± 0.86	6.68 ± 0.58	3.541	0.006*

Table 2. Paired sample t-test results.*: Statistically significant differences.

This study used three tests to measure the adolescents' functional performance: The STS, 6MWT, and TUG tests. The tests' post-intervention scores were correlated using Pearson's correlation. The results showed a significant statistical correlation between the tests of functional performance, suggestive of a healthy ability for these tests to assess the functional performance of adolescents in Table 3.

Pearson's correlation	Pre-intervention		Post-intervention	
	R-value	P-value	R-value	P-value
STS with 6MWT	0.532	0.114	0.684	0.029*

STS with TUG	-0.524	0.12	-0.664	-0.036*
6MWT with TUG	-0.609	0.061	-0.678	0.031*

Table 3. Pearson's correlation between pre-intervention scores of STS, 6MWT and TUG. *: Statistically significant differences.

Moreover, no statistically significant difference was observed in the test scores between genders, indicating comparable results of intervention for both male and female participants Table 4.

Parameters		Male	Female	t-value	P-value*
Weight	Pre	59.98 ± 29.77	56.22 ± 20.35	0.233	0.822
	Post	58.74 ± 29.27	55.36 ± 19.64	0.214	0.836
BMI	Pre	23.16 ± 6.60	22.28 ± 6.47	0.213	0.837
	Post	22.64 ± 6.68	21.98 ± 6.26	0.161	0.876
TUG	Pre	7.32 ± 0.83	7.79 ± 0.91	-0.832	0.43
	Post	6.80 ± 0.55	6.55 ± 0.65	0.655	0.531
Sit–Stand 1 m	Pre	24.20 ± 4.76	27.00 ± 3.24	-1.087	0.309
	Post	28.60 ± 10.38	30.20 ± 3.56	-0.326	0.753
6MWT_total distance	Pre	508.11 ± 41.63	498.63 ± 49.38	0.328	0.751
	Post	558.37 ± 47.74	541.45 ± 65.95	0.465	0.655

Table 4. Differences in scores between genders. *: Statistically significant differences.

Figure 1 represents the differences in the participants' pre and post scores graphically. A positive correlation was observed between the pre and post sit–stand test at 1 min with a correlation value of 0.834 (p-value=0.003). The STS test at 1 min pre-exercise is negatively correlated with TUG post-exercise, which was found to be statistically significant with a p-value of -0.035. The 6MWT total distance post-test and 6MWT total distance post-test were positively correlated with STS 1 m post-exercise, with correlation values of 0.695 and 0.684, respectively. Strong positive correlation between pre and post 6MWT total distance was also observed (Figure 2).

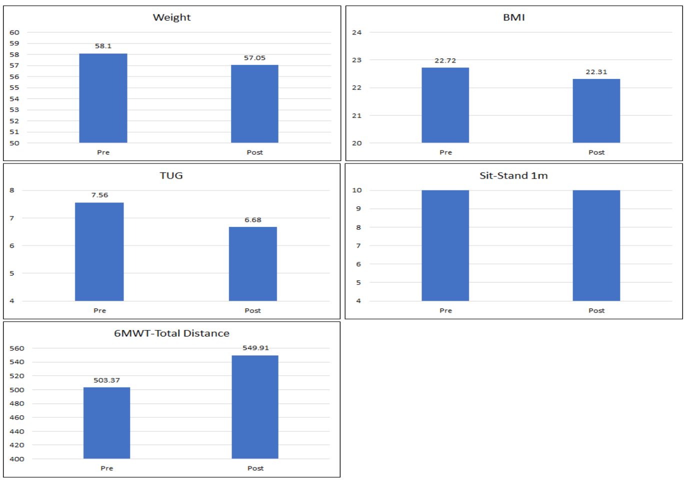

Figure 1. Graphical representation of pre and post intervention scores.

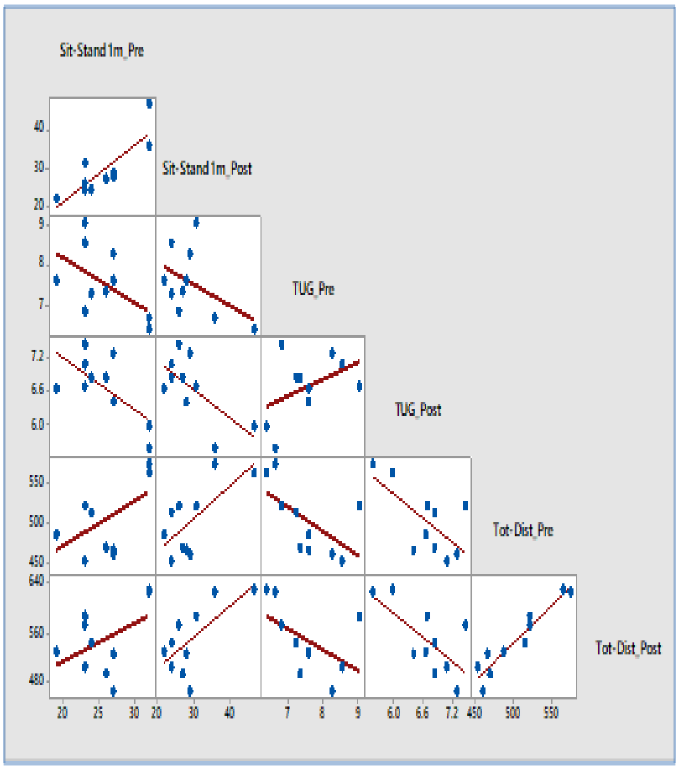

Figure 2. Scatter plots for relationship between STS, 6MWT and TUG tests.

Analysis of the SEQ-C scores revealed a statistically significant (p=0.005 improvement in self-efficacy in the cumulated scores, with the most significant changes observed in Q1_1 (p=0.015), Q1_2 (p=0.016), Q1_3 (p=0.021), Q1_5 (p=0.010), and Q1_8 (p=0.020) (Table 5). These results reveal a positive impact on adolescents' emotional self-efficacy and thus emphasize the importance of physical activity in this population. Similarly, comparison of the Godin leisure-time exercise scores revealed marked improvement in strenuous and moderate physical activity (Table 6).

SEQ-C	Pre	Post	Mean difference	Z-value	P-value*
Q1_1	2.2 ± 0.9	3.3 ± 1.1	1.1	2.428	0.015*
Q1_2	2.2 ± 1.0	3.3 ± 0.9	1.1	2.414	0.016*
Q1_3	1.8 ± 0.8	2.7 ± 0.7	0.9	2.31	0.021*
Q1_4	2.9 ± 1.4	3.0 ± 0.5	0.1	0.289	0.773
Q1_5	1.9 ± 1.0	3.2 ± 0.6	1.3	2.565	0.010*
Q1_6	2.7 ± 0.9	3.3 ± 1.3	0.6	1.613	0.107
Q1_7	2.8 ± 1.1	3.3 ± 0.7	0.5	1.508	0.132
Q1_8	2.1 ± 1.1	3.3 ± 0.7	1.2	2.326	0.020*
Cumulated score SEQ-C	18.6 ± 5.4	24.9 ± 3.7	6.3	2.81	0.005*

Table 5. Pre and post intervention comparison of SEQ-C scores. *: Statistically significant differences.

Godin leisure-time	Pre	Post	Mean difference	Z-value	P-value*
Q2_1	1.4 ± 1.9	3.9 ± 2.2	2.5	2.53	0.011*
Q2_2	1.8 ± 1.5	3.3 ± 1.8	1.5	2.565	0.010*
Q2_3	3.6 ± 2.8	2.2 ± 2.0	-1.4	1.214	0.225
Cumulated score GLT	32.4 ± 22.0	58.2 ± 23.6	25.8	2.81	0.005*

Table 6. Pre and post intervention comparison of Godin leisure-time exercise scores. *: Statistically significant differences.

Discussion

Sedentary behavior is an emerging risk factor for compromised metabolic health and chronic diseases [26]. In recent decades, a dramatic increase in the sedentary behavior of adolescents has been reported to pose a public risk for both developed and developing countries [27]. After completion of 8-weeks of exercise intervention, statistically significant differences were noted in the scores of all three tests measuring functional performance (*i.e.,* the STS test, the 6MWT, and the TUG test), supporting the statement, "physical activity enhances functional capacity and functional performance in healthy adolescents." Each participant was subjected to one hour of exercise (light to vigorous intensity). Similar results were reported by another study that found that adolescents who achieve 60 minutes or more of moderate-to-vigorous-intensity physical activity on a daily basis exhibit healthier cardiorespiratory fitness level [28-31]. Thus, the improvement observed in the scores of the functional performance tests may be due to enhanced cardiorespiratory fitness. Moreover, the improved STS test, 6MWT, and TUG test scores signify positive effects on multiple components of physical fitness, such as muscular fitness, speed, and agility. This result is consistent with the literature, indicating that various types of physical exercise programs (considering or not considering diet intervention) effectively enhance cardiorespiratory fitness, muscular fitness, and speed [32,33].

This study used the timed STS test, 6MWT and TUG test to measure adolescents' functional performance. The post-intervention scores showed a statistically significant relationship between all these measures, which justifies the assumption that physical fitness influences all three of the activities performed during these tests. This correlation is consistent with the findings of previous studies that examined the relationship between the STS, 6MWT and TUG tests [34,35]. Hence, the results strengthen the assumption that the STS, 6MWT and TUG tests are consistent with one another with respect to functional performance assessment. However, the 6MWT is associated with certain barriers, such as the need for a long hallway, and the need for a second repeat test. Therefore, to obtain complementary information, the STS and TUG tests were also used in this study [36,37].

A statistically significant difference was observed in the cumulated scores of the self-efficacy questionnaire at the end of the 8-week exercise program. Oman and King suggested that a higher level of self-efficacy at the start of a home-based physical activity trial among middle-aged and older individuals predicted physical activity behavior two years later. Conversely, declines in physical activity and self-efficacy in elderly persons have been linked to being inactive [38,39]. This implies that physical activity and exercise may be beneficial in improving self-efficacy and confidence levels in adolescents. Improved self-efficacy is also a significant predictor of adherence and exercise compliance [40]. Hence, physical activity improves self-efficacy, which, in turn, enhances adherence to exercise as a fruitful return.

At the end of the program's 8 weeks, the participating adolescents had developed the habit of performing or participating in physical activities, as measured by the Godin leisure-time exercise questionnaire. The participants exhibited greater and more frequent involvement in moderate to strenuous activity than in light exercises. It is thus important to emphasize the effectiveness of exercise in motivating adolescents to develop the habit of engaging in physical activity. Considering the prevalence of sedentary behavior in adolescents across the world and the urgency of reducing the global insufficiency of physical activity, the WHO has endorsed a Global Action Plan on Physical Therapy (GAPPA) and agreed to a new target of a 15% relative reduction in insufficient physical activity among adolescents by 2030 [38].

Evidence of differences in physical activity levels between adolescent females and males has been reported, whereby females were found to be less active than males after the age of 13. Although controversial, our results indicated no significant difference between males and females in observed test scores, with both genders exhibiting comparable improvements in test scores, suggesting a lack of any gender bias.

In our study, the virtual exercise program positively affected adolescents' functional performance and follow-up to the program from both genders. Our findings are corroborated by a previous study, which reported that adolescents' adherence to aerobic and strengthening exercises through digital platforms has increased fourfold during the pandemic. Moreover, good guidance from the therapist was associated with greater adherence to the home-based exercise, which increased the individuals' self-motivation and self-efficacy. As this was a pilot study, the sample size was small and considering the participants' behavioral development during their adolescence, it is challenging to promote adherence to the exercise regime. Consequently, a similar study should be conducted with a larger sample size to better understand the relationship between leisure-time activities and improved functional performance scores. Although we did not compare the evidence-based home exercise program to the control group, it was found to have a positive effect on the young age group; however, it is recommended that future research tests this type of intervention with a larger and more diverse age group.

Conclusion

The need for physical activity among adolescents is among the most pressing needs of the current decades, particularly in light of recent advances and increased reliance on technology for entertainment during the pandemic. This study concludes that an 8-week exercise program at home may yield promising results, as it can improve functional performance in adolescents.

Author Contributions

Conceptualization: AA, AG, AK and OS; Methodology: AA, AG, AK and OS; Software: MA; Validation: MA; Formal analysis: SQ; Investigation: AA, AG, AK and OS; Data duration: AA, AG, AK and OS; Writing original draft preparation: AA; Writing review and editing: AG, AK, OS, and SQ; Visualization: SQ; Supervision: MA; Project administration: AA, AG, AK and OS; All authors have read and agreed to the published version of the manuscript.

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Conflict of Interest

The authors declare no conflict of interest.

References

1. Strong WB, Malina RM, Blimkie CJ, et al. Evidence based physical activity for school-age youth. J Pediatr 2005; 146(6): 732-7.
2. Kimm SY, Glynn NW, Kriska AM, et al. Decline in physical activity in black girls and white girls during adolescence. N Engl J Med 2002; 347(10): 709-15.
3. Tadiotto MC, Duncan M, Mota J, et al. Excess adiposity and low physical fitness hamper Supine-to-Stand test performance among sedentary adolescents. J de Pediatr (Rio J) 2021; 97(6): 658-4.
4. Machado-Rodrigues AM, Leite N, Coelho-e-Silva MJ, et al. Metabolic risk and television time in adolescent females. Int J Public Health 2015; 60(2): 157-65.
5. Connolly LJ, Scott S, Morencos CM, et al. Impact of a novel home-based exercise intervention on health indicators in inactive premenopausal women: a 12-week randomised controlled trial. Eur J Appl Physiol 2020; 120(4): 771-82.
6. Hammami A, Harrabi B, Mohr M, et al. Physical activity and coronavirus disease 2019 (COVID-19): specific recommendations for home-based physical training. Manag Sport Leis 2020.
7. Hofgaard J, Ermidis G, Mohr M. Effects of a 6-week Faroese chain dance programme on pos- tural balance, physical function, and health profile in elderly subjects: A pilot study. Bio Med Res Int 2019; 5392970.
8. Bull FC, Al-Ansari SS, Biddle S, et al. World Health Organization 2020 guidelines on physical activity and

sedentary behaviour. Br J Sports Med 2020; 54(24): 1451-62.

9. 2018 Physical activity guidelines advisory committee scientific report. US Department of Health and Human Services.
10. Guthold R, Stevens GA, Riley LM, et al. Global trends in insufficient physical activity among adolescents: A pooled analysis of 298 population-based surveys with 1.6 million participants. Lancet Child Adolesc Health 2020; 4(1): 23-35.
11. Menezes-Junior FJ, Jesus IC, Mota J, et al. Validation of equations to estimate the peak oxygen uptake in adolescents from 20 metres shuttle run test. J Sports Sci 2020; 38(22): 2588-96.
12. Arena R, Myers J, Williams MA, et al. Assessment of functional capacity in clinical and research settings: A scientific statement from the American heart association committee on exercise, rehabilitation, and prevention of the council on clinical cardiology and the council on cardiovascular nursing. Circulation 2007; 116(3): 329-43.
13. Noonan V, Dean E. Submaximal exercise testing: Clinical application and interpretation. Phys Ther 2000; 80(8): 782-807.
14. Harada ND, Chiu V, Stewart AL. Mobility-related function in older adults: Assessment with a 6-minute walk test. Arch Phys Med Rehabil 1999; 80(7): 837-41.
15. Bennell K, Dobson F, Hinman R. Measures of physical performance assessments: Self-Paced Walk Test (SPWT), Stair Climb Test (SCT), Six-Minute Walk Test (6MWT), Chair Stand Test (CST), Timed Up and Go (TUG), Sock Test, Lift and Carry Test (LCT), and Car Task. Arthritis Care Res (Hoboken) 2011; 63(11): S350-70.
16. Bandura A, Pastorelli C, Barbaranelli C, et al. Self-efficacy pathways to childhood depression. J Pers Soc Psychol. 1999; 76(2): 258-69.
17. Muris P. A brief questionnaire for measuring self-efficacy in youths. J Psychopathol Behav Assess 2001; 23: 145-9.
18. Habibi M, Tahmasian K, Ferrer-Wreder L. Self-efficacy in Persian adolescents: Psychometric properties of a Persian version of the Self-Efficacy Questionnaire for Children (SEQ-C). Int Perspect Psychol: Res Pract Consult 2014; 3(2): 95-105.
19. Bohannon RW, Bubela DJ, Magasi SR, et al. Sit-to-stand test: Performance and determinants across the age-span. Isokinet Exerc Sci 2010; 18(4): 235-40.
20. Haile S, Fühner T, Granacher U, et al. Reference values and validation of the 1-minute sit-to-stand test in healthy 5-16-year-old youth: A cross-sectional study. BMJ 2021; 11(5): e049143.
21. Mylius CF, Paap D, Takken T. Reference value for the 6-minute walk test in children and adolescents: A systematic review. Expert Rev Respir Med 2016; 10(12): 1335-1352.
22. Nicolini-Panisson R, Donadio M. Timed "Up and Go" test in children and adolescents. Rev Paul Pediatr 2013; 31(3): 377-83.
23. Tremblay MS, Colley RC, Saunders TJ, et al. Physiological and health implications of a sedentary lifestyle. Appl Physiol Nutr Metab 2010; 35(6): 725-40.
24. Plotnikoff RC, Gebel K, Lubans DR. Self-efficacy, physical activity, and sedentary behavior in adolescent girls: Testing mediating effects of the perceived school and home environment. J Phys Act Health 2014; 11(8): 1579-86.
25. Ruiz JR, Rizzo NS, Hurtig-Wennlof A, et al. Relations of total physical activity and intensity to fitness and fatness in children: The European youth heart study. Am J Clin Nutr 2006; 84(2): 299-303.
26. Hussey J, Bell C, Bennett K, et al. Relationship between the intensity of physical activity, inactivity, cardiorespiratory fitness and body composition in 7–10-year-old Dublin children. Br J Sports Med 2007; 41(5): 311-6.
27. Gutin B, Yin Z, Humphries MC, et al. Relations of moderate and vigorous physical activity to fitness and fatness in adolescents. Am J Clin Nutr 2005; 81(4): 746-50.
28. Ortega F, Ruiz J, Hurtig-Wennlöf A, et al. Physically active adolescents are more likely to have a healthier cardiovascular fitness level independently of their adiposity status. The european youth heart study. Rev Esp Cardiol 2008; 61(2): 123-9.
29. Faigenbaum AD, Loud RL, O'Connell J, et al. Effects of different resistance training protocols on upper-body strength and endurance development in children. J Strength Cond Res 2001; 15(4): 459-65.
30. Manios Y, Kafatos A, Mamalakis G. The effects of a health education intervention initiated at first grade over a 3 year period: Physical activity and fitness indices. Health Educ Res 1998; 13(4): 593-606.
31. Meriem M, Cherif J, Toujani S, et al. Sit-to-stand test and 6-min walking test correlation in patients with chronic obstructive pulmonary disease. Ann Thorac Med 2015; 10(4): 269-73.
32. Gruet M, Peyre-Tartaruga LA, Mely L, et al. The 1-minute sit-to-stand test in adults with cystic fibrosis: Correlations with cardiopulmonary exercise test, 6-minute walk test, and quadriceps strength. Respir Care 2016; 61(12): 1620-1628.
33. Reychler G, Cabillic M, Morales Mestre N, et al. Predictive model for the 1-minute sit-to-stand test in healthy children aged 6 to 12 years. Ann Phys Rehabil Med 2021; 64(2): 101-410.
34. Oman R, King A. Predicting the adoption and maintenance of exercise participation using self-efficacy and previous exercise participation rates. Am J Health Promot 1998; 12(3): 154-61.
35. Schwarzer R, Luszczynska A, Ziegelmann JP, et al. Social-cognitive predictors of physical exercise adherence: Three longitudinal studies in rehabilitation. Health Psychol 2008; 27(1S): S54-63.
36. Weiss D, O'Loughlin J, Platt R, et al. Five-year predictors of physical activity decline among adults in low-income communities: A prospective study. Int J Behav Nutr Phys Act 2007; 4(23): 4-2.

37. McAuley E, Blissmer B. Self-efficacy determinants and consequences of physical activity. Exerc Sport Sci Rev 2000; 28(2): 85-8.
38. Biddle SJ, Gorely T, Stensel DJ. Health-enhancing physical activity and sedentary behaviour in children and adolescents. J Sports Sci 2004; 22(8): 679-701.
39. Parker K, Uddin R, Ridgers N, et al. The use of digital platforms for adults and adolescents physical activity during the COVID-19 pandemic (our life at home): Survey study. J Med Internet Res 2021; 23(2): e23389.
40. Bachmann C, Oesch P, Bachmann S. Recommendations for improving adherence to home-based exercise: A systematic review. Phys Med Rehab Kuror 2018; 28: 20-31.

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