The Influence of Body Acceptance on Physical Fitness of Schoolchildren

A Influência da Aceitação Corporal na Aptidão Física de Escolares

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Abstract

Several studies are investigating the association of body image in relation to health, however there are few papers investigating the influence of body image regarding physical fitness to health among schoolchildren. So the objective is to investigate the relationship between self-perception with body image and physical fitness to health. For the research, a total of 130 pre-pubertal children of both sexes in schools of São Paulo were assessed. A Children’s Figure Scale was used to evaluate body image, as well as a battery of tests in the standardization of American Alliance for Health, Physical Education (1980) for the determination of physical fitness related to health. The data were analyzed based on descriptive statistics and application of the Chi-square test and analysis of variance, using the statistical program SPSS, version 10.0. As a result 64.62% body dissatisfaction was registered with no significant difference between genders. There is influence of acceptance of the body on morphological and metabolic aspect among girls but not among boys. However, boys dissatisfied with their body image showed a difference only in the aspect of neuromotor abdominal strength resistance when compared to the group with body satisfaction. It can be concluded that there is a relationship between the levels of physical fitness with body image in pre-pubertal children, which is dependent on gender.

Keywords: body image; physical activity; children; body composition; health.

Resumo

Vários estudos vêm investigando a associação da imagem corporal em relação à saúde, porém são escassos trabalhos que investiguem a influência da imagem corporal em relação à aptidão física para saúde entre escolares. Sendo assim, objetiva-se investigar a relação entre auto-percepção com a imagem corporal e aptidão física para saúde. Para tanto, foram avaliados um total de 130 crianças pré-púberes de ambos os gêneros em escolas de São Paulo. Foi aplicada uma escala de figuras (Children’s Figure Scale) assim como uma bateria de testes segundo a padronização da American Alliance for Health, Physical Education (1980) para a determinação da aptidão física relacionada à saúde. Os dados foram analisados com base em estatística descritiva e aplicação do teste do qui-quadrado e análise de variância, usando o programa de estatística SPSS, versão 10.0. Como resultado, 64,62% de insatisfação corporal foi registrado sem diferença significativa entre gêneros. Existem influências de aceitação do corpo no aspecto morfológico e metabólico entre meninas, mas não entre meninos. No entanto, meninos insatisfeitos com a imagem do corpo mostraram uma diferença apenas no aspecto da resistência de força abdominal neuromotora quando comparados ao grupo com satisfação corporal. Pode-se concluir que há uma relação entre os níveis de aptidão física com imagem corporal em crianças pré-púberes, que depende de gênero.
Alliance for Health, Physical Education (1980) para determinação da aptidão física relacionada à saúde. Os dados obtidos foram interpretados através da estatística descritiva e aplicação do teste Quiquadrado e análise de variância utilizando o programa estatístico SPSS, versão 10.0. Foi verificada uma insatisfação corporal de 64,62% sem diferença significativa entre os gêneros. Existe influência da aceitação corporal sobre aspectos morfológicos e metabólicos entre as meninas, mas não entre os meninos. Porém, meninos insatisfeitos com a imagem corporal demonstraram diferença apenas no aspecto neuromotor de resistência de força abdominal quando comparado ao grupo com satisfação corporal. Pode-se concluir que existe uma relação dos níveis de aptidão física com a imagem corporal em crianças pré-púberes, a qual é dependente do gênero.

**Palavras-Chave:** imagem corporal; atividade física; crianças; composição corporal; saúde.

**Introduction**

In the last years, many papers 1-10 established a direct relation of some eating disorders (anorexia, bulimia, and the muscular dystrophy) with body image. People dissatisfied with their bodies may be subject to harmful health strategies.

Self-perception of the body image depends on many factors that are connected directly to the environment these people live in. According to Medina et al, 2006 11, each person has their own imaginary symbolic, a conscience their own body image.

Body image is not linked with the real body, but also the with a symbolic body, being formed by affective experiences of different stages of life, which is influenced by the media as it sets certain standards of beauty 12. However, “the contents displayed by the media cannot always be taken as a basis”.13

Thus, a paradox of the “perfect body” is present, defining two distinct stereotypes: for males, muscular and defined bodies, and for females, a slim body with low percentage of fat 11,14-17.

The perception of body image becomes a very important factor for health, as well as aspects of physical fitness 16. Since low self-esteem, social exclusion and difficulty in body acceptance are factors that affect physical exercise.

In Addition, when an obese person perceives themselves, probably this will change their lifestyle, and thus the quality of life and full development of this individual would be enhanced. 16

Several studies indicate high levels of body dissatisfaction among the population 16,18-23. However, few Brazilian studies establish a relationship between physical fitness and body dissatisfaction in children.

Thus, we investigate the acceptance of body image and possible relations with aspects of physical fitness for health in pre-pubertal children of both genders.
It is important to the implementation of intervention projects, aimed at understanding the psycho-social, since this component has a major influence on body self-perception\(^2^4\). Additionally, it is necessary that health professionals involved are attentive to identify more serious and still poorly recognized components.

**Materials and Methods**

**Participants**

For this study, the sample comprised a total of 130 volunteering children of both genders aged between 7 to 10 years old (n=130). The data collection occurred in two schools located in the state of São Paulo, Brazil. This study was approved by the Ethics Committee of Cruzeiro do Sul University, São Paulo, Brazil.

**Measurement of components of physical fitness**

**Variables anthropometrics**

Height was measured to the nearest centimeter using a rigid stadiometer. Weight was measured to the nearest 0.1 kg using a calibrated balance scale. Body mass index was calculated as the weight in kilograms divided by the height in meters squared. Skin folds were measured with Lange calipers (Lange Instrument Co., Inc., Lange, Cambridge USA) on the right side of the body at two sites: at triceps and subscapular Muscles.\(^2^5\) Each site was measured thrice and the mean value was recorded. If two values differed by more than 2 mm, a fourth measurement was taken, and the mean of the two closest measures was recorded. The values of skin folds were used to calculate percentage of fat using the equation \(^2^5\).

**Measuring Endurance strength**

The volunteer positioned him/herself supine on a thin mattress with the knees flexed at 90 degrees and with the arms crossed over the thorax. The assessor put the students’ feet on the floor. On receiving a signal, the students began strength movements from the trunk until their elbows touched their knees, then returned to the original position. The assessor announced the score aloud. The students made as much complete repetitions as the could in 1 minute. The result was expressed by the number of complete moves made in 1 minute.\(^2^6\)

**Measure Flexibility**

The volunteers sat with their legs together, but stretched out in front of a Wells bench, their feet touching the bench. The volunteers put their forefingers together and slowly slid ahead as much as possible, over the printed ruler, while their knees were kept stretched with the assessor’s help. A warm up was done before the test itself. The test was taken thrice, taking note of the maximum coverage.\(^2^6\)

**Measuring Aerobic Capacity**
The Shuttle Test as an Indirect Measure of Aerobic Capacity: The 20-MST was performed according to the protocol. This test is based on the linear relationship which links the increase of running velocity to the rise in $VO_{2max}$ and, when conducted to exhaustion, can be used to determine the $VO_{2max}$ from the maximal velocity attained. The reliability of this test for $VO_{2max}$ assessment has been studied. These authors have shown that the 20-MST is reliable both in children and adults; no significant differences in $VO_{2max}$ values were found between test and retest.

The test consisted of running for as long as possible between two lines set 20 m apart at an increasing pace dictated by a recording emitting tones at appropriate intervals. Velocity was set at 8 kilometer per hour (km/h) for the first minute, and increased by 0.5 km/h every minute thereafter. The turning speed of the cassette recorder was checked prior to the start of each test to ensure that any deviation was less than 1 min. The children were instructed to complete as many stages as possible. They ran in groups of no more than three and were always accompanied and vigorously encouraged by an investigator who did not know to which group they belonged. The test was stopped when a subject was unable to follow the pace. During the last stage, the maximal running velocity was adjusted in terms of the length of time it was maintained by using the following equation.

$VO_{2max}$ (Km/h=V+0.5xn/60 where $V$ max is maximal running velocity; $V$ is the velocity maintained during the next to last stage; 0.5 is the value of the increase in velocity from one stage to another; $n$ is the number of seconds the last stage was maintained; and 60 is the number of seconds in the stage.

The $VO_{2max}$ values were calculated from the age of the subjects and the adjusted $V$ max using the regression equation provided.

$VO_{2max}=31,025+(3.238x V)-(3.248xA)+(0.1536 x A x V)$

Where $VO_{2max}$ is expressed in mm/kg; $V$ is the maximal velocity in km/h attained in the last stage; and $A$ is the age expressed in years.

**Determination of body acceptance level**

Questionnaires were administered in class time. Each question was read aloud and explained. There were two questions: one for girls and the other for boys. Children were presented with a series of nine same-sex silhouette figures ranging from very thin to very fat, numbered 1 to 9, and asked to choose the drawing that was most similar to their own body (current), a body that they would be more likely to like), the difference between the figures characterized the body dissatisfaction. When this difference was not observed, the child was considered to be body satisfied.

**Statistical analysis**

Statistical procedures were performed using the one-way analysis of variance (ANOVA), followed by Bonferroni post-tests
for multiple comparisons among groups. Chi-square test $P$ values less than 0.05 were considered statistically significant. Data was presented as the mean ± SEM. The statistical software package SPSS, v 10 for Windows was used for the analysis.

**Results**

The comparison between features of gender was a not significant difference (Table 1). The degree of body dissatisfaction for both genders is 64.62%, indicating a drop in the level of body acceptance without significant difference between genders $P <0.932$ (Table 2).

| Table 1. Characterization of the sample. |
|-----------------|-----------------|-----------------|
|                | Male ( 60 )     | Female ( 70 )   | P       |
| Age (years)    | 8.53± 0.29      | 8.56± 0.08      | 0.778   |
| Weight (kg)    | 33.06±3.40      | 33.00±1.17      | 0.607   |
| Stature (cm)   | 135±0.03        | 136±0.01        | 0.353   |
| BMI (kg/m$^2$) | 17.91±0.518     | 17.49±1.15      | 0.764   |
| Body Fat (%)   | 20.61±2.26      | 21.38±1.43      | 0.464   |

Values expressed as mean and EPM. (n= 130 number elements)

| Table 2. Level of body acceptance between genders. |
|---------------------------------|--------|--------|--------|
| Body Image                     | Satisfaction | %     | Dissatisfaction | %     |
| Male                           | 21     | 35.0   | 39     | 65.0   |
| Female                         | 25     | 35.7   | 45     | 64.3   |
| Both Genders                   | 46     | 35.4   | 84     | 64.6   |

Table 3 shows the effect of body dissatisfaction on the indication of the desired silhouette in relation to the gender. The body satisfaction degree of girls is associated with a manful BMI increase and the fat percentage and with a decrease of the oxygen maximum consumption in relation to the body satisfied group. However, we checked that in the male group the satisfaction degree is associated only with the strength performance decrease of the abdominal resistance.

**Discussion**

This paper investigated the influence of body acceptance on the components of physical fitness for children of both genders.

We observed a high body dissatisfaction around 64.62%. However, there is no significant difference between genders. This finding is in agreement with a paper similar to ours, because it used the same tool for research of body image and age. This study observed a dissatisfaction level of 63.90%.

In the study presented by Vilela, 2004, children and adolescents from 7 to 19 years belonging to public schools (the rural region of Minas Gerais, Brazil) showed a dissatisfaction of 59%.

Perhaps the media and lifestyle are influencing body satisfaction. This is called social stigma and standardization of beauty (lean body) influenced by the media. In a paper published by Pope et al, 1999, he noticed a transformation of the size of children's dolls over the years and found that they had a large increase in the presence of muscle mass, promoting the stereotype of muscular body to the male. Norton et al, 1996 performed similar analysis with Barbie® dolls women, noting the decrease in the size of the body forms of toys, making the body "lean" to the feminine gender, recovery which coincides with the idea, when investigating the
stereotype of ideal body to the opposite sex, found that low weight falls as desire, demystifying that man must have muscle advantageous forms.

The media influence on satisfaction promotes and encourages the body to increase muscle mass in men, and that these factors result in low self-esteem, psychological disorders (depression), behavioral (excessive exercise).\(^{33}\)

The woman is bombarded mainly by social group means of communication, leaving to seek their identity to search for identification.\(^{34}\) It was found that already in childhood for girls 7-12 years have a greater concern with the body compared to boys.\(^{28}\) Adolescence is believed to be a stage where they are the main victims of social pressure and media. Actually the pressure in adolescence seems to exert greater influence, by exposure to the large amount of information and the constant search form social acceptance.\(^{28}\)

However, in calling attention to the upside of sexuality in childhood, perhaps this could explain the high rates of dissatisfaction found in our study. It was found that the influence of the stereotype of body "ideal" is found earlier in girls,\(^{20}\) perhaps because they reach the age of menarche at around 10 years.\(^{35}\)

Interesting that in a study conducted among a religious community away from contemporary customs there is dissatisfaction or lack of body image.\(^{36}\) This can be explained, because by means of socialization and if it introduces specific cultural patterns of a group to which it belongs.\(^{37}\)

In Chile, in a lower-class population, attention was drawn to the relationship between body image and the diet,\(^{38}\) which was also found in a public school in Brazil. Braggion et al 2000 also highlight that a diet perceived as inadequate will promote obesity, and that an adequate understanding of body image can contribute to public health problems. Severe psychiatric disorders associated with obesity include relationship of body image and negative emotional relationship to the diet.\(^{39}\) As I described earlier women are the main victims, according to Behar et al, 2001 they have a higher incidence of eating disorders, drawing attention even though 55.6% of these have a training level. In their study (06) it was found that female practitioners exercised in excess, and 60.5% wanted to lose weight for aesthetic reasons, putting the reduction of weight for health in the background with 26.3% of the sample.

We suggest that the capitalist market combined with mass media is a large contributor to determining a type of profile as the default to be sought, revealing the constant call from childhood.

We can verify that the silhouette desired by the boys and girls was not different, and a smaller silhouette is a desire of children who are dissatisfied with their own body image.\(^{4,18}\) However, some studies show contradictory data, where a higher profile was predominant body dissatisfaction among boys.\(^{4,18}\) However,
this group has shown that girls dissatisfied with their body want a lower profile, given that this coincides with our findings.

Men and women value lean body 19 In a research with contradictory results in a population aged over 18 years, men do not present a specific tendency on the type of silhouette desired, but among the women, a tendency to desire a smaller silhouette was verified 40. These differences in preference of a particular type of silhouette can be influenced by the socio-economic status, education level, residence area, family environment, among others. It seems that the desire to BE or HAVE something depends to a large extent on the social context in which the individual is inserted.

Students with imprecise body image adhere to body changing strategies not recommended for health, mentioning that body perception acts as a factor for weight loss. 41 For the females, there are many studies in this sense, but there are few researches done for men, which may be a limiting factor for identification of risk situations for the male gender. 15 Existence of many studies in this direction for a few women and for men, this may be a limiting factor for identifying situations of risk for the males. 15

Some effects to health and epidemic of obesity are related to the way we see our bodies. 42 This might help explain the increase in psychological illnesses. 43

In our findings we can see that the girls who had higher body mass index and fat percentage are more dissatisfied with their body. Female recruits dissatisfied with their body present higher body mass indexes. 44 According to Kakeshita & Almeida 2006, university overweight women have higher body dissatisfaction and 87% of overweight eutrophic women overestimate their body size characterizing distortion of body image. In an investigation, a similar study shows that for every point gained on the body mass index (BMI), the children presented a 4% likeliness to feel fat, as well as a desire by children with higher BMI to have a more slender body. This data strengthens our findings, there is a relationship between morphology and body acceptance among females. 20

The obese women have more difficulty in expressing their living body. 45

This would be justified by the loss of functionality, and therefore as, 46 increasing the percentage of fat at a disadvantage of strength, flexibility, balance and cardiorespiratory ability.

In our results we found that the group of girls dissatisfied with their body showed a reduction in maximum oxygen consumption. We suggest that this is because of the degree of adiposity in this group, the literature in some way supports this assumption.

A study of children and adolescents found a link between obesity and VO2 max, that is, the
higher the BMI the lower cardiorespiratory performance\(^7\) what coincides with Lennox & Pienar 2008, who showed a relationship between aerobic capacity and the percentage of fat, that is, the higher the percentage of fat the less the aerobic capacity.

In a study conducted by Stratton et al, 2007, children with a decline of VO\(_{2}\) max were found to have an increase in body mass index. These results coincide with our data, since children with a larger fat percentage, present a lower cardiorespiratory capacity.

However, we found no association between the level of body acceptance and neuronal aspects among girls. However, in the male group, there was a relationship between strength and abdominal strength of body acceptance, so we believe that more variables need to be investigated in order to provide a plausible explanation for this differentiation.

Interestingly, there was no association between acceptance and body morphology and metabolic among boys, perhaps this is due to the fact that boys have fewer social pressure and body fat.

Among children, individuality and environmental factors that promote behavioral changes must be considered. For this, some variables must be taken into consideration, such as: socio-economic status, diet and level of physical activity.\(^8\)

### Conclusion

In the investigated population, it was found that in both genders there is a high incidence of body dissatisfaction, this dissatisfaction may be caused by several factors that should be the goal of future studies. When we began research in children assuming that body image could influence the levels of physical fitness for health in all its dimensions (morphological, neuromotor and cardiopulmonary). This hypothesis was confirmed, showing that children with body dissatisfaction show differences in some components of physical fitness compared to

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**Table 3. Body acceptance and fitness variables.**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Fitness variables</th>
<th>Body acceptance</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Satisfaction</td>
<td>Dissatisfaction</td>
<td>Level significant</td>
</tr>
<tr>
<td>Female</td>
<td>BMI (kg/m(^2))</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16.50 ± 0.38</td>
<td>18.70 ± 0.52 *</td>
<td>p&lt;0.005</td>
</tr>
<tr>
<td></td>
<td>18.26 ± 0.87</td>
<td>24.98 ± 1.21 *</td>
<td>p&lt;0.000</td>
</tr>
<tr>
<td></td>
<td>Body fat (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>27.88 ± 1.88</td>
<td>24.22 ± 1.26</td>
<td>p&gt;0.100</td>
</tr>
<tr>
<td></td>
<td>Flexibility (cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>27.46 ± 1.16</td>
<td>27.05 ± 1.05</td>
<td>p&lt;0.806</td>
</tr>
<tr>
<td></td>
<td>VO(<em>{2})(</em>{\text{max}}) (ml/kg/min)</td>
<td>47.11 ± 0.35</td>
<td>45.71 ± 0.29 *</td>
</tr>
<tr>
<td>Male</td>
<td>BMI (kg/m(^2))</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.21 ± 0.51</td>
<td>18.01 ± 0.54</td>
<td>p&lt;0.816</td>
</tr>
<tr>
<td></td>
<td>20.14 ± 2.09</td>
<td>22.06 ± 1.80</td>
<td>p&gt;0.512</td>
</tr>
<tr>
<td></td>
<td>Body fat (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>31.33 ± 1.33</td>
<td>25.43 ± 1.69 *</td>
<td>p&lt;0.022</td>
</tr>
<tr>
<td></td>
<td>Flexibility (cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25.86 ± 1.15</td>
<td>25.48 ± 1.35</td>
<td>p&lt;0.851</td>
</tr>
<tr>
<td></td>
<td>VO(<em>{2})(</em>{\text{max}}) (ml/kg/min)</td>
<td>47.77 ± 0.56</td>
<td>46.99 ± 0.37</td>
</tr>
</tbody>
</table>

values expressed as mean ± EPM.

(*) = Level of significance - (dissatisfied vs. satisfied)
children with body satisfaction, but it is dependent on gender.

It is believed that the intervention strategies in children should be taken more often by parents, teachers and health professionals, minimizing the pressure to which children are subjected. Understanding issues related to a healthy body and promote the development from childhood are critical strategies that might minimize this phenomenon.

Acknowledgement

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