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A Longitudinal Evaluation of Physical Activity in Brazilian Adolescents: Tracking, Change and Predictors

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Abstract

This study aimed to: 1) describe the change in leisure-time physical activity (LTPA) during early-to-mid adolescence; 2) analyze the tracking of LTPA; 3) identify the predictors of LTPA change. 4,120 adolescents were from 11 to 15 years old. Outcome was self-reported LTPA (min/wk). Boys increased their LTPA level over the four years (mean: 75 min/wk; 95%CI: 49,100), whereas a decrease was observed among girls (mean: −42 min/wk; 95%CI: −57,−28). Likelihood to be active at 15 years of age was 50% higher (95%CI: 39–62) among those who were active at 11 years. The main predictor of LTPA change was the number of physical activities performed at baseline. Regular physical activity early in life can predict this behavior afterward.

Physical inactivity has been identified as one of the main public health problems of the 21st century (6). The health benefits of physical activity (PA) are widely demonstrated in the scientific literature (25). Among children and adolescents, there is strong evidence that regular PA improves body composition, cardiorespiratory and muscular fitness, bone health and metabolic health biomarkers (25). Moreover, youth PA can exert both direct and indirect positive effects on adult health (24) and may track from adolescence to adulthood (23), which suggests that PA promotion should start early in life (9).

Despite its health benefits, PA level tends to decline during the lifespan, particularly during adolescence (19,8). However, at present, there are no prospective data from developing countries or from Latin American countries concerning PA changes (8). Therefore, the aims of this study were: a) to describe the change in PA during the early-to-mid adolescence period; b) to analyze tracking of PA during this period; c) to identify the predictors, related to baseline PA, of its change throughout the follow-up.

Methods

A longitudinal prospective study was conducted among the 1993 Pelotas (Brazil) Birth Cohort Study participants. This cohort comprises all children born in Pelotas, a 340,000

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inhabitants city in Southern Brazil, in the year 1993. Subsets of the 5,249 subjects enrolled in this cohort were followed at ages 1, 3, 6 and 12 months, 4, 6, 9 and 12 years. In 2004, when they were on average 11 years (mean = 11.3; *SD* = 0.3), all participants were searched for a new follow-up, and 4,452 (87.5%) of the original cohort was traced. In 2008, when they were 14/15 years (referred hereafter as 15 years; mean = 14.7; *SD* = 0.3), all individuals were sought again, and 4,325 were followed (85.2%). Detailed information about the cohort methodology and past follow-ups are published elsewhere (27,28,2). The study protocol was approved by the Ethics Committee of the Federal University of Pelotas Medical School. All participants (adolescents and their mothers or guardians) signed a written informed consent.

Both data collection periods (in 2004 and 2008) lasted approximately eight months. The first one was carried out from July 2004 to March 2005; whereas the second was carried out from January to August 2008. The methodology employed in both surveys was basically the same. Data were collected by trained interviewers through face-to-face home interviews. One questionnaire was administered to mothers (or guardian) and another, with different questions, to the adolescent. For quality control purposes, 30% of the interviews were reapplied (10% in person and 20% by phone call), through a short questionnaire, by two study supervisors. All questionnaires were reviewed by the study supervisors, once they were completed.

The outcome of interest in this study was leisure-time physical activity (LTPA). This variable was self-reported and assessed by a questionnaire that included 13 physical activities (most common in Brazilian adolescents), with moderate-to-vigorous intensity. A very similar version of this instrument, with nine of the 13 physical activities inquired in the current study, has demonstrated fair reliability (rho = 0.62) and validity (kappa = 0.58) compared with pedometer measurements (3). For each PA, the adolescent was queried if he or she had engaged in physical activities in the week before the interview (last seven days), and, if so, how many days per week (d/wk) and for how long (minutes per day—min/d). A similar version of the instrument was administered on both waves. The only difference was the replacement of two physical activities more common in the childhood (outside games) by activities that are more common in the midadolescence (walking for recreation and weight lifting). In addition, the interviewer asked if the adolescent engaged in physical activities that were not specifically included in the instrument. The questionnaire did not include assessment of participation in physical education classes, although other sort of organized activities performed in the school setting could be mentioned. A score in minutes per week (min/wk) was derived for each kind of LTPA, multiplying its duration (min/d) by its frequency (d/wk). Further, an overall score of LTPA in min/wk was generated by the sum of all single scores.

To investigate if PA patterns at 11 years could predict the LTPA change from 11 to 15 years, characteristics associated with leisure-time physical activities were examined, such as the type of PA performed (individual, team sports or both); the number of physical activities they were engaged in; engagement in any LTPA; and LTPA divided into quartiles. The participation in any organized sport (school, outside school or both); active commuting to or from school; and self-perception of own PA level in comparison with friends (more active, less active or the same) at 11 years were also assessed and analyzed as possible predictors of LTPA change.

The variables considered as possible confounders for the tracking and predictors analyses were socioeconomic level, sexual maturation, and seasonality. Socioeconomic level was evaluated by an assets index, generated from a principal component analyses of a series of domestic goods and characteristics of the residence (2). Sexual maturation was obtained

through Tanner's pubertal stages (21). And seasonality was appraised considering the season the interview was undertaken.

Statistical Analyses

The data were double entered by two data-entry clerks, and analyzed using Stata software version 10.0 (*StataCorp, College Station, TX, USA*). Descriptive analyses for each type of PA, as well as for overall LTPA measure, were done both for 11 and 15 years of age. These included the percentage of engagement in each PA, mean frequency (d/wk), median duration (min/wk) along with its interquartile range (percentile 25 and percentile 75), and the proportion of time spent on each LTPA among those who were engaged in any kind of LTPA. To compare if the proportion of time spent on each LTPA was different between both surveys, the Wilcoxon sign-ranked test was used.

Several approaches were used to perform the tracking analyses, considering the percentage of engagement in each LTPA; participation in individual activities and team activities; engagement in any LTPA and attainment of 300 min/wk LTPA threshold. This cut-off point was chosen based on the current recommendations regarding PA for school-aged children and adolescents (20,25). The analytical approaches consisted of agreement by Kappa coefficients, predictive negative and positive values (PNV and PPV, respectively) and the relative risk (RR) along with its 95% confidence interval (95%CI) to examine the agreement and the chance to practice a given activity at 15 years of age, conditioned to this practice at 11 years of age.

The analyses of the predictors of LTPA change (min/wk) from 11 to 15 years were conducted by multiple linear regression, including in the model the outcome (LTPA change), each examined predictor (PA characteristics at 11 years), with adjustment for baseline LTPA (min/wk) and follow-up duration (in months). This approach was considered to minimize the potential for regression-to-the-mean, as well as to take into account the time being followed, that could vary for each individual. Then, the adjusted mean change (min/wk) for each predictor was reported.

Spearman correlation coefficients (rho) were calculated to compare LTPA level (min/wk) at 11 and 15 years. To evaluate if there was a significant change in the LTPA level (min/wk), and in the number of leisure-time physical activities performed between 11 and 15 years, Wilcoxon sign-ranked test was administered. For LTPA score (min/wk), median and interquartile range (25th and 75th percentile) were preferred rather than mean and standard deviation (*SD*) due to its asymmetric distribution. However, the LTPA change presented a near-normal distribution, and means are reported along with its 95%CI. All analyses were stratified by gender, and the tests were two-sided with statistical significance level of 5% ($p < .05$).

Results

Overall, 4,120 adolescents provided complete information about LTPA for both waves, corresponding to 93% of those who were interviewed at baseline (2004). Of those, 51% were females, 66% were white, and the mean scholar level was 6.4 years ($SD = 1.8$). There was no difference in terms of baseline PA level (min/wk) between those who were interviewed in both waves and those who were not found in the last wave, in 2008 ($n = 199$; $p = .98$). The average follow-up duration was 3.4 years ($SD = 0.2$), ranging from 2.8 to 4.0 years.

For the entire sample, no significant difference in LTPA was detected: mean (*SD*) at 11 years = 341 min/wk (471); mean at 15 years = 356 min/wk (499); $p = .73$. However, when

data were stratified by gender, the results were in opposite directions. Whereas boys increased their mean LTPA levels by 17% (from 436 min/wk at 11 years to 511 min/wk at 15 years; $p < .001$); girls decreased their mean LTPA level by 17% (from 249 min/wk to 207 min/wk; $p < .001$). The LTPA variability (interquartile range) decreased 35 min/wk in girls and increased 120 min/wk in boys. When we looked at those interviewed in the same season in both waves, the PA change was similar to that found for the overall sample. Nevertheless, boys who were interviewed in a season hotter than the baseline evaluation presented the higher increase. In the same way, girls who were interviewed in a season colder than the baseline evaluation presented the higher PA decline.

LTPA level (min/wk) at 11 and 15 years presented a weak correlation (rho = 0.22), that was similar among boys (rho = 0.16) and girls (rho = 0.14). Although among boys the prevalence of no LTPA remained the same (13%), the prevalence of those attaining the threshold of 300 min/wk increased from 48% at 11 years to 54% at 15 years. Among girls, the greatest difference was the increase in the prevalence of those engaged in no LTPA (from 24% at 11 years to 36% at 15 years).

When LTPA level was analyzed according to the 300 min/wk threshold, despite its similar prevalence at 11 and 15 years (37% versus 38%), a great shift of status in both genders can be seen in Figure 1. Although 48% of the inactive boys at baseline became active in the follow-up, 40% who were active became inactive. Among girls, the prevalence of those who became active was lower (21%), but 72% who were active at baseline became inactive by the end of follow-up. In terms of continuity, the tracking of physical inactive status (PNV) was high in girls (79%) and moderate in boys (52%), whereas the tracking of physical active (PPV) was moderate in boys (60%) and low in girls (28%).

The description of engagement in each PA, as well as the mean frequency (d/wk), median duration (min/wk) and percentage time spent on each activity among those who reported any LTPA are presented in Table 1 (boys) and Table 2 (girls). The most commonly reported LTPA among boys was soccer, in both surveys, and among girls was volleyball at 11 and walking at 15 years. Mean frequency was between 2 and 3 d/wk for most activities, and was similar in both waves. Median duration (min/wk) for each activity, in general, was higher at 15 years in comparison with the previous age. Nevertheless, the median number of leisure-time physical activities decreased significantly in both genders ($p < .01$). Among girls, the median number of leisure-time physical activities declined from two at 11 years to one at 15 years, and among boys the median remained the same, although the paired test had indicated a significant decline ($p < .01$).

The gender-stratified tracking analyses for each PA, as well as for their grouping in individual or team activities, and for LTPA (any and by the 300 min/wk threshold) are shown in Table 3. Overall, the agreement of LTPA and its subcomponents at 11 and 15 years of age was weak (highest kappa = 0.21). The predictive negative value (PNV), i.e., the probability of not being engaged in a given activity at both waves, was high (> 80%) for most single activities, with exception of soccer (boys) and volleyball (girls). This means that the likelihood of becoming engaged in a given activity from 11 to 15 years was very low. On the other hand, the predictive positive value (PPV), that is, the likelihood to maintain engagement in a given activity during the follow-up, was low (< 30%) for all activities, except soccer among boys.

Regarding the type of activities, the PPV of team activities in boys was higher than the PPV of individual activities (80% versus 53%). Among girls, the PPV of individual activities was higher than the PPV of team activities (55% versus 38%). The risk analyses were significant for all activities, except for athletics in girls (Table 3). This suggests that the likelihood to be

engaged in a given activity during the follow-up was higher among those who were already active at baseline, compared with those who were not. Although both were significant, the magnitude of RR for team activities was greater than the RR for individual activities, with no difference between boys and girls (Table 3).

When PA was dichotomized according to the 300 min/wk threshold, active boys at 11 years were 25% (95%CI: 15, 25) more likely to be active at 15 years in comparison with those who were inactive at baseline. A similar pattern was observed among girls, with a 33% higher likelihood (95%CI: 13, 57). These results were independent of socioeconomic level and seasonality of interview (data not shown).

The results of analyses for predictors of LTPA change (min/wk) are presented in Table 4. For the entire sample, only active commuting to school (yes/no) was not associated with LTPA change ($p = .90$). However, in the gender-stratified analyses, some differences were observed. The type of LTPA was not associated with LTPA change among boys, but was significantly associated with LTPA change among girls. Girls who were engaged in both individual and team activities did not decrease their LTPA level. No differences were observed between individual and team activities. The number of activities at 11 years had a direct and linear association with LTPA change.

Baseline LTPA engagement was not a predictor of LTPA change in boys, but presented a direct association in girls. Participation in organized sport activities at 11 years did not predict LTPA change. Self-perceived PA presented a direct association among both genders ($p < .01$). Boys who perceived themselves as less active than their peers showed the lowest increase in LTPA level; while girls who perceived themselves as more active than their peers had the lowest decrease (Table 4).

Discussion

To the best of our knowledge, this is the first study from a developing country to investigate the change and stability in PA among adolescents. In the current study, the median LTPA (min/wk) had, on average, a yearly decline of 5% in girls, but actually increased 5% in boys. A systematic review has shown that PA declines, on average, 7% per year (8). The decline we found among girls is consistent with the literature, including those studies that employed the same (or equivalent) measure to assess PA, similar age groups and follow-up duration (1,11,15,17,26). Only one study was found reporting an increase in the PA level among boys, although no differences were observed in girls (10). It is important to mention that those changes in LTPA level in the current study were independent of sexual maturation stage (data not-shown).

Nevertheless, even with that increase on PA level in boys during the follow-up, the level of PA at the end of the study (8.5 hr/wk at 15 years) was lower than that reported by some studies (1,11,16), but similar or higher than the level of other studies (7,15,17,18,26). Among girls, with exception of one study (18), all the other with similar PA measures reported a higher level of PA, either in the baseline or in the follow-up (1,7,11,14,17,26). We must also mention that the variability of PA among boys increased during follow-up, which could result in a polarization of the data.

In terms of PA prevalence, two studies using the criterion of 420 min/wk reported a decrease. In one, using self-reported measurement, the prevalence of PA declined from 83 to 59% in boys and from 66 to 58% in girls, from 13 to 15 years (26). In the other study, with PA measured by accelerometer, PA prevalence declined from 96% at 11 years to 27% at 15 years (15). If the same cut-off point were considered in the current study, prevalence of PA would remain stable from 11 to 15 years (28–30%, respectively) for the overall sample, but

would increase in boys (37% at 11 years to 43% at 15 years) and slightly decrease in girls (from 19% to 16%).

Such as observed in another study encompassing adolescents from 13 to 16 years (1), the PA decline, particularly among girls, was a function of the decline in the number of physical activities, rather than its frequency or duration. This finding was confirmed in the current study when the change in LTPA was stratified by the difference in the number of physical activities during the follow-up (more, less or the same). Among those participants who maintained or increased the number of physical activities, a significant increase in their LTPA level in min/wk was detected. Moreover, as shown in Tables 1 and 2, the weekly frequency (d/wk) was basically the same for all specific activities, and its duration (min/wk) was slightly higher at 15 years, among those who were engaged in any LTPA. This decline in the number of physical activities was also referred by another study that followed adolescents aged 15 years during three years (7), and found an average decrease in the median value from seven to three activities.

The tracking of LTPA presented low stability for continued participation in any type of PA (PPV), except outdoor soccer among boys. On the other hand, the probability of not being engaged in both waves (PNV) was high for almost all activities. Although the predictive value depends on the prevalence of estimate, these results are in agreement with those reported by a another study with adolescents from United States (1). When the physical activities were grouped into individual or team activities, the results were also consistent between the above mentioned study (1) and this one. Individual activities had similar PPV and PNV values (around 60%) for both genders, whereas team activities presented higher PNV among boys (74%) and higher PPV among girls (54%), compared with 44% and 38%, respectively, in the current study.

Another study employed the same procedures to analyze the stability and shifts in the PA level (Figure 1), but according the cut-off point of 3 hr/wk (180 min/wk; 18). Using the same threshold, while physical inactivity tracked less well in boys (41% in our study versus 60%), among girls it was basically the same (67% versus 62%), compared with that other study (18). However, the tracking of PA in boys was similar (73% versus 75%), but lower in girls (45% versus 69%). Kappa coefficient was also lower in comparison with the previously mentioned study (0.13 versus 0.30; 18).

With regard to the predictors of LTPA change, the most important among those analyzed in Table 4 was the number of physical activities, with a strong direct association. Another important predictor was PA self-perception compared with peers, which could be treated as a proxy of the PA level. No difference in the LTPA change was found according the involvement in individual or sports activities at baseline, although the profile was more favorable among those engaged in both types of LTPA. Baseline LTPA seemed to be more related to the LTPA trajectory among girls than among boys, while the active commuting to school did not present any association with LTPA change. Engagement in organized sports has been previously considered a poor predictor of later PA in adolescents (29,5), although the results are inconsistent with previous researches (13,22).

Some methodological aspects of this study should be addressed. First, physical activity was self-reported. However, another study with adolescents found similar results in the PA decline comparing questionnaire and accelerometer measurements (12). Second, physical education classes were not considered in the PA score. Nonetheless, another Brazilian study performed a simulation including physical education classes in the final score, and found that the prevalence of PA would have an increase of only 3.3 percentage points (3). Third, active commuting to school was collected but not included in the PA score due to its low

intensity. Nonetheless, if it was considered, the results would remain very similar (data not shown). PA at work or commuting to work was not considered because few adolescents had been working in the time of data collection. Finally, PA levels could be affected by the different periods of each wave, because of potential seasonal effects. However, despite the different months the fieldwork was carried out, both took a part of the Winter in South Hemisphere and the entire Summer, seasons when PA level uses to present the largest variation (4).

In conclusion, conversely to what has been reported in the literature, in this longitudinal study of children and adolescents, PA increased over a four year follow-up period among boys. Consistent with other studies, PA among girls decreased from early-to-mid adolescence (11–15 years old). That decline was largely due to the total number of physical activities in which girls participated, which was the main predictor of its change. Thus a reasonable recommendation is that engagement in a variety of leisure-time physical activities needs to be encouraged from childhood, because evidence shows that inactive children/adolescents are less likely to become active during adolescence. In addition to that, it is important to highlight that earlier PA may predict this behavior later in life.

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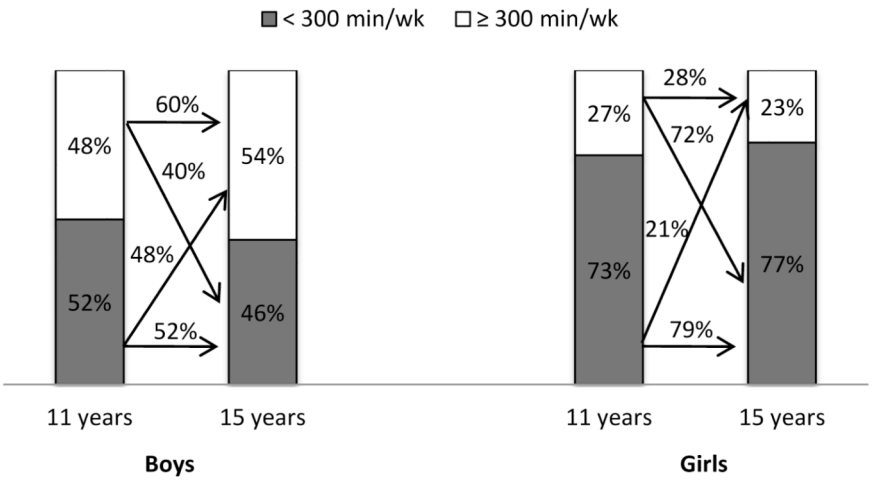

Figure 1.
Sex-stratified Leisure-Time Physical Activity Change From 11 to 15 Years, According to the 300 min/wk Threshold, in the 1993 Pelotas Birth Cohort, 2004–2008 (*N* = 4,120).

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Table 1

Description of Leisure-time Physical Activities Among Boys (*N* = 2,023) From the 1993 Pelotas (Brazil) Birth Cohort Study, 2004–2008

Physical activity	Engagement (%)	Mean frequency in d/wk (*SD*)	Median duration in min/wk (P25-P75)[a]	Proportion of time spent[b]
Outdoor soccer				*P* < .01*
11 y	65.7	3.1 (2.1)	180 (90–360)	42.9
15 y	61.8	3.1 (2.0)	240 (120–480)	47.1
Volleyball				*P* < .01
11 y	28.1	2.0 (1.4)	60 (30–120)	9.3
15 y	14.3	2.1 (1.4)	90 (60–180)	4.6
Indoor soccer				*P* < .01
11 y	14.7	2.1 (1.4)	120 (60–180)	6.3
15 y	23.1	1.9 (1.4)	90 (60–180)	9.3
Dance				*P* = .09
11 y	4.3	2.1 (1.6)	120 (60–190)	1.9
15 y	3.5	2.3 (1.9)	210 (120–360)	1.7
Basketball				*P* < .01
11 y	10.6	2.0 (1.5)	60 (30–120)	2.5
15 y	7.4	2.1 (1.6)	120 (60–180)	2.7
Athletics				*P* < .01
11 y	8.6	2.6 (2.0)	60 (30–120)	2.7
15 y	4.0	2.7 (1.9)	128 (60–300)	1.5
Martial arts				*P* < .01
11 y	6.7	1.9 (1.1)	120 (45–180)	2.3
15 y	4.3	2.7 (1.5)	180 (120–270)	2.2
Swimming				*P* = .04
11 y	3.7	2.3 (1.7)	120 (60–360)	2.0
15 y	4.6	2.8 (1.8)	180 (90–450)	2.3
Handball				*P* < .01
11 y	4.7	1.6 (0.9)	60 (30–120)	0.8
15 y	0.7	2.5 (2.1)	120 (60–245)	0.2
Gymnastic				*P* < .01
11 y	1.1	2.0 (0.7)	70 (45–180)	0.2
15 y	0.6	2.2 (1.2)	60 (30–150)	0.1
Tennis				*P* = .01
11 y	1.9	2.2 (1.7)	60 (45–120)	0.8
15 y	1.0	2.4 (2.0)	60 (60–240)	0.4
Other activity				*P* = .04
11 y	51.5	*c*	150 (60–360)	28.6
15 y	44.0	*c*	210 (90–480)	27.9
Any LTPA				
11 y	87.5	*c*	330 (150–630)	-
15 y	87.3	*c*	390 (180–810)	-

Abbreviations: LTPA, leisure-time physical activity.

[a] Only among those who were engaged in the respective activity.

[b] Among those who were engaged in some physical activity.

[c] Datum not available

[*] Wilcoxon sign ranked test.

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Table 2

Description of Leisure-time Physical Activities Among Girls (*N* = 2,097) From the 1993 Pelotas (Brazil) Birth Cohort Study, 2004–2008

Physical activity	Engagement (%)	Mean frequency in d/wk (*SD*)	Median duration in min/wk (P25-P75)[a]	Proportion of time spent[b]
Outdoor soccer				*P* = .68
11 y	20.1	2.2 (1.6)	60 (30–180)	10.3
15 y	14.1	2.0 (1.5)	120 (60–180)	11.0
Volleyball				*P* < .01
11 y	46.4	2.5 (1.7)	75 (30–180)	30.4
15 y	24.8	2.0 (1.2)	90 (60–180)	20.3
Indoor soccer				*P* < .01
11 y	2.6	1.6 (1.1)	80 (60–120)	1.5
15 y	3.8	1.8 (1.2)	90 (60–180)	2.4
Dance				*P* < .01
11 y	17.2	2.4 (1.8)	120 (60–210)	12.8
15 y	10.5	2.7 (1.9)	180 (120–300)	10.4
Basketball				*P* < .01
11 y	7.4	2.0 (1.3)	60 (30–95)	2.4
15 y	2.0	1.9 (1.1)	90 (45–120)	1.3
Athletics				*P* < .01
11 y	5.9	2.5 (2.0)	60 (30–180)	2.6
15 y	1.9	2.8 (1.8)	120 (60–180)	1.1
Martial arts				*P* < .01
11 y	2.8	2.4 (1.5)	165 (90–240)	1.8
15 y	0.8	2.1 (0.7)	120 (105–210)	0.7
Swimming				*P* = .05
11 y	1.9	2.9 (2.1)	210 (90–480)	1.4
15 y	2.2	2.9 (1.8)	180 (120–360)	2.4
Handball				*P* < .01
11 y	5.5	1.8 (0.9)	60 (30–120)	1.7
15 y	1.2	2.3 (1.4)	135 (60–180)	0.8
Gymnastic				*P* < .01
11 y	2.8	2.6 (1.8)	120 (60–240)	1.7
15 y	1.6	2.9 (1.8)	120 (45–150)	0.5
Tennis				*P* = .01
11 y	1.2	2.2 (1.7)	90 (30–210)	0.7
15 y	0.6	3.3 (2.0)	180 (120–210)	0.4
Other activity				*P* < .01
11 y	44.4	*c*	90 (40–210)	32.8
15 y	42.4	*c*	140 (60–270)	48.0
Any LTPA				
11 y	76.2	*c*	180 (90–420)	-
15 y	64.3	*c*	200 (90–420)	-

Abbreviations: LTPA, leisure-time physical activity.

[a] Only among those who were engaged in the respective activity.

[b] Among those who were engaged in some physical activity.

[c] Datum not available

[*] Wilcoxon sign ranked test.

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Table 3

Sex-stratified Tracking of Leisure-time Physical Activity (LTPA) From 11 to 15 Years, According to Different Analytical Approaches, in the 1993 Pelotas (Brazil) Birth Cohort Study, 2004–2008

Physical activity	Kappa	PNV (%)	PPV (%)	RR	95%CI
Outdoor soccer					
Boys	0.21	52.4	69.2	1.45	1.33, 1.58
Girls	0.09	87.6	27.7	1.67	1.33, 2.09
Volleyball					
Boys	0.09	87.7	19.6	1.60	1.29, 1.98
Girls	0.04	77.1	27.0	1.18	1.02, 1.37
Indoor soccer					
Boys	0.15	79.6	38.6	1.89	1.59, 2.23
Girls	0.09	96.5	14.8	4.29	2.17, 8.45
Dance					
Boys	0.13	97.0	14.8	4.95	2.82, 8.69
Girls	0.10	91.0	17.6	1.95	1.49, 2.55
Basketball					
Boys	0.14	93.9	18.5	3.03	2.17, 4.23
Girls	0.07	98.4	6.4	3.89	1.95, 7.76
Athletics					
Boys	0.06	96.3	8.0	2.19	1.26, 3.80
Girls	−0.01	98.0	1.6	0.82	0.20, 3.34
Martial arts					
Boys	0.06	96.1	10.2	2.62	1.52, 4.51
Girls	0.04	99.3	3.5	5.05	1.17, 21.7
Swimming					
Boys	0.08	96.1	21.3	5.42	3.33, 8.82
Girls	0.07	97.9	10.0	4.81	1.81, 12.8
Handball					
Boys	−0.01	99.2	0.0	-[a]	-[a]
Girls	0.05	99.0	4.4	4.33	1.66, 11.3
Gymnastic					
Boys	−0.01	99.4	0.0	-[a]	-[a]
Girls	0.05	98.5	5.0	3.42	1.07, 10.9
Tennis					
Boys	0.16	99.2	12.8	16.0	6.2, 41.4
Girls	0.15	99.5	12.0	25.0	7.3, 85.5
Other PA					
Boys	0.03	57.9	45.5	1.08	0.98, 1.19
Girls	0.08	61.2	46.6	1.20	1.10, 1.33
Individual activities					
Boys	0.05	51.7	53.1	1.10	1.01, 1.20
Girls	0.07	52.7	55.3	1.17	1.07, 1.28
Team activities					
Boys	0.18	44.4	77.9	1.37	1.25, 1.49
Girls	0.09	72.0	37.9	1.36	1.19, 1.45

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Physical activity	Kappa	PNV (%)	PPV (%)	RR	95%CI
Any LTPA					
Boys	0.12	23.5	88.9	1.16	1.08, 1.25
Girls	0.07	42.2	66.3	1.15	1.06, 1.25
LTPA[3] 300 min/wk					
Boys	0.12	51.8	60.1	1.25	1.15, 1.35
Girls	0.07	79.2	27.5	1.33	1.13, 1.57

Abbreviations: CI, confidence interval; PNV, predictive negative value; PPV, predictive positive value; RR, risk relative.

[a]Data not calculated because of the small numbers.

Table 4

Leisure-Time Physical Activity (LTPA) Change (min/wk) From 11 to 15 Years, According to Some Physical Activity Characteristics Assessed at 11 years, in the 1993 Pelotas (Brazil) Birth Cohort Study, 2004–2008

Physical activity characteristic at 11 y	N	All		Boys		Girls	
		Adjusted mean change (min/wk)[a]					
		Mean	95%CI	Mean	95%CI	Mean	95%CI
Type of LTPA	3,976	*P* < .01		*P* = .34		*P* = .01	
None	756	−61	−99, −24	12	(−64, 88)	−84	−115, −52
Individual	312	−30	−85, 25	84	−26, 195	−53	−99, −6
Team	1,804	24	1, 47	82	44, 120	−40	−62, −18
Both	1,104	70	39, 102	95	49, 141	1	−33, 36
Number of LTPA	4,119	*P* < .01*		*P* = .01*		*P* < .01*	
0	756	−63	−100, −25	5	−71, 80	−83	−115, −52
1	1,145	−11	−40, 18	56	4, 108	−58	−84, −31
2	975	32	1, 63	67	18, 117	−27	−58, 5
3	623	58	19, 98	104	43, 165	−7	−48, 34
4 or more	620	89	46, 132	130	66, 193	17	−30, 65
Any LTPA	4,119	*P* < .01		*P* = .09		*P* = .02	
No	756	−51	−88, −15	15	−60, 89	−76	−107, −45
Yes	3,363	30	13, 47	84	56, 111	−32	−48, −15
LTPA (quartiles)	4,120	*P* < .01*		*P* = .10*		*P* < .01*	
1	1,033	−55	−90, −21	47	−22, 116	−83	−112, −53
2	1,108	−29	−60, 2	23	−34, 80	−58	−86, −30
3	977	56	25, 87	101	51, 151	−12	−43, 19
4	1,002	96	52, 141	105	46, 165	31	−27, 88
Organized sports activities	4,116	*P* = .01		*P* = .33		*P* = .40	
None	2,986	4	−14, 22	61	30, 91	−46	−63, −29
School	474	−2	−47, 42	111	30, 192	−51	−91, −11
Outside school	567	73	33, 114	95	35, 155	−15	−61, 32
Both	89	103	0, 205	172	12, 332	18	−90, 125
Active commuting to school	4,099	*P* = .90		*P* = .57		*P* = .42	
No	966	14	−18, 45	89	35, 143	−52	−82, −23
Yes	3133	16	−2, 33	71	42, 100	−39	−55, −22
Self-perceived LTPA (compared with friends)	4,114	*P* < .01*		*P* < .01*		*P* < .01*	
Less	718	−44	−80, −8	−22	−89, 39	−83	−118, −48
Same	2,761	17	−1, 35	81	49, 112	−37	−54, −20
More	635	74	36, 113	151	90, 213	−14	−53, 24
Total	4,120	15	1, 30	75	49, 100	−42	−57, −28

Abbreviations: LTPA, leisure-time physical activity

[a] Adjusted for baseline LTPA (min/wk) and follow-up duration (months).

* *P*-value for linear trend.