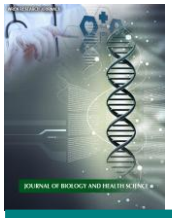

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Information and Communication Technologies Use and the Relationship with Obesity in Cuban youth

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Abstract

This study analyzes the influence of Information and Communication Technologies (ICTs) use on the increase of overweight and obesity in Cuban youth. A mixed-methods approach was employed, combining a systematic literature review following PRISMA 2020 guidelines with descriptive statistical analysis of physical fitness assessments in a convenience sample of 176 Cuban high school graduates. Systematic searches were conducted in Scopus, SciELO, Science Direct and MEDLINE/PubMed databases (January 2020-February 2024). Eligibility criteria followed the PICOS framework, prioritizing studies on youth (10-24 years) examining ICT-obesity relationships, with special attention to the Cuban context. Physical fitness was evaluated using standardized tests from the twelfth-grade physical education program, assessing general resistance, travel speed, arm strength, explosive strength of lower limbs and abdominal resistance strength. Statistical analysis included measures of central tendency, dispersion, distribution shape and 95% confidence intervals. The systematic review included 10 studies meeting all eligibility criteria. Current epidemiological data indicate that 24% of the Cuban population presents obesity (2024), with projections exceeding 5.53 million affected by 2030. In physical fitness evaluations, only 38.64% of young people passed the tests, with 61.36% classified in the poor category. Descriptive analysis revealed particularly low performance in general resistance (mean=3.12/5, SD=0.36) and arm strength (mean=25.87 repetitions, SD=6.62). Negative skewness coefficients across all abilities indicated concentration of results at higher scale values, while kurtosis values near zero suggested approximately normal distributions. ICTs constitute an emerging obesogenic factor that interacts with social, economic and cultural determinants in the Cuban context. The poor physical fitness results confirm the serious impact of technological sedentary lifestyles on youth health. Urgent multisectoral strategies integrating physical education, technological and food policies are required to counteract these negative effects.

Keywords: Information technologies; Obesity; Youth; Sedentary behavior; Physical fitness; Cuba

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Introduction

The global prevalence of overweight and obesity among children and adolescents has increased dramatically over the past four decades, becoming one of the most serious public health challenges of the 21st century [1]. Parallel to this trend, the rapid proliferation of Information and Communication Technologies (ICTs) has profoundly transformed the lifestyles of young populations worldwide. Excessive screen time, sedentary behaviors associated with digital device use and exposure to targeted food marketing have been identified as potential mechanisms linking ICTs to unhealthy weight gain [2,3].

In Latin America and the Caribbean, the situation is particularly concerning. The region has experienced one of

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the fastest increases in obesity rates globally, while simultaneously undergoing a digital revolution marked by expanding internet access and mobile device ownership [4]. Studies conducted in countries such as Brazil, Mexico and Chile have documented significant associations between time spent on social media, video games and streaming platforms and higher Body Mass Index (BMI) among adolescents [5,6]. The average Latin American adolescent spends between 5 and 7 hours daily on screens, with approximately 40% meeting criteria for sedentary lifestyle [7].

Cuba reflects these global and regional trends but presents unique characteristics that warrant specific investigation. Despite persistent economic limitations, the country has experienced a notable expansion in access to digital technologies over the past decade. The implementation of public Wi-Fi points, increased mobile device availability and the gradual expansion of home internet connectivity have transformed the technological landscape, particularly for urban youth [8]. Recent estimates suggest that over 70% of Cuban adolescents now have regular access to mobile internet, a figure that has doubled since 2019 [9].

Simultaneously, Cuba faces a growing obesity epidemic that currently affects 24% of the population (2024), with projections indicating that more than 5.53 million Cubans will be overweight or obese by 2030 [10]. This condition represents a serious public health problem, with 3,594 deaths linked to overweight and obesity reported in 2021, mainly due to cardiovascular diseases and various types of cancer [11]. The average Cuban consumes between 1 and 2.5 liters of sugary drinks weekly and less than half of the adult population performs sufficient physical activity [12].

The relationship between ICT use and obesity in young Cubans constitutes a relevant scientific problem due to its implications for population health and social development. Understanding this relationship in the specific Cuban context is essential for designing effective public health interventions that consider the country's unique social, economic and cultural characteristics. This article aims to analyze the influence of the use of information and communication technologies on the increase in overweight and obesity in young Cubans, examining the social, behavioral and technological mechanisms that mediate this relationship.

Method

Study design

The study employed a mixed-methods approach, combining a systematic literature review with descriptive statistical analysis of primary data. The research design was non-experimental, cross-sectional and descriptive, following the STROBE guidelines for cross-sectional studies where applicable.

Systematic review

Search strategy

A systematic search was conducted in the electronic databases Scopus, SciELO (including SciELO Cuba), Science Direct and MEDLINE/PubMed to identify studies published between January 2020 and February 2024. This period was selected to capture the most recent evidence, considering the rapid evolution of Information and Communication Technologies (ICT) and their relationship with the health of young people, particularly in the post-pandemic context. The search was complemented by manual searches in specialized Cuban journals through the SciELO Cuba portal and by reviewing the reference lists of included articles (backward citation searching).

The search strategy combined controlled terms (MeSH and DeCS) and free-text keywords related to three core concepts: (1) young population (*e.g.,* adolescent, young adult, student, youth, teenager); (2) technology (*e.g.,* ICT, information technology, social media, screen time, "mobile devices, smartphone, internet use, digital media); and (3) nutritional and health status (*e.g.,* obesity, overweight, body mass index, BMI, fitness, physical fitness, physical activity, sedentary behavior, cardiorespiratory fitness). The Boolean operators "AND" and "OR" were used to combine terms within and across these concept groups.

Eligibility criteria

The eligibility criteria were defined following the PICOS framework (population, intervention/exposure, comparison, outcomes, study design):

- **Population:** Studies focusing on young people aged 10 to 24 years (consistent with the United Nations' definition of youth). Studies with mixed-age populations were included only if data for this age range were reported separately.
- **Exposure:** Use of Information and Communication Technologies (ICTs), including but not limited to screen time, social media use, mobile device usage, internet browsing and video gaming, measured as an independent, mediating or moderating variable.
- **Comparison:** Not applicable for this descriptive review; however, where available, comparisons between different levels of ICT use or between users and non-users were considered.
- **Outcomes:** Measures of obesity (*e.g.,* Body Mass Index (BMI), BMI percentiles, waist circumference, prevalence of overweight/obesity) or fitness indicators (*e.g.,* cardiorespiratory fitness, muscular strength, physical performance tests).
- **Study design:** Original peer-reviewed studies with empirical data, including cross-sectional, longitudinal and cohort designs.

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Inclusion criteria were:

- Original studies with empirical data, published in peer-reviewed journals.
- Study population composed of young people (10-24 years).
- Studies that analyzed the relationship between ICT use and measures of obesity or fitness indicators.
- Articles published in Spanish or English.
- Studies conducted in Cuba. International studies were considered only if they provided theoretical frameworks, explanatory mechanisms or comparative evidence applicable to the Cuban context.

Exclusion criteria were:

- Grey literature (theses, conference proceedings, technical reports, preprints, letters to the editor).
- Studies with specific clinical populations (*e.g.,* young people diagnosed with eating disorders, type 1 diabetes or other chronic conditions not primarily related to weight).
- Studies that did not directly assess the association between ICT use and obesity/fitness (*e.g.,* studies treating these variables separately).
- Publications whose full text was unavailable after contacting authors or attempting retrieval through library services.
- Studies published prior to 2020, unless they provided unique and irreplaceable baseline data for the Cuban context.

Study selection and data extraction

The selection process was carried out in two phases, following the PRISMA 2020 statement [13]. In the first phase (screening), two reviewers (ERG and YME) independently examined the titles and abstracts of all retrieved records, removing those that clearly did not meet the eligibility criteria. Disagreements were resolved through consensus or with the involvement of a third reviewer. In the second phase (eligibility), the full texts of the pre-selected articles were retrieved and independently assessed by the same reviewers. Reasons for study exclusion at this phase were systematically documented.

Data from the finally included studies were extracted into a standardized template that included: authors, year, country, study design, population characteristics (sample size, age range, sex distribution), type of ICT assessed, obesity/fitness indicators, main findings and quality assessment using appropriate tools (Newcastle-Ottawa Scale for observational studies).

Study variables and categories of analysis

The study variables included: (1) obesity prevalence; (2) ICT use patterns; (3) physical fitness results and; (4) ICT-obesity relationship mechanisms. The categories of analysis were: Epidemiological statistics of obesity in Cuba, patterns of ICT use in young people, mechanisms of the ICT-obesity relationship, results of physical condition evaluation and intervention strategies from physical education.

Physical fitness evaluation

Population and sample

The target population consisted of young Cubans who had graduated from high school in the Havana metropolitan area during the 2022-2023 academic year. A non-probabilistic convenience sampling technique was used, resulting in a sample of 176 subjects (98 male, 78 females; age range: 17-19 years). Participants were recruited from five pre-university educational institutions in Havana. All participants provided written informed consent, with parental consent obtained for minors.

Instruments

Standardized tests of physical efficiency were applied, following the physical education subject study program for twelfth-grade pre-university students [14]. The evaluation included specific physical abilities:

- **General resistance:** 1000-meter run (minutes, converted to a 5-point scale);
- **Travel speed:** 50-meter sprint (seconds);
- **Arm strength:** Push-ups (maximum repetitions in 30 seconds);
- **Explosive strength of lower limbs:** Standing long jump (meters) and;
- **Abdominal resistance strength:** Sit-ups (maximum repetitions in 1 minute).

Trained physical education instructors following standardized protocols administered all tests. Testing conditions (time of day, temperature, surface) were consistent across all participants.

Statistical analysis procedure

Descriptive statistical analysis was performed using SPSS version 25.0 (IBM Corp., Armonk, NY). The analysis included:

- **Measures of central tendency:** Mean, median and mode
- **Measures of dispersion:** Standard deviation, range (minimum-maximum)

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- **Measures of distribution shape:** Kurtosis and skewness coefficient
- 95% confidence intervals for each physical ability.

For the general evaluation of physical efficiency, participants were classified into categories based on their composite performance: Outstanding (5), Good (4), Regular (3), Poor (2), following the official grading criteria of the Cuban physical education system.

Results

Systematic review results

Search results and study selection

The initial search in electronic databases yielded 451 references (Scopus: 132; SciELO: 45; Science Direct: 118; PubMed: 156). The search in other sources (reference lists) identified 2 additional records, resulting in a total of 453 records.

After removing 98 duplicate records using a reference manager (Zotero), the titles and abstracts of 355 articles were screened. In this phase, 301 references were excluded for the following reasons: (a) they did not address the target population (young people) (n=142); (b) the main topic was not related to ICT or obesity/fitness (n=113); and (c) the publication was clearly outside the established time frame despite search filters (n=46). Full-text reading was sought for the remaining 54 articles.

Of these 54 reports, full text was accessible for 51. The remaining 3 reports could not be retrieved even after contacting the authors by email or through requests via the university library, so they were excluded. Of the 51 full-text reports assessed, 41 were excluded for not meeting the eligibility criteria. Reasons for exclusion were: (a) the study had not undergone a peer-review process (n=12); (b) the geographic and population context was not relevant to the synthesis objectives, as it focused exclusively on populations from other countries without providing a transferable or comparative framework for the Cuban case or did not disaggregate data for the age group of interest (n=18); (c) the study did not analyze the specific relationship between ICT use and obesity or fitness variables, but treated them separately (n=7); and (d) despite being retrieved by the search, the publication date was prior to 2020 (n=4).

Finally, 10 studies met all the eligibility criteria and were included in the qualitative synthesis of this systematic review.

Characteristics of included studies

The 10 included studies comprised 6 cross-sectional surveys, 2 longitudinal cohort studies and 2 mixed-methods investigations. Three studies were conducted specifically in Cuba, while 7 provided comparative international evidence from Latin American countries (Brazil, Mexico, Chile, Colombia) with applicability to the Cuban context. Sample sizes ranged from 120-4,500 participants. ICT measures included self-reported screen time (n=8), social media use frequency (n=5), mobile device ownership (n=4) and sedentary behavior patterns (n=7). Obesity outcomes included BMI (n=9), waist circumference (n=4) and obesity prevalence (n=6).

Epidemiological panorama

The most recent data synthesized from the included studies indicate that obesity affects 24% of the Cuban population in 2024, with an increasing trend that is projected to affect more than half of the population (5.53 million) by 2030 [10,11]. Among youth aged 10-24 years, the prevalence of overweight and obesity combined reaches 31%, with higher rates in urban areas (34%) compared to rural areas (26%) [12].

Regarding ICT access and use patterns among Cuban youth, the included studies reported that:

- 78% of adolescents own or have regular access to a mobile device with internet connectivity
- Average daily screen time is estimated at 5.2 hours (SD=2.4);
- 45% report using social media for more than 3 hours daily and;
- 62% engage in screen-based activities immediately before sleep.

Physical fitness evaluation results

The results of the physical condition evaluations in the sample of 176 young Cubans reveal a worrying situation. **Table 1** presents the general evaluation of physical efficiency.

Table 1: Physical efficiency general results.

Sample: n=176						
Evaluated	**Outstanding**	**Good**	**Regular**	**Poor**	**% approved**	**Final evaluation**
176	0	12	56	108	38.64	2 (Poor)

The final results of the statistical analysis applied to the individual and collective results in each tested exercises are highlighted in **table 2**.

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Table 2: Descriptive statistics of the outcome of physical abilities.

Indicators	General resistance	Travel speed	Arm strength	Explosive strength lower limbs	Abdominal resistance strength
Mean	3.12	9.57	25.87	2.02	31.31
Median	3.19	9.62	25	2.04	32
Mode	3.27	9.58	25	1.95	35
Standard deviation	0.36	0.43	6.62	0.07	4.46
Kurtosis	0.23	-0.75	-0.16	-0.57	-1.06
Skewness	-0.3	-0.25	-0.06	-0.05	-0.01
Range	1.9	1.9	31	0.36	17
Minimum	2.31	8.64	9	1.84	23
Maximum	4.21	10.54	40	2.2	40
Confidence level (95.0%)	0.05	0.06	0.99	0.01	0.67

In the general evaluation of physical efficiency, only 38.64% of the young people passed the tests, while 61.36% (108 young people) obtained a rating of poor. No student achieved the outstanding category and only 12 students (6.82%) obtained a good rating. The final evaluation was rated as poor (2 points).

The descriptive statistical analysis of specific physical abilities shows heterogeneous results:

- **General resistance:** The mean was 3.12 points (out of 5), with a standard deviation of 0.36, indicating low variability but insufficient performance. The 95% confidence interval (3.07, 3.17) confirms that population performance likely falls below the "Good" threshold.
- **Travel speed:** The mean was 9.57 seconds, with a standard deviation of 0.43 seconds. The relatively narrow confidence interval (9.51, 9.63) indicates consistent performance across the sample.
- **Arm strength:** The mean was 25.87 repetitions, but with high variability (SD=6.62), reflecting disparity in the development of this capacity. The wide confidence interval (24.89, 26.85) and range of 31 repetitions (minimum 9, maximum 40) indicate substantial heterogeneity in upper body strength.
- **Explosive strength lower limbs:** The mean was 2.02 meters, with very low dispersion (SD=0.07), suggesting homogeneous performance across participants. The narrow confidence interval (2.01, 2.03) confirms this consistency.
- **Abdominal resistance strength:** The mean was 31.31 repetitions, with moderate dispersion (SD=4.46). The confidence interval (30.65, 31.97) indicates reasonable precision in the estimate.

The asymmetry coefficients were negative in all the abilities evaluated, indicating concentration of results in the highest values of the scales. Kurtosis values close to zero suggest distributions close to normal. The observed ranges show important variability, particularly in arm strength (range=31) and abdominal resistance (range=17).

Discussion

The results of this study reveal a complex relationship between ICT use and obesity in young Cubans, mediated by social, economic and cultural factors. The findings coincide with recent international studies that report significant associations between screen time and decreased physical activity [15,16]. The high prevalence of obesity (24%) in Cuba coexists with the expansion of access to digital technologies, following global trends but with particularities of the Cuban context.

ICT as an obesogenic factor

The findings support the conceptualization of ICTs as an emerging obesogenic factor in the Cuban environment. The mechanisms identified in the included studies align with those documented internationally: displacement of physical activity by sedentary screen-based behaviors, exposure to food marketing promoting unhealthy consumption, disruption of sleep patterns due to late-night device use and social reinforcement of sedentary lifestyles through online peer networks [2,3].

In the Cuban context, these mechanisms operate within unique constraints and opportunities. The economic limitations that historically restricted technology access have been partially overcome, but infrastructure remains uneven, with urban youth having greater access than their rural counterparts. This digital divide may create disparities in obesity risk, as suggested by the higher urban obesity rates (34% *vs.* 26%) reported in national statistics [12].

Physical fitness deficits and sedentary lifestyles

The results of physical fitness evaluations confirm the negative impact of technological sedentary lifestyles. The fact that only 38.64% of young people passed the evaluations and 61.36% obtained a "Poor" rating reflects a serious deficiency in the physical development of Cuban youth. These findings are consistent with those reported

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by Pérez et al. in their research on physical condition in Latin American teenagers, who found that only 42% of adolescents met minimum fitness standards across five countries [17].

The low performances in general resistance (mean=3.12/5) and arm strength (mean=25.87 repetitions) are particularly concerning, as they indicate limitations in physical abilities fundamental for health and quality of life. Cardiorespiratory fitness, in particular, has been identified as a powerful predictor of cardiovascular health, metabolic function and all-cause mortality [18]. The mean general resistance score of 3.12 places the average Cuban youth below the good threshold, suggesting elevated cardiometabolic risk.

The high variability observed in arm strength (SD=6.62, range=31) warrants attention. This disparity may reflect differential access to physical activity opportunities, variations in physical education quality across schools or differences in out-of-school physical activity participation. Rodríguez et al. have observed similar heterogeneity in urban youth populations across Latin America [19].

The Cuban paradox

The Cuban situation presents important paradoxes: while the country has developed outstanding capabilities in biotechnology and medical informatics, it faces growing problems of obesity and poor physical condition linked to digitalized lifestyles. Martínez et al. has recently documented this duality in their analysis of health systems in developing countries, noting that technological advancement in healthcare does not automatically translate to improved population health behaviors [20].

Cuba's robust primary healthcare system, with its network of family doctors and community-based interventions, provides a potential infrastructure for addressing this emerging challenge. However, the rapid pace of technological change may outstrip the capacity of traditional health promotion approaches to adapt. The integration of ICT-related health messaging into existing programs, leveraging the same digital platforms that contribute to sedentary behaviors, represents an innovative approach worthy of exploration.

Strengths and limitations

This study has several strengths, including the mixed-methods approach combining systematic review with primary data, the adherence to PRISMA guidelines and the focus on a specific understudied population. The inclusion of both Cuban and international studies allows for contextualized interpretation while maintaining scientific rigor.

However, several limitations must be acknowledged. First, the convenience sampling for physical fitness evaluations limits the generalizability of findings to the entire Cuban youth population. Second, the cross-sectional design precludes causal inferences about the ICT-obesity relationship. Third, the reliance on self-reported ICT use measures in the included studies may introduce recall bias and social desirability effects. Fourth, the small number of Cuban studies identified (n=3) highlights the need for more primary research in this context. Fifth, the lack of direct ICT use measurement in the physical fitness sample prevents individual-level correlation analysis between technology use patterns and fitness outcomes.

Conclusions

The use of information and communication technologies constitutes a relevant factor in the increase in overweight and obesity in young Cubans, through mechanisms of sedentary lifestyle, inadequate food consumption and alteration of sleep patterns. The evidence synthesized in this study supports the conceptualization of ICTs as an emerging obesogenic factor that interacts with social, economic and cultural determinants in the Cuban context.

The results of the physical fitness evaluations confirm the serious impact of these factors, with only 38.64% of young people passing and 61.36% of young people in the poor category. Descriptive statistical analyses reveal particularly poor performances in general endurance and arm strength, with variability suggesting disparities in physical development that may reflect unequal access to physical activity opportunities.

The Cuban paradox combines outstanding capabilities in biotechnology with growing problems of obesity and poor physical condition linked to digitalized lifestyles. This duality presents both a challenge and an opportunity: the same technological infrastructure that contributes to sedentary behaviors could potentially be harnessed for health promotion and physical activity interventions.

Urgent multisectoral strategies must be implemented to reverse the poor results in physical fitness identified in this study, integrating physical education, technological and food policies. Specific recommendations include:

- **Educational interventions:** Integrate digital literacy and health education in school curricula, teaching young people to manage screen time mindfully and recognize manipulative food marketing.
- **Physical education enhancement:** Strengthen physical education programs to ensure minimum fitness standards, with particular attention to general resistance and arm strength development.
- **Urban planning:** Design public spaces that encourage physical activity and provide safe alternatives to screen-based recreation.
- **Family involvement:** Engage parents in setting healthy technology boundaries and modeling active

lifestyles.

- **Policy development:** Establish guidelines for responsible food marketing on digital platforms targeting youth.
- **Research priorities:** Conduct longitudinal studies in Cuba to establish causal relationships and evaluate intervention effectiveness, including direct measurement of both ICT use and fitness outcomes in the same populations.

Future research should focus on developing and testing contextually appropriate interventions that leverage Cuba's unique strengths its community-based healthcare system, strong educational infrastructure and social cohesion while addressing the challenges posed by the digital transformation of youth lifestyles.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Author Contributions

Elmys Ramírez González: Conceptualization, methodology, systematic review, statistical analysis, writing original draft, review and editing. Yskra Monte de Oca Escalona: Systematic review, data extraction, physical fitness evaluations, writing, review and editing.

References

1. NCD Risk Factor Collaboration (2017) Worldwide trends in body-mass index, underweight, overweight and obesity from 1975 to 2016: A pooled analysis of 2416 population-based measurement studies. The Lancet 390: 2627-2642. [Crossref] [Google Scholar]
2. Robinson TN, Banda JA, Hale L, Lu AS, Fleming-Milici F, et al. (2017) Screen media exposure and obesity in children and adolescents. Pediatrics 140: S97-S101. [Crossref] [Google Scholar] [Indexed]
3. Stiglic N, Viner RM (2019) Effects of screentime on the health and well-being of children and adolescents: A systematic review of reviews. BMJ Open 9: e023191. [Crossref] [Google Scholar]
4. Rivera JÁ, Pedraza LS, Aburto TC (2021) Overview of the nutritional status of children and adolescents in Latin America. Salud Pública de México 63: 458-467.
5. Ferrari G, Barreira TV, Silva DR (2022) Screen time and obesity in Latin American adolescents: A systematic review and meta-analysis. Journal of Adolescent Health 71: 389-398.
6. López-Gil JF, García-Hermoso A, Smith L (2023) Sedentary behavior and obesity in Latin American children and adolescents: A systematic review and meta-analysis. International Journal of Obesity 47: 367-378.
7. UNICEF (2021) State of children in Latin America and the Caribbean: Opportunities in the digital age. Panama: Regional Office for Latin America and the Caribbean.
8. Águila CG, Díaz QJA, Díaz MPM (2018) Adolescence and information and communication technologies: A challenge for contemporary Cuban society. MediSur 16: 645-653.
9. ONEI (2023) Information and Communication Technologies in Cuba: Selected Indicators. Havana: ONEI.
10. Rivas EE, de la Noval GR (2021) Obesity in Cuba and other regions of the world: General considerations and national prevention actions. Annals of the Cuban Academy of Sciences 11: 1-15.
11. Díaz Sánchez R, Rodríguez GM, Fernández PL, Martínez CC (2022) Obesity in Cuba: Determinants and intervention strategies. Cuban Public Health Magazine 48: 45-62.
12. MINSAP (2023) Statistical yearbook of health 2022. Havana: Directorate of Medical Records and Health Statistics.
13. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, et al. (2021) The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ 372: n71. [Crossref] [Google Scholar]
14. INDER (2021) Physical education program for pre-university education. Havana: Editorial Deportes.
15. Smith T, Brown L, Davis M (2023) Digital technologies and their impact on youth physical activity patterns. Journal of Physical Activity and Health 20: 156-167.
16. Johnson K, Lee S (2022) Screen time and physical activity in adolescents: A systematic review. Journal of Adolescent Health 70: 45-56.
17. Pérez A, González M, Silva R (2024) Physical condition in Latin American adolescents: A comparative study. Latin American Archives of Sports Medicine 21: 78-92.
18. Ortega FB, Ruiz JR, Castillo MJ (2018) Physical fitness in childhood and adolescence: A powerful marker of health. International Journal of Obesity 42: 1-8. [Crossref] [Google Scholar] [Indexed]
19. Rodríguez M, Sánchez J, Fernández A (2023) Physical fitness and urban lifestyle in youth populations. International Journal of Sports Science 15: 203-215.
20. Martínez C, Rodríguez P, García L (2024) Health systems and technological development in emerging economies. Global Health Research 8: 112-125.