

## Discrepancies between objectively measured and self-perceived physical fitness across adolescent weight status categories

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### Abstract:

**Background:** Excess body weight in adolescents represents a significant public health concern because it increases the risk of developing cardiometabolic conditions in adulthood. In this context, physical fitness plays a crucial role, serving as a strong predictor of mortality and health complications associated with physical inactivity. **Objective:** To analyze differences between measured and self-perceived physical fitness in adolescents with and without excess body weight. **Methods:** A quantitative, descriptive, comparative, cross-sectional study was performed with a sample of 386 adolescents aged 12–18 years, including 51% females ( $n = 197$ ; mean age =  $14.88 \pm 1.67$  years) and 49% males ( $n = 189$ ; mean age =  $14.38 \pm 1.69$  years). Written informed consent was obtained from parents or legal guardians, and voluntary assent was provided by the participants. Students with disabilities or health conditions that limited participation were excluded. Instruments and measures included the Physical Activity Questionnaire for Adolescents (PAQ-A), the International Fitness Scale (IFIS), body mass index (BMI), waist-to-hip ratio (WHR), waist-to-height ratio (WHtR), body fat percentage (BF%), and the ALPHA-Fitness test battery. **Results:** The IFIS demonstrated good reliability (Cronbach's  $\alpha = 0.75$ ) and measurement validity (KMO = 0.754). Significant differences were observed in the discrepancy between measured and self-perceived physical fitness among adolescents with and without excess body weight for cardiorespiratory endurance, muscular strength, and speed, except for muscular strength in the male subgroup ( $U = 3921.00$ ,  $p = .224$ ). Discrepancies in cardiorespiratory endurance and speed were greater among females ( $p < .01$ ). The regression model was statistically significant,  $F(4, 381) = 50.31$ ,  $p < .001$ , explaining 34.6% of the variance in agility discrepancy ( $R^2 = .346$ ; adjusted  $R^2 = .339$ ). Among the predictors, the interaction between centered BMI and weight category was significant ( $B = -0.184$ ,  $t = -2.919$ ,  $p = .004$ ,  $\beta = -0.321$ ). **Conclusions:** This study provides evidence that adolescents with excess body weight—particularly females and those with higher BMI—tend to underestimate their actual physical fitness, exhibiting notable discrepancies in cardiorespiratory endurance, muscular strength, and speed. These findings highlight the need for preventive and educational strategies targeting adolescents at risk of sedentary behavior or excess body weight.

**Keywords:** body mass index, obesity, overweight, School Health Services, self-concept, sex factors

### Introduction

Adolescence is a period of intense biopsychosocial maturation (Escrivá et al., 2021). During this stage, lifestyle habits and health-related behaviors—both positive and negative—are established, exerting a decisive influence on health outcomes in adulthood (Ortega et al., 2008).

In Mexico, excess body weight among adolescents constitutes a major public health concern. It is estimated that 21.4% of adolescents aged 12–19 years are overweight and 16.7% are obese (Instituto Nacional de Salud Publica, 2023). In the state of Nuevo León, the combined prevalence of overweight and obesity in this age group reaches 47.3% (Instituto Nacional de Salud Publica, 2022). These figures are particularly alarming because excess body weight at early ages increases the likelihood of developing cardiometabolic risk factors during both adolescence and adulthood (Drozdz et al., 2017). In this context, studies by Ceballos Gurrola et al. (2020) have highlighted the importance of early physical fitness assessment for identifying adolescents at risk of poor health and reduced physical performance, especially in school and community settings.

In this context, physical fitness is a key factor because it strongly predicts mortality and comorbidities associated with physical inactivity (Palacios-Cartagena et al., 2022). Moreover, evidence indicates that physical

fitness levels tend to decline after adolescence (Joensuu et al., 2021), underscoring the importance of attaining adequate fitness during this developmental stage. Therefore, attaining high levels of physical fitness should be promoted from childhood and adolescence because low fitness levels in adulthood are associated with several chronic diseases and increased mortality. Moreover, high physical fitness during adolescence has been associated with a more favorable body composition and a healthier cardiometabolic profile in adulthood (García-Hermoso et al., 2022).

Physical fitness is a multidimensional construct encompassing cardiorespiratory endurance, muscular strength, flexibility, and body composition, and it is a key predictor of health outcomes and functional capacity (Ortega et al., 2008). Although objective measures provide reliable and valid data on these components, they do not capture adolescents' perceptions of their own abilities, which can influence motivation, participation, and long-term adherence to physical activity. Physical fitness can be assessed using laboratory-based tests, which are considered the most objective but require specialized equipment, trained personnel, and substantial financial resources. Alternatively, field-based tests offer a more feasible and cost-effective option, though they may require more time when assessing large groups. Complementarily, the assessment of self-perceived physical fitness represents a practical and accessible approach that can be completed in only a few minutes (Galán-Arroyo et al., 2023). In this regard, studies such as that by Palacios-Cartagena et al. (2022), performed with 1,229 Peruvian adolescents aged 12–17 years, have reported a positive correlation between physical activity levels and self-perceived physical fitness ( $r = 0.664$ ;  $p < 0.012$ ). Self-perceived physical fitness is closely associated with psychological and behavioral outcomes. Adolescents who perceive themselves as physically competent are more likely to engage in both structured and unstructured physical activities, which in turn promote healthier lifestyles and reduce risk factors for chronic diseases (Haible et al., 2020; Marsh et al., 2010). When self-perceptions do not align with objectively measured fitness, such discrepancies may lead to either underestimation or overestimation of physical capabilities, potentially resulting in reduced engagement or unrealistic expectations that undermine long-term participation in physical activity.

In this context, this study arises from the need to examine the relationship between objectively measured and self-perceived physical fitness in adolescents, taking into account the influence of excess body weight. The study is based on comparing objective physical fitness measures obtained through validated field-based tests with self-perceived fitness assessed using standardized instruments. This approach enables a clearer understanding of discrepancies between the two measures and provides valuable insights for the development of assessment strategies, interventions, and physical activity promotion programs in school and community settings. In practical settings such as schools and community programs, assessments that integrate both objective and subjective measures offer a more comprehensive understanding of adolescents' physical fitness profiles. For instance, combining objective field-based tests (e.g., endurance runs and strength assessments) with self-perception questionnaires enables practitioners to design interventions that not only improve physical capacity but also address psychological barriers to participation. This integrated approach supports the development of targeted physical education curricula and community-based activity programs that consider both measured ability and perceived competence, thereby improving effectiveness and long-term adherence.

Regional research further underscores the importance of considering adolescents' perceptions alongside objective measures of physical behavior. A study performed in a Mexican population highlighted the relationship between physical activity levels, self-perception of physical attributes, and health-related behaviors (Gutiérrez-Higuera et al., 2023), suggesting that adolescents' perceptions of their activity and physical condition can influence lifestyle choices. In addition, broader research on physical activity behaviors has consistently demonstrated associations between perception, self-efficacy, and activity levels, supporting the need for multidimensional evaluation approaches (Villarreal-Salazar et al., 2021).

In summary, understanding the discrepancy between objectively measured and self-perceived physical fitness is crucial because it informs the design of assessment strategies and guides interventions that promote sustained physical activity—particularly when tailored to adolescents' psychological and physical contexts. This dual perspective supports more effective physical education programs, preventive health initiatives, and community-based efforts aimed at reducing sedentary behavior and improving long-term health outcomes. Despite these advances, current knowledge regarding the agreement between objective and self-perceived physical fitness in adolescent populations remains limited, especially when considering differences in nutritional status. This gap is particularly relevant because adolescents with excess body weight may misperceive their physical abilities, potentially affecting their motivation, participation, and adherence to physical activity and sports. Accordingly, the aim of this study was to examine differences between actual and self-perceived physical fitness among adolescents with and without excess body weight.

## Materials and Methods

This study used a quantitative, descriptive, comparative, and cross-sectional non-experimental design, with data collected at a single point in time (Ato et al., 2013). In addition, a correlational, probabilistic, and predictive phase was incorporated to examine associations between variables.

### Participants

The study population consisted of secondary and high school students. A total of 386 adolescents aged 12–18 years participated, including 51% females ( $n = 197$ ; mean age =  $14.88 \pm 1.67$  years) and 49% males ( $n = 189$ ; mean age =  $14.38 \pm 1.69$  years). The sample size was calculated for an infinite population using the SurveyMonkey sample size calculator, assuming a 95% confidence level and a 5% margin of error. Data collection was performed in October 2024. Inclusion criteria were: (1) enrollment in one of the participating educational institutions and (2) being in the specified age range. Participation required written informed consent from parents or legal guardians and voluntary assent from the students. Exclusion criteria included: (1) students with disabilities limiting participation and (2) those with medical conditions or temporary injuries that prevented physical assessment.

### ***Instruments***

A sociodemographic questionnaire was administered to collect basic information on participants' personal and contextual characteristics, including age, sex, educational level, type of school, socioeconomic status, health system affiliation, housing type, household size, parents' marital status, and means of transportation to school, among other relevant variables (not all data are reported here). The questionnaire was completed on-site at the participating educational institutions under the direct supervision of the research team, ensuring standardized and reliable data collection. The Physical Activity Questionnaire for Adolescents (PAQ-A) (Kowalski et al., 1997) was used to assess self-reported physical activity levels over the previous seven days. The instrument comprises nine items, eight of which are used to calculate the final score on a five-point Likert scale, while the ninth item identifies potential health conditions or temporary limitations. The PAQ-A evaluates physical activity during leisure time, physical education classes, at different times of the day, and on weekends. Administration in the school setting typically requires approximately 10–15 minutes. The International Fitness Scale (IFIS) was used to assess self-perceived physical fitness. This self-administered instrument comprises five Likert-type items evaluating general fitness, cardiorespiratory fitness, muscular strength, speed–agility, and flexibility, with response options ranging from 1 (very poor) to 5 (very good). The IFIS has demonstrated adequate reliability and validity across diverse populations, with a Kappa coefficient of 0.70 reported in Spanish children (Sánchez-López et al., 2014) and a Cronbach's alpha of 0.80 in Colombian adolescents (Español-Moya & Ramírez-Vélez, 2014), supporting its internal consistency and cross-cultural applicability.

### ***Measurements***

Several anthropometric and body composition parameters were assessed. Body mass index (BMI) was calculated using the standard formula: weight in kilograms divided by height in meters squared. Waist-to-hip ratio (WHR) was obtained by dividing waist circumference by hip circumference, and waist-to-height ratio (WHtR) was determined by dividing waist circumference by height.

Body fat percentage (BF%) was estimated using the sex-specific equations proposed by Slaughter et al. (1988), which incorporate triceps and subscapular skinfolds. For girls,  $BF\% = 1.33 \times (\text{triceps} + \text{subscapular}) - 0.013 \times (\text{triceps} + \text{subscapular})^2 - 2.5$ ; for boys,  $BF\% = 1.21 \times (\text{triceps} + \text{subscapular}) - 0.008 \times (\text{triceps} + \text{subscapular})^2 - 1.7$ . Nutritional status was classified according to BMI-for-age percentiles provided by the Centers for Disease Control and Prevention (CDC, 2024). Participants were considered to have excess weight (overweight or obesity) if their BMI was at or above the 85th percentile, adjusted for age and sex.

### ***Physical fitness test***

Physical fitness was assessed using the ALPHA-Fitness test battery, which comprises both anthropometric and physical performance measures, including height, weight, BMI, waist circumference, handgrip strength, standing long jump, skinfold thickness, motor capacity, and cardiorespiratory fitness. All assessments were performed in appropriate, controlled settings using validated and calibrated instruments—such as scales, stadiometers, measuring tapes, dynamometers, and stopwatches—to ensure the validity, reliability, and reproducibility of the collected data. Handgrip strength (kg) was measured using a dynamometer, recording the best attempt from each hand (precision: 0.1 kg) following a maximal contraction of 3–5 s. Lower-limb muscular power (cm) was assessed via the standing long jump test, measuring the distance from the take-off line to the nearest heel mark (precision: 1 cm). Speed–agility (s) was evaluated using a short shuttle run on a non-slip surface, with results recorded in seconds to a precision of 0.1 s. Cardiorespiratory endurance (m) was assessed using the 20-m shuttle run test (Course Navette), recording either the last half-stage completed or, for greater precision, the final time in seconds (Ruiz et al., 2011).

### ***Procedures***

This study was performed in accordance with the principles of the Declaration of Helsinki (WMA, 2017), which establishes essential ethical standards for research involving human participants. All participants provided free, informed, and voluntary consent by signing an electronic informed consent form. The study also adhered to the Ethical Standards in Sport and Exercise Science Research (Harriss et al., 2019). The research was non-invasive and adhered to ethical criteria applicable to both quantitative and qualitative methodologies, with a social and scientific purpose aimed at promoting well-being, improving quality of life, and generating knowledge to address real-world issues. The informed consent process ensured voluntary and informed participation, aligning the research procedures with participants' values, interests, and preferences, in accordance with the principles of autonomy and individual responsibility (Miranda-Novales & Villasis-Keever, 2019).

After identifying the target population and selecting the data collection instruments, contact was made with principals and teachers from the participating secondary and high schools to inform them about the study objectives and invite their collaboration in disseminating the project to students. Once authorization was granted, parents were informed about their children's anonymous participation to ensure transparency. The questionnaires were then administered in person by the research team, with support from the physical education teachers at each institution.

### Statistical analysis

Data were compiled in Microsoft Excel and analyzed using SPSS version 27.0 (IBM Corp., Armonk, NY, USA). The internal consistency of the scales was assessed using Cronbach's alpha, and the Kaiser–Meyer–Olkin (KMO) test was applied to evaluate sampling adequacy. The Kolmogorov–Smirnov test with Lilliefors correction was used to assess the normality of data distribution.

Descriptive statistics were reported as measures of central tendency and dispersion, in accordance with the non-probabilistic distribution of the data. Given the non-normal distribution of some variables, the Mann–Whitney U test was used to identify differences in continuous variables between groups. The significance level was set at  $\alpha = 0.05$ . For additional analyses, a discrepancy variable was created by subtracting the objectively measured physical fitness score from the self-perceived fitness score, with negative values indicating underestimation and positive values indicating overestimation. A multiple linear regression analysis was then performed to examine the potential moderating effect of body composition variables, such as BMI. In this model, predictors included weight category (0 = normal weight/no excess weight; 1 = excess weight), centered BMI, and the interaction term between weight category and BMI. Biological sex (1 = male; 2 = female) and age were included as covariates. A significant interaction term was interpreted as evidence that BMI moderated the relationship between weight status and the discrepancy in physical fitness perception.

### Results

Data from 386 participants were analyzed, including 51% females ( $n = 197$ ; mean age =  $14.88 \pm 1.67$  years), of whom 47.71% had excess body weight. The remaining 49% were males ( $n = 189$ ; mean age =  $14.38 \pm 1.69$  years), with 42.86% presenting excess body weight. The IFIS demonstrated good reliability, with a Cronbach's alpha of 0.75, and its measurement validity was supported by a Kaiser–Meyer–Olkin (KMO) value of 0.754. Descriptive data for the female subsample, stratified by the presence or absence of excess body weight, are presented in Table 1.

**Table 1.** Descriptive characteristics of female adolescents stratified by excess body weight status

| Variable                            | Without excess weight ( $n = 103$ ) |            |           | With excess weight ( $n = 94$ ) |            |           | <i>p</i> |
|-------------------------------------|-------------------------------------|------------|-----------|---------------------------------|------------|-----------|----------|
|                                     | <i>M</i>                            | <i>Mdn</i> | <i>SD</i> | <i>M</i>                        | <i>Mdn</i> | <i>SD</i> |          |
| Age (years)                         | 14.93                               | 15.00      | 1.74      | 14.82                           | 15.00      | 1.59      |          |
| PAQ-A score                         | 2.30                                | 2.10       | 0.73      | 2.19                            | 2.30       | 0.44      |          |
| Weight (kg)                         | 49.78                               | 50.00      | 5.95      | 72.19                           | 68.50      | 16.40     | **       |
| Height (m)                          | 1.56                                | 1.57       | 0.05      | 1.57                            | 1.57       | 0.07      |          |
| BMI ( $\text{kg}/\text{m}^2$ )      | 20.37                               | 20.40      | 1.90      | 28.94                           | 27.60      | 4.89      | **       |
| BMI-CDC percentile                  | 54.49                               | 60.30      | 20.79     | 93.94                           | 95.06      | 4.09      | **       |
| Waist circumference (cm)            | 67.70                               | 68.00      | 4.18      | 84.81                           | 82.65      | 10.85     | **       |
| Hip circumference (cm)              | 89.18                               | 89.30      | 1.611     | 89.34                           | 89.00      | 3.325     |          |
| Waist-to-hip ratio                  | 0.76                                | 0.76       | 0.05      | 0.95                            | 0.92       | 0.14      | **       |
| Waist-to-height ratio               | 0.43                                | 0.43       | 0.03      | 0.54                            | 0.53       | 0.06      | **       |
| Body fat (%)                        | 26.41                               | 27.70      | 4.08      | 30.01                           | 30.90      | 2.27      | **       |
| IFIS1 – General fitness             | 3.12                                | 3.00       | 0.94      | 2.96                            | 3.00       | 0.76      |          |
| IFIS2 – Cardiorespiratory endurance | 2.93                                | 3.00       | 0.93      | 2.63                            | 2.00       | 0.93      | *        |
| IFIS3 – Muscular strength           | 2.84                                | 3.00       | 0.80      | 2.89                            | 3.00       | 0.75      |          |
| IFIS4 – Speed–agility               | 3.01                                | 3.00       | 0.83      | 2.82                            | 3.00       | 0.87      |          |
| IFIS5 – Flexibility                 | 2.79                                | 3.00       | 0.95      | 2.64                            | 3.00       | 0.90      |          |
| IFIS total score                    | 2.94                                | 3.00       | 0.68      | 2.79                            | 2.80       | 0.59      |          |
| Handgrip strength (kg)              | 23.22                               | 22.80      | 3.79      | 25.41                           | 25.40      | 4.94      | **       |
| Lower-limb power (cm)               | 124.09                              | 120.00     | 23.89     | 117.17                          | 119.00     | 20.57     |          |
| Speed–agility (s)                   | 14.01                               | 13.70      | 1.48      | 14.49                           | 14.40      | 1.43      | *        |
| Cardiorespiratory endurance (m)     | 465.53                              | 400.00     | 249.60    | 334.89                          | 300.00     | 186.93    | **       |
| ALPHA-Fitness score                 | 2.86                                | 2.90       | 0.56      | 1.90                            | 1.90       | 0.47      | **       |

*Note.* *M* = mean; *Mdn* = median; *SD* = standard deviation; PAQ-A = Physical Activity Questionnaire for Adolescents; BMI = Body mass index; CDC = Centers of Disease Control; IFIS = International Fitness Scale. *p* = Mann–Whitney U test significance. \* $p < .05$ ; \*\* $p < .01$ ;  $n = 197$

Descriptive data for the male subsample are presented in Table 2. Comparisons between males and females revealed sex-related differences for most variables, with the exceptions of BMI-CDC percentile, waist circumference, self-perceived general physical fitness, self-perceived cardiorespiratory endurance, and self-perceived muscular strength ( $p > .05$ ).

**Table 2.** Descriptive characteristics of male adolescents stratified by excess body weight status

| Variable                            | Without excess weight (n = 108) |        |        | With excess weight (n = 81) |        |        | p  |
|-------------------------------------|---------------------------------|--------|--------|-----------------------------|--------|--------|----|
|                                     | M                               | Mdn    | SD     | M                           | Mdn    | SD     |    |
| Age (years)                         | 14.50                           | 14.00  | 1.59   | 14.21                       | 14.00  | 1.81   |    |
| PAQ-A score                         | 2.76                            | 2.80   | 0.83   | 2.53                        | 2.50   | 0.67   | *  |
| Weight (kg)                         | 54.52                           | 53.50  | 8.61   | 72.53                       | 71.00  | 13.02  | ** |
| Height (m)                          | 1.65                            | 1.66   | 0.08   | 1.64                        | 1.65   | 0.10   |    |
| BMI (kg/m <sup>2</sup> )            | 19.86                           | 20.00  | 2.19   | 26.96                       | 26.10  | 3.45   | ** |
| BMI-CDC percentile                  | 52.21                           | 59.30  | 24.59  | 93.62                       | 95.16  | 4.29   | ** |
| Waist circumference (cm)            | 70.64                           | 70.00  | 5.95   | 85.35                       | 85.50  | 10.17  | ** |
| Hip circumference (cm)              | 77.48                           | 77.55  | 6.882  | 77.18                       | 78.10  | 8.161  | ** |
| Waist-to-hip ratio                  | 0.92                            | 0.93   | 0.09   | 1.12                        | 1.10   | 0.19   | ** |
| Waist-to-height ratio               | 0.43                            | 0.43   | 0.03   | 0.52                        | 0.52   | 0.06   | ** |
| Body fat (%)                        | 19.25                           | 18.50  | 6.43   | 30.78                       | 32.20  | 6.91   | ** |
| IFIS1 – General fitness             | 3.29                            | 3.00   | 0.98   | 3.09                        | 3.00   | 0.90   |    |
| IFIS2 – Cardiorespiratory endurance | 3.05                            | 3.00   | 1.14   | 2.90                        | 3.00   | 0.98   |    |
| IFIS3 – Muscular strength           | 2.97                            | 3.00   | 0.92   | 2.99                        | 3.00   | 0.80   |    |
| IFIS4 – Speed–agility               | 3.32                            | 3.00   | 1.04   | 3.06                        | 3.00   | 0.89   |    |
| IFIS5 – Flexibility                 | 2.75                            | 3.00   | 0.98   | 2.74                        | 3.00   | 1.00   |    |
| IFIS total score                    | 3.08                            | 3.00   | 0.72   | 2.96                        | 3.00   | 0.55   |    |
| Handgrip strength (kg)              | 31.62                           | 32.45  | 8.48   | 33.10                       | 32.30  | 8.57   |    |
| Lower-limb power (cm).              | 163.76                          | 164.50 | 28.19  | 150.29                      | 152.00 | 27.99  | ** |
| Speed–agility (s)                   | 12.27                           | 12.10  | 1.24   | 12.93                       | 12.60  | 1.50   | ** |
| Cardiorespiratory endurance (m)     | 893.93                          | 790.00 | 788.50 | 611.80                      | 540.00 | 327.50 | ** |
| ALPHA-Fitness score                 | 3.17                            | 3.10   | 0.55   | 2.18                        | 2.10   | 0.60   | ** |

Note. M = mean; Mdn = median; SD = standard deviation; PAQ-A = Physical Activity Questionnaire for Adolescents; BMI = Body mass index; CDC = Centers of Disease Control; IFIS = International Fitness Scale. p = Mann–Whitney U test significance. \*p < .05; \*\*p < .01; n = 189

The Mann–Whitney U test revealed significant differences in the discrepancy between measured and self-perceived physical fitness among adolescents with and without excess body weight for cardiorespiratory endurance, muscular strength, and speed, except for muscular strength in the male subgroup ( $U = 3921.00$ ,  $p = .224$ ). Discrepancies in cardiorespiratory endurance and speed were greater among females (Table 3).

**Table 3.** Discrepancies between measured and self-perceived cardiorespiratory endurance, muscular strength, and speed

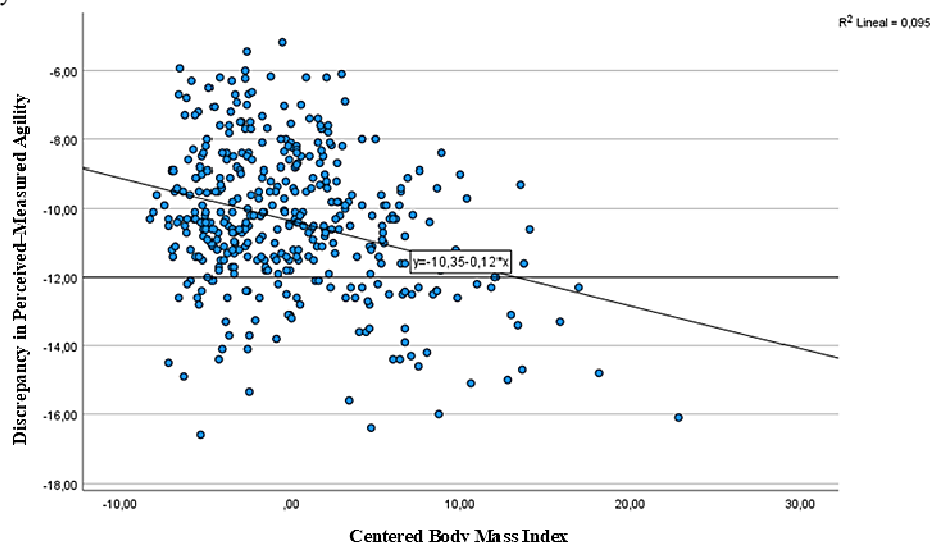
| Perceived value                     | Observed value                  | Females |       |       |         | p  | Males   |       |        |         | p  |
|-------------------------------------|---------------------------------|---------|-------|-------|---------|----|---------|-------|--------|---------|----|
|                                     |                                 | M       | Mdn   | SD    | U       |    | M       | Mdn   | SD     | U       |    |
| IFIS2 – Cardiorespiratory endurance | Cardiorespiratory endurance (m) | –400.41 | –336  | 230.6 | 3049.50 | ** | –770.03 | –656  | 647.25 | 2835.50 | ** |
| IFIS3 – Muscular strength           | Handgrip strength (kg)          | –21.39  | –21.1 | 4.57  | 3544.50 | ** | –29.28  | –29.1 | 8.37   | 3921.00 |    |
| IFIS4 – Speed–agility               | Speed–agility (s)               | –11.32  | –11.2 | 1.84  | 3768.50 | ** | –9.35   | –9.4  | 1.77   | 3182.00 | ** |

Note. M = mean; Mdn = median; SD = standard deviation; U = Mann–Whitney U test; IFIS = International Fitness Scale. \*\*p < .01

A multiple linear regression analysis was performed to examine whether BMI moderated the relationship between weight category (without vs. with excess body weight) and the discrepancy between perceived and measured agility, controlling for biological sex as a covariate. The model was statistically significant ( $F_{(4, 381)} = 50.31$ ,  $p < .001$ ) and accounted for 34.6% of the variance in agility discrepancy ( $R^2 = .346$ , adjusted  $R^2 = .339$ ).

Among the predictors, the interaction between centered BMI and weight category was significant ( $B = -0.184$ ,  $t = -2.919$ ,  $p = .004$ ,  $\beta = -0.321$ ), indicating that BMI moderated the relationship between weight category and agility discrepancy. Specifically, as BMI increased (Figure 1), adolescents with excess body weight showed a greater negative discrepancy, reflecting a stronger underestimation of their actual agility.

Biological sex was a significant predictor ( $B = -1.905$ ,  $t = -10.98$ ,  $p < .001$ ), with females exhibiting a significantly larger (more negative) discrepancy between perceived and measured agility than males. This indicates that female adolescents tend to underestimate their actual agility to a greater extent. In contrast, neither weight category ( $B = 0.112$ ,  $p = .701$ ) nor centered BMI ( $B = -0.015$ ,  $p = .785$ ) were significant predictors individually.



**Figure 1.** Relationship between weight status and the discrepancy between perceived and measured agility

## Discussion

The aim of this study was to examine differences between measured and self-perceived physical fitness in adolescents with and without excess body weight. The main findings reveal a significant discrepancy between perceived and objectively assessed fitness—particularly in cardiorespiratory endurance, muscular strength, and speed—with this gap being more pronounced among adolescents with excess weight, especially females and those with higher BMI. Additionally, moderation analysis indicates that higher BMI further amplifies the underestimation of agility in the overweight group.

These results are partially consistent with recent literature indicating that perceived physical fitness does not always accurately reflect objective condition. For example, a study of Slovenian adolescents found that physical self-concept—including perceptions of strength, endurance, and flexibility—correlated with objective fitness measures, though there was only partial overlap between psychological and physical dimensions (Cecić Erpič & Bezjak, 2021). Similarly, these findings demonstrate implicit associations between perception and reality, while also highlighting a systematic underestimation of fitness, particularly among adolescents with excess weight.

Evidence from health and well-being psychology indicates that a positive perception of physical activity or fitness is associated with fewer psychosomatic symptoms, even among adolescents with unhealthy lifestyles. In a large sample of 3,284 adolescents, poor perceived physical fitness was associated with greater somatic and psychological complaints, after controlling for age, gender, and BMI (Baceviciene et al., 2019). These findings highlight the importance of perceptual dimensions in adolescent health: while perception may not perfectly mirror objective reality, it can significantly influence psychological well-being. This study extends this literature by showing that perceptual discrepancies not only exist but also vary by weight status and sex, and are further moderated by BMI, offering an additional explanatory perspective on motor perception in adolescents with excess weight.

A noteworthy finding is that the negative discrepancy (i.e., underestimation) was largest for cardiorespiratory endurance, followed by speed and muscular strength, although the latter was not significant among males. This suggests that adolescents with excess weight may struggle to accurately estimate their performance in activities requiring sustained effort or high-speed movement, aligning with the notion that aerobic capacity and running performance are particularly difficult to self-assess.

Regarding gender differences, females showed greater negative discrepancies, reflecting a stronger underestimation of agility. This aligns with research on body image and physical self-concept, which indicates that adolescent girls tend to evaluate themselves more critically—potentially shaped by sociocultural norms related to aesthetics and gender, such as greater pressure for thinness. Such factors may bias self-perceptions toward more pessimistic evaluations.

The moderating role of BMI in the relationship between weight group and discrepancy suggests that a simple dichotomous classification (with vs. without excess weight) may be insufficient. Rather, a gradient effect is evident: as BMI increases, so does the underestimation of actual motor fitness. Similar findings were reported by Fernández-Bustos et al. (2015), who observed that higher body dissatisfaction and BMI were associated with poorer physical self-perceptions—particularly regarding attractiveness—and a more negative physical self-concept. These results indicate that educational or motivational interventions should account not only for categorical weight status but also for the degree of excess weight when designing perceptual feedback strategies.

These findings also highlight psychological and self-esteem barriers among adolescents with excess weight, who may internalize negative beliefs about their physical abilities shaped by prior experiences of failure, social comparison, or weight stigma. Such beliefs can result in pessimistic self-perceptions that do not align with actual performance (Westbury et al., 2023). Thus, these adolescents may accumulate fewer motor experiences because reduced engagement in physical activity or avoidance of intense exercise limits the sensory feedback needed to accurately gauge their capabilities. Some may underestimate their abilities as a defensive strategy—either to shield themselves from external expectations or owing to unfamiliarity with specific physical tasks, such as speed or endurance tests. Additional mechanisms, including heightened self-criticism among females and the internalization of aesthetic ideals, warrant further investigation in future studies.

Despite its contributions, this research has several limitations. The cross-sectional design precludes causal inference, leaving it unclear whether higher BMI leads to underestimation of physical fitness or whether biased self-perception affects physical activity behavior and subsequent weight gain. Additionally, the study did not include direct measures of self-esteem, physical self-efficacy, body dissatisfaction, or weight stigma, which could mediate the relationship between weight status and perceptual discrepancy.

Although the sample size was relatively large, generalizability is limited because participants may not reflect populations with diverse cultural, socioeconomic, or ethnic characteristics. The IFIS showed an acceptable Cronbach's alpha of .75, though not optimal; response variability may have introduced measurement error, potentially attenuating or distorting observed discrepancies. While multiple fitness domains were assessed (handgrip strength, power, speed, endurance), future research should also consider additional dimensions, such as motor coordination and balance. Finally, self-report bias related to social desirability cannot be ruled out.

To advance this field, longitudinal research should examine how perception–reality discrepancies evolve over time and whether they predict changes in body composition, physical activity, motivation, or mental health. Future studies should also incorporate psychological and sociocultural factors—including self-esteem, motor self-efficacy, body dissatisfaction, internalization of aesthetic ideals, weight stigma, and social support—to model the mediating and moderating mechanisms underlying these discrepancies. Interventions could provide adolescents with guided feedback comparing perceived and actual physical fitness to assess whether improving perceptual accuracy enhances motivation and adherence to physical activity. Finally, replication across diverse cultural, socioeconomic, and geographic contexts is necessary to determine whether discrepancy patterns and their correlates are consistent. Integrating objective and subjective measures in predictive models of exercise adherence, weight change, or metabolic health is a promising direction for future research.

## Conclusions

In summary, this study provides evidence that adolescents with excess body weight—especially females and those with higher BMI—tend to underestimate their actual physical fitness, with notable discrepancies observed in cardiorespiratory endurance, muscular strength, and speed. The moderating effect of BMI suggests that a simple classification based only on the presence or absence of excess weight is insufficient; instead, the magnitude of perceptual bias is influenced by the degree of excess weight. Overall, adolescents with overweight or obesity consistently underestimated their cardiorespiratory endurance, speed, and, in some cases, muscular strength, with this underestimation being more pronounced among females. These findings show that self-perceptions of physical fitness do not always align with objective performance, particularly in adolescents with higher BMI.

This negative perceptual bias may serve as a cognitive barrier to motivation for engaging in regular or vigorous physical activity. Adolescents who underestimate their abilities may avoid activities they are actually capable of performing and enjoying. Therefore, school- and health-based interventions should target not only improvements in physical fitness but also the enhancement of motor self-perception, providing objective feedback and strategies to foster more accurate self-assessment.

Understanding these discrepancies has important implications for practice and policy. First, it highlights the need for integrated assessment strategies that combine objective measures with self-perception instruments, allowing educators, coaches, and health professionals to identify both physical and psychological barriers to participation. Second, the findings suggest that interventions should be tailored to address sex-specific and weight-related differences, promoting accurate self-perception, self-efficacy, and sustained motivation to engage in physical activity.

Additionally, this study offers guidance for the design of school- and community-based physical activity programs that aim not only to improve objective fitness but also to enhance adolescents' confidence in

their abilities. Addressing perceptual gaps may increase participation, adherence, and long-term maintenance of healthy lifestyles, ultimately helping to prevent sedentary behaviors and reduce cardiometabolic risk.

The findings also underscore the importance of considering BMI as a moderating factor in the relationship between perceived and actual fitness. Future research should examine longitudinal trajectories of these discrepancies and evaluate interventions aimed at aligning self-perception with objective fitness outcomes, particularly among adolescents with excess weight. In conclusion, bridging the gap between perceived and measured physical fitness is critical for developing effective physical education strategies and public health initiatives that promote adolescent health and well-being.

**Conflicts of interest** The authors declare no conflict of interest.

**Declaration of generative AI and AI-assisted technologies in the writing process.** During the preparation of this work the authors used ChatGPT with Advanced Data Analysis in order to configure the statistical analyzes and carry out the translation into English prior to review by the translation expert. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the content of the publication.

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