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Effects of 12 weeks of interdisciplinary interventions on behavioral and eating parameters of adolescents with overweight or obesity

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Abstract

Objetctive: To analyze the 12 weeks' effects of interdisciplinary interventions on behavioral and eating parameters of overweight or obese adolescents.

Methods: This study presents a longitudinal and quasi-experimental design. 40 adolescents aged 16 ± 1 years were selected to participate on the study. Therefore, only 17 completed the 12 weeks of interdisciplinary interventions. The interventions were realized by physical education professionals (physical exercises three times a week), physiotherapists (exercises to strengthen the core and postural exercises three times a week), nutrition (feeding re-education twice a week) and cognitive-behavioral therapy (focus on behavior change and adoption of an active lifestyle once a week). In order to quantify the adolescents' behavioral parameters, the questionnaires were: Body Shape Questionnaire (BSQ), Eating Attitudes Test (EAT), Rosenberg self-esteem scale (RAS) and Hamilton anxiety scale (HAS).

Results: For BSQ's answer 9: "are you with thin people of the same sex as you, make you feel worried about your physique? "A significant reduction in the responses attributed by the adolescents at the post-intervention ($p<0.05$) level was identified, as well as for the HAS, in question 3: fear - of the dark, of unknown, of the crowd, of being abandoned, large animals, transit", with lower values ($p<0.05$) after interdisciplinary interventions.

Conclusion: Interdisciplinary interventions resulted in improvements in body image in relation to the perception of physical state, as well as in a decrease in fear presented by adolescents. The 12 weeks of interventions presented slight changes in the adolescents' behavior analyzed in the study.

Keywords: food behavior, interdisciplinary research, adolescent health.

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Authors summary

Why was this study done?
The present study was designed to investigate the effects of an interdisciplinary intervention on behavioral and dietary parameters of overweight or obese adolescents. Since it is a chronic disease of multifactorial etiology, identifying eventual changes in mental health parameters becomes relevant to understand the responses of the proposed intervention approach.

What did the researchers do and find?
The researchers have worked on cognitive behavioral therapy, dietary reeducation, physical rehabilitation and resistance exercise. Cognitive behavioral therapy was performed 1x per week, dietary reeducation 2x per week, physical rehabilitation and exercise were completed 3x per week. All activities were developed over 12 weeks of intervention. The researchers identified small improvements in parameters from the Body Shape Questionnaire and the Hamilton Anxiety Scale. However, no changes were observed for self-esteem or for eating attitudes.

What do these findings mean?
Based on the responses of the present study, 12 weeks of interdisciplinary interventions are incipient to provide major differences in body dissatisfaction and anxiety variables. Moreover, this period did not cause changes in self-esteem and eating attitudes. Considering the points listed, new studies with longer intervention periods and/or more sessions a week (and even with the participation of parents) become substantial with the intention of identifying possible improvements in the investigated mental health parameters.

INTRODUCTION

Obesity is defined as the accumulation of fat mass, caused by a positive calorie balance, in which the intake is higher than the energy expenditure, and can be classified according to the body mass index (BMI), which is used for calculation the body weight (BW) divided by height (H) squared (BW/H^2), being a positive indicator for obesity, when the result is equal to or greater than 30.0 kg/m^2, for non-athletes[1-3]. The indication of obesity in adolescents, aged 10 to 19, uses classification curves in accordance with the World Health Organization (WHO), according to age (in months), sex and BMI, with the following classifications, according to percentiles: a) overweight: from p85 and less than p97; b) obesity: greater than p97 and less than p99.9 and c) severe obesity: above p99.9. In addition, another classification used is the table proposed by Cole *et al*.[4] that separates children and adolescents, in cut ranges.

Obesity is considered a non-transmissible chronic disease (NCD), multifactorial and progressive[5]. For the WHO, obesity is considered one of the most serious and challenging problems for global public health[6]. The Surveillance System for Risk Factors and Protection for Chronic Diseases by Telephone Inquiry (VIGITEL) presented data showing that, in the last 10 years, obesity increased by 60%, from 11.8% in 2006 to 18.9% in 2016[7]. Similarly, the research carried out by the Study on Cardiovascular Risks in Adolescents (ERICA), presented a prevalence of obesity of 8.4% in adolescents between 13 and 17 years old, totaling 1.1 million obese adolescents in Brazil[8]. In view of this, it is verified that the prevalence of obesity in different age groups is alarming and, as a result, there are substantial proposals for intervention for the prevention and treatment of this public health problem.

Between the many problems that can be observed with obesity are: sedentarism, anxiety, binge eating, excessive consumption of ultra-processed foods, among others[9]. Additionally, in adolescents, obesity is caused by several other factors, associated with pubertal alterations, low self-esteem, preference for industrialized foods rich in sugars, fats, which are excessively caloric, such as fast-foods, snacks, crackers and other foods that show high palatability[10].

On the other hand, healthy foods are associated with restrictive and unpalatable feeding for adolescents, a factor that leads to the reduction of their consumption[11]. Associated with these aspects, there is a progressive reduction in the level of physical activity (PA) combined with an increase in the time dedicated to low-intensity activities, such as watching television, using a computer and playing video games[10-12].

At this juncture, the media has extreme influence on the food supply of the Brazilian population, being responsible for 40% of the food choices, followed by nutritionists and doctors with 20%, internet with 19% and the rest from other sources such as friends, family, magazines and newspapers[11]. In this sense, it is through publicity campaigns in the various social media that beauty patterns are presented extremely healthy and thin, leading some adolescents to denote great dissatisfaction and frustration with their own body[13,14]. Complementarily, those who do not fit into the current pattern of beauty become victims of prejudice, rejection and personal dissatisfaction, as a consequence, this causes several psychological disorders such as anxiety, eating compulsions and low self-esteem[13,14].

In fact, anxiety, binge eating and low self-esteem directly affect the body image of adolescents, who manifest a distorted image of themselves and the actual perception of their own body, generating constant searches for restrictive diets to lose weight (none of them is effective and not healthy), provoking feeling of frustration for not obtaining consistent results[15].

Thus, the objective of the present study was to analyze the effects of 12 weeks of interdisciplinary interventions on behavioral and eating parameters of adolescents with overweight or obesity.

METHODS

The study presented a longitudinal, quasi-experimental and quantitative design. Based on divulgations in electronic media, newspapers and television, the proposal of the present study was communicated to the residents of the metropolitan area of Maringa, Paraná, Brazil to reduce the different impacts caused by obesity in adolescents.

After the disclosure process, adolescents aged 16

± 1 years, living in the city of Maringa, Paraná, Brazil, enrolled to participate in the 12 weeks of interdisciplinary interventions. The interventions were performed in a group, by physical education professionals (physical exercises three times a week, during 60 min, per session), physiotherapists (focus on postural correction and core, three times weekly, for 30 min, per session), nutrition (diet re-education twice a week for 45 min per session) and psychology (cognitive-behavioral theory for 60 min once a week). During all the interventions, points were raised regarding the promotion of health in the biopsychosocial spheres. The study entitled "Multidisciplinary Program for the Treatment of Obesity in Adolescents: Effectiveness Test" was approved by the Local Ethics and Research Committee: nº: 2.505.200/2018. All the adolescents signed the agreement, and their respective parents or guardians authorized the children, through the signing of the free and informed consent form. The research followed all the recommendations of resolution no. 466/2012 of the Ministry of Health and the Helsinki Declaration.

Questionnaires Used

The questionnaires addressed were the Body Shape Questionnaire (BSQ), Eating Attitudes Test (EAT), Rosenberg Self-esteem Scale (RSS) and Hamilton Anxiety Scale (HAS). Details of each of these instruments are detailed below[16-19].

Body Shape Questionnaire

The Body Shape Questionnaire (BSQ) contains 34 questions to measure satisfaction and concerns about body shape, organized on a six-point likert scale, with ratings: never, rarely, sometimes, often, very often and always (which includes categorizations from 1 to 6)[16,20].

Eating Attitude Test (EAT)

The food attitudes test was initially developed in 1979[21], adapted in 1982[22] and translated into Portuguese, validated with female adolescents in 2003[23] and has 26 items with a cut-off point of 21 (twenty-one) points as a positive indicator (EAT-26 +) of the possibility of an eating disorder[23]. Organized on a six-point likert scale, with ratings: never, rarely, sometimes, often, very often and always (encompassing enumeration 0 through 5). The evaluation of EAT-26 responses is done by assigning three scores for each item that marked the most extreme response ("always"), two scores for the second most extreme response ("very often"), and a score for the third most extreme ("often"); other answers are not punctuated. The question of number four presents a particularity, since the punctuation is done in reverse, that is, "sometimes" equals one point, "rarely" equals two points and "never" equals three points, and the other answers are not scored. This occurs only in question four. When the instrument was applied, the scores obtained in each EAT-26 question are summed and computed for each person evaluated. If the total score found was greater than 21 (twenty-one), EAT-26 is considered positive (EAT-26 +) and confirmed the presence of pathological eating attitudes and risk for the development of eating disorders[23].

Rosenberg Self-Esteem Scale (RSS)

The Rosenberg Self-Esteem Scale was created in 1989 and adapted for adolescents in 2000, and consists of 10 questions, in which the answers are: I totally disagree, disagree, agree and totally agree with the statement presented, with the purpose of verifying the satisfaction with oneself. The alternatives are divided into five positive questions (one, two, four, six and seven) and five negative questions (three, five, eight, nine and 10)[18].

Hamilton Anxiety Scale (HAS)

The anxiety questionnaire was published in 1959 in which these questions serve to identify the severity of depressive symptoms and not their existence. The questionnaire has 14 items with responses from zero to four, where: zero (0) indicates that the symptom is absent, one (1) indicates that the symptom is of low mean intensity, two (2) indicates that the symptom is intensity, three (3) symptoms are strong and four (4) indicate that the symptom is disabling intensity[24].

Statistical Analysis

Previously, the normality of the data was tested using the Shapiro-Wilk test. After this confirmation, the data were presented by the mean μ and standard deviation (S). Subsequently, the paired t-test was used to compare pre and post-intervention values, assuming a significance level of 5%. Statistical analyzes were performed using the statistical package IBM SPSS Statistics 22.0 (International Business Machines, IBM, United States of America)

RESULTS

A total of 40 registrations were received from adolescents, aged 16 ± 1 years. However, only 17 of them completed the 12 weeks of interdisciplinary interventions. The other 23 teenagers decided to give up the project at the first meeting held. Table 1 shows the pre and post intervention responses for the BSQ questionnaire, which addresses the perception of the body image of adolescents. The results from the 12 weeks of intervention indicated a significant difference for BSQ question 9: *"Being with thin people of the same sex as you, makes you feel worried about your physique?"* In which lower values were detected after the respective period when compared with the pre-intervention values ($p<0.05$); for the other questions of the respective questionnaire, no significant differences were observed ($p>0.05$) (Table 1).

Table 1: Distribution of question answers between the moments: pre and post intervention for the Body Shape Questionnaire (n = 17), of the adolescents participating in the project of treatment of overweight or obesity, in Maringa, Paraná, Brazil, in the second half of 2017.

In the last four weeks	Pre	Post
	$\mu \pm S$	$\mu \pm S$
1. Feeling bored makes you worry about your physical shape?	2.6 ± 1.5	3.1 ± 1.9
2. Have you been so preoccupied with your physical form that you feel like you should have a diet?	4.3 ± 1.6	3.7 ± 1.9
3. Do you think your thighs, hips or buttocks are too big for the rest of your body?	3.2 ± 2.0	3.1 ± 1.8
4. Have you ever felt afraid of getting fat?	4.1 ± 1.7	3.5 ± 2.1
5. Do you worry that your body is not firm enough?	3.4 ± 1.5	3.0 ± 1.6
6. Feeling satisfied (ex after eating a large meal) makes you feel fat?	2.9 ± 1.6	2.5 ± 1.8
7. Have you ever felt so bad about your body that you came to cry?	2.1 ± 2.0	2.4 ± 1.8
8. Have you ever avoided running because of the fact that your body could swing?	1.9 ± 1.4	2.4 ± 1.9
9. Being with thin people of the same sex as you, makes you feel worried about your physical?	3.1 ± 2.0	**2.2 ± 1.7***
10. Have you ever worried that your thighs can take up too much space when you sit down?	3.2 ± 1.9	2.9 ± 2.0
11. Have you ever felt fat, even eating a small amount of food?	2.3 ± 1.5	2.2 ± 1.8
12. Have you noticed the physical figure of other people of the same sex as yours and, while comparing yourself, you feel at a disadvantage?	3.5 ± 1.8	3.1 ± 1.9
13. Thinking about your physique interferes with your ability to focus on other activities (for example, while watching television, reading or engaging in conversation)?	1.8 ± 1.3	1.6 ± 0.7
14. Being naked, for example, during bathing, does it make you feel fat?	2.8 ± 1.8	2.5 ± 1.9
15. Have you avoided wearing clothes that make you notice the shapes of your body?	3.7 ± 1.9	3.3 ± 2.3
16. Do you imagine yourself cutting off portions of your body?	2.2 ± 1.9	2.2 ± 1.8
17. Eating candy, cakes or other high calorie foods makes you feel fat?	2.6 ± 1.5	2.6 ± 1.7
18. Do you have stopped participating in social events (such as parties) because you feel bad about your physical?	1.8 ± 1.4	2.0 ± 1.5
19. Do you feel excessively large and round?	2.9 ± 1.7	2.5 ± 1.9
20. Do you feel ashamed of your body?	3.7 ± 2.0	3.3 ± 2.1
21. Do the worries about your physique leads to dieting.?	3.2 ± 2.0	3.0 ± 1.7
22. Do you feel happier about your physique when on an empty stomach (for example in the morning)?	2.2 ± 1.4	2.3 ± 1.8
23. Do you think your current physique arises from a lack of self-control?	3.6 ± 1.3	3.8 ± 1.7
24. Do you worry that other people might be seeing folds in your waist or stomach?	3.4 ± 1.8	3.2 ± 2.2
25. Do you find it unfair that other people of the same sex as yours are thinner than you?	1.9 ± 1.5	1.6 ± 1.4
26. Have you vomited to feel slimmer?	1.1 ± 0.3	1.4 ± 1.3
27. When accompanied are you worried about taking up too much space (for example, sitting on a couch or in the seat of a bus)?	2.1 ± 1.3	2.6 ± 2.0
28. Do you worry about the folds in your body?	3.4 ± 1.7	3.6 ± 1.9
29. Seeing your reflection (for example, in a mirror or shop window) makes you feel bad about your physical?	3.1 ± 1.8	3.0 ± 1.9
30. Do you pinch areas of your body to see how much fat there is?	2.6 ± 1.8	2.6 ± 1.9
31. You avoid situations where people can see your body (e.g., changing rooms or swimming pools)?	3.8 ± 1.9	3.2 ± 2.1
32. Do you take laxatives to feel slim?	1.0 ± 0.0	1.0 ± 0.0
33. Do you become more preoccupied with your physical shape when in the company of other people?	2.7 ± 1.5	2.9 ± 2.0
34. Does worry about your physique make you feel like you should exercise?	4.4 ± 1.6	4.4 ± 1.8
General results	2.8 ± 0.4	2.7 ± 0.4

Note: data are expressed by the average (μ) and standard deviation (S); * = difference between moments ($p<0.05$).
Source: Authors (2018).

Table 2: Distribution of the question answers between the moments: pre and post intervention for the food attitudes questionnaire (n = 17), of adolescents participating in the project of treatment of overweight or obesity in Maringa, Paraná, Brazil, in the second half of 2017.

Question	Pre	Post
	μ ± S	μ ± S
1. I am often in a diet.	0.5 ± 1.1	0.6 ± 1.1
2. I eat dietetic foods.	0.4 ± 0.9	0.1 ± 0.3
3. I feel bad after eating sweets.	0.4 ± 1.0	0.4 ± 1.0
4. I like to try new fattening foods.	1.5 ± 1.1	1.3 ± 0.9
5. I avoid foods that contain sugar.	0.3 ± 0.8	0.3 ± 0.6
6. I particularly avoid foods high in carbohydrates (bread, potatoes, rice, etc.).	0.2 ± 0.7	0.4 ± 0.9
7. I am worried about the desire to be thinner.	1.2 ± 1.4	1.1 ± 1.2
8. I like having an empty stomach.	0.1 ± 0.2	0.4 ± 0.9
9. When I exercise I think about burning calories.	1.2 ± 1.3	1.5 ± 1.2
10. I feel extremely guilty after eating.	0.5 ± 0.7	0.2 ± 0.8
11. I'm terrified of being overweight.	0.5 ± 0.9	0.8 ± 1.3
12. I am worried about having fat in my body.	0.6 ± 1.0	0.9 ± 1.3
13. I know how many calories foods have.	0.2 ± 0.8	0.6 ± 1.2
14. I feel like vomiting after a meal.	0.0 ± 0.0	0.0 ± 0.0
15. I vomit after eating.	0.0 ± 0.0	0.0 ± 0.0
16. I've been through situations where I ate too much thinking I could not stop.	0,0 ± 0.0	0.4 ± 1.0
17. I spend a lot of time thinking about food.	0.1 ± 0.2	0.3 ± 0.6
18. I think a person worried about food.	0.1 ± 0.2	0.2 ± 0.4
19. I feel that food controls my life.	0.2 ± 0.4	0.0 ± 0.0
20. I cut my food into small pieces.	0.2 ± 0.5	0.2 ± 0.8
21. I take more time to eat.	0.2 ± 0.8	0.5 ± 0.9
22. Other people think I'm too thin.	0.0 ± 0.0	0.0 ± 0.0
23. I feel that others would prefer that I eat more.	0.0 ± 0.0	0.0 ± 0.0
24. I feel that others are pushing me to eat.	0.0 ± 0.0	0.1 ± 0.5
25. I avoid eating when I'm hungry.	0.0 ± 0.0	0.1 ± 0.2
26. I demonstrate self-control over food.	0.8 ± 1.0	0.5 ± 0.9
Total results	8.9 ± 7.1	10.8 ± 7.9

Note: data are expressed by the average (μ) and standard deviation (S).
Source: Authors (2018).

Table 3: Distribution of question answers between the moments: pre and post intervention for the Rosenberg self-esteem scale (n = 17), of the adolescents participating in the project in Maringa, Paraná, Brazil, in the second semester of 2017.

Question	Pre	Post
	μ ± S	μ ± S
1. I feel that I am a person of value, at least as much as other people.	2.9 ± 1.0	3.1 ± 1.0
2. I think I have several good qualities.	3.4 ± 0.6	3.5 ± 0.7
3. Taking everything into account, I think I'm a failure.	1.7 ± 0.9	1.6 ± 1.1
4. I think I can do things as well as most people do.	3.1 ± 0.8	3.2 ± 0.8
5. I think I do not have much to be proud of.	2.0 ± 0.9	1.8 ± 1.0
6. I have a positive attitude toward myself.	2.8 ± 1.0	3.1 ± 1.1
7. All in all, I'm pleased with myself..	2.3 ± 0.8	2.6 ± 1.1
8. I wish I could have more respect for myself.	2.9 ± 0.8	2.7 ± 1.1
9. Sometimes I feel useless.	2.3 ± 1.1	2.3 ± 1.0
10. Sometimes I think I'm good for anything..	2.1 ± 1.3	1.9 ± 1.2
Total	2.5 ± 0.6	2.6 ± 0.6

Note: data are expressed by the average ($\overline{X}$) and standard deviation (S).
Source: Authors (2018).

Table 4: Distribution of the question answers between the moments: pre and post intervention for the Hamilton anxiety scale (n = 17), of the adolescents participating in the project in Maringa, Paraná, Brazil, in the second half of 2017.

Question	Pre	Post
	$\mu \pm S$	$\mu \pm S$
1 Anxious mood - restlessness, fear of the worst, apprehension as to future or present, irritability	1.5 ± 1.1	1.4 ± 1.3
2 Stress - Feeling of tension, Feasibility, tremors, easy crying, inability to relax, restlessness	1.2 ± 1.3	0.9 ± 1.2
3 Fear - of darkness, of strangers, of crowds, of being abandoned, of large animals, of traffic	1.5 ± 1.2	0.9 ± 1.1*
4 Insomnia - difficulty falling asleep, painful dreams, interrupted sleep, unsatisfactory sleep, fatigue upon waking, nightmares	0.6 ± 0.9	1.0 ± 1.5
5 Intellectual Difficulties - difficulty concentrating, memory disorders	1.5 ± 1.2	1.1 ± 1.1
6 Depressed mood - loss of interest, variable mood, indifference to routine activities, early awakening, depression	1.1 ± 1.3	1.3 ± 1.4
7 Motor Summations - muscle aches and pains, muscle stiffness, myoclonus, teeth grinding, unsafe voice	0.5 ± 0.9	0.5 ± 0.9
8 Sensory Summations - blurred vision, hot or cold waves, feeling weak, stinging sensation, tinnitus	0.6 ± 1.1	0.5 ± 1.1
9 Cardiovascular symptoms - tachycardia, palpitations, precordial pains, beats, heartbeats, feeling faint	0.4 ± 0.9	0.4 ± 0.9
10 Respiratory symptoms - feeling of oppression, dyspnea, constriction of the chest, sighs, pharyngeal cough	0.4 ± 0.7	0.6 ± 1.0
11 Gastrointestinal symptoms - difficulty swallowing, aerophagia, dyspepsia, pre- or postprandial pain, burning, nausea, vomiting, diarrhea, constipation, weight loss	0.4 ± 0.8	0.1 ± 0.3
12 Genitourinary symptoms - frequent urination, urgency of urination, frigidity, amenorrhea, premature ejaculation, impotence	0.1 ± 0.2	0.1 ± 0.2
13 Neurovegetative symptoms - dry mouth, flushing, pallor, sweating, vertigo, tension headache	0.4 ± 0.7	0.8 ± 1.1
14 Behavior in the interview - tense, uncomfortable, shaking hands, fingers, tics, restlessness, sighs	1.4 ± 1.3	1.3 ± 1.3
Total	0.8 ± 0.5	0.8 ± 0.4

Note: data are expressed by the average (μ) and standard deviation (S); * = difference between moments ($p<0.05$).
Source: Authors (2018).

Table 2 shows the EAT questionnaire responses before and after 12 weeks of interdisciplinary interventions. However, for the abovementioned questionnaire, no significant differences were identified for any of the 26 questions addressed ($p> 0.05$), when compared to pre- and post-intervention values.

Table 3 shows the pre and post-intervention responses related to the EAR questionnaire. However, no significant differences were identified for the 10 questions treated ($p> 0.05$), in the questionnaire cited between the two moments of measurement.

Table 4 shows the results of the application of EHA before and after the interdisciplinary intervention period for the treatment of overweight or obesity in adolescents from Maringa, Paraná, Brazil. In this aspect, the pre and post intervention comparisons showed significant differences for question 3: "fear - of dark, of unknown, of crowds, of being abandoned, of large animals, of transit", with lower values after the intervention period, when compared to the pre-intervention values, with $p<0.05$.

DISCUSSION

In accordance with the objectives of the present study, which were: to analyze the effects of 12 weeks of interdisciplinary interventions on behavioral and eating parameters of overweight or obese adolescents, we identified: a) reductions in the concern about being with lean people of the same sex, with respect to the BSQ and b) inferior values for the sensation of fear in different situations, with respect to the HAS. However, no other significant differences were detected for the other BSQ and HAS questions, with $p> 0.05$. Similarly, no differences were found for the questionnaire responses: EAT and RSS, with $p> 0.05$.

The attenuation analyzed in the post-intervention moment in the BSQ question: *"Being with thin people of the same sex as you, makes you feel worried about your physique?"*, Suggests being linked to increased self- as demonstrated by the post-intervention outcome of the respective questionnaire. In this perspective, evidence indicates that obese adolescents have significantly

lower levels of self-esteem than non-obese adolescents, especially in girls[25,26]. Therefore, the development of interventions for the promotion of behavioral changes, are substantial in this age group of the population. In addition, the present study shows that the adolescent group and the increase of the knowledge made possible by the intervention: nutritional knowledge and the physical state, can provide greater corporal satisfaction of the adolescents[27], thus corroborating to the reduction of the concern to be with thinner, same-sex people.

Simultaneously, the interventions conducted presented the multiprofessional and interdisciplinary model. Regarding the process with a focus on behavior change, cognitive-behavioral therapy was used, since the literature suggests that the accompanying model has shown effectiveness in the treatment of different NCDs[28,29]. Therefore, in order to present lasting results in the adolescent's life, to contribute to the permanent change of the nutritional behavior and to the adoption of an active lifestyle, the behavioral changes are indispensable, since they aim to minimize eventual relapses[30].

In a study published on anxiety disorder, it was presented that fear, especially in obese people, is associated with insecurity in the face of various situations, such as being excluded from occasions, fear of being in crowds, creating enmities, among others[31]. On the other hand, after the intervention, the adolescents had a significant improvement regarding the response presented in the anxiety questionnaire, suggesting that the young ones felt more secure after the period of attendance. In addition, it can be seen that health education focusing on psychosocial parameters provides an improvement in self-esteem and can make adolescents safer and more satisfied with their own body[32]. Thus, during a period full of physical and psychological changes that is adolescence, one can increase the willingness to socialize and improve self-esteem[33-35].

Of the participants who completed the interventions, 23 adolescents were withdrawn from the treatment process. Studies show that several factors of the adolescent's life directly influence the outcome of the intervention, such as: support of the family group and / or friends that the teenager is inserted, interaction with the media and the internet, the professional's attitude to the relationship with the and the period of care[36-38]. In this way, longer interventions can be tested in order to investigate possible behavioral changes. In view of this, it is believed that the time of exposure and immersion in the proposed behavior change, can directly impact the results found. In addition, interdisciplinary interventions become more effective for adolescents when compared to disciplinary intervention in the treatment of overweight and obesity[36]. As a result, the interdisciplinary approach should be stimulated to treat obesity that denotes multifactorial origin. Another point that should be highlighted is the participation of the family in the treatment process. Undoubtedly, the research published by Fonseca *et al.,*[39] indicated the indispensability of family participation in the process of treatment of obesity, with the aim of improving satisfactorily the health and quality of life of adolescents. Subsequently, it is noteworthy that during group treatment, it is also essential that active professionals look at adolescents subjectively and individually, by stimulating increased consumption of "in nature" foods, incorporation of an active lifestyle and, in particular, using heterogeneous strategies, based on the peculiar characteristics of each patient[37,38].

In addition, it is indicated that the practice of PA should not be consummated only in the programs of treatment of excess weight and obesity. The recommendation for the practice of PA involves the accomplishment of 60 min of moderate to vigorous exercises per day, in that age group of the population[40]. Likewise, behavioral changes are elementary to the success of the treatment program. A recent study published by the Task Force on "Behavioral Interventions to Prevent Morbidity and Mortality from Obesity"[41] suggests that counseling, stimulating the practice of PA, behavioral changes and dietary re-education are determining pillars for the maintenance of BW. Consequently, multidisciplinary and interdisciplinary care is indispensable in the treatment of overweight and, above all, obesity.

Magnani Branco *et al.*,[42] identified that interdisciplinary interventions by physical education, physiotherapy, nutrition and psychology professionals had a positive effect on the reduction of circumferences, fat mass and body fat percentage of male adolescents (n = 19) after 12 weeks of treatment. The aforementioned authors compared two approaches to physical exercise, one with BW and the other using machines, which presented similar results. Thus, with few material resources it is possible to combat sedentarism and improve the quality of life of the population. Therefore, among the several benefits caused by PA, the following stand out: improved well-being and sleep, cognitive and intellectual development, increased school performance, as well as reduced prevalence of NCDs, stress and depression[43-46].

Finally, the 12 weeks of intervention exhibited few significant changes in the parameters analyzed in the present study. In view of this, interventions with a longer duration, *i.e.*, 16, 20, 24 weeks or even constant, are proposed. In view of the limitations, they are listed: a) attendance was only performed with adolescents without the family and b) the university cannot absorb a high demand of participants. In addition, it is noted that professionals who work directly in health promotion, prevention and treatment of NCDs sometimes do not have access to scientific journals. For this reason, the preparation of flyers, folders, pamphlets and educational materials are vital for payment between research centers, with basic health care services.

CONCLUSION

The interdisciplinary intervention resulted in the improvement of the corporal image in relation to the perception of the physical state and a reduction of the fear presented by the adolescents. For the other variables evaluated in this study, the participants did not present significant improvement. Thus, feedback from interventions, including the family, requires incorporation with the intention of providing more expressive results in the parameters evaluated and also in the quality of life of adolescents.

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Resumo

Objetivo: Analisar os efeitos de 12 semanas de intervenções interdisciplinares em parâmetros comportamentais e alimentares de adolescentes com excesso de peso ou obesidade.

Método: O estudo apresenta um delineamento longitudinal e quase-experimental. Foram selecionados para participar da pesquisa 40 adolescentes com idade de 16 ± 1 anos. No entanto, apenas 17 concluíram as 12 semanas de intervenções interdisciplinares. As intervenções foram realizadas por profissionais de educação física (exercício físico três vezes por semana), fisioterapeutas (exercícios para o fortalecimento do core e posturais, três vezes por semana), nutrição (reeducação alimentar, duas vezes por semana) e terapia cognitivo-comportamental (foco na mudança de comportamento e adoção de um estilo de vida ativo, uma vez por semana). A fim de quantificar os parâmetros comportamentais dos adolescentes, foram utilizados os questionários: Body Shape Questionnaire (BSQ), teste de atitudes alimentares (EAT), escala de autoestima de Rosenberg (EAR) e escala Hamilton de ansiedade (EHA).

Resultados: para a resposta 9 do BSQ: “estar com pessoas magras do mesmo sexo que você, faz você se sentir preocupada (o) em relação ao seu físico? ” Foi identificada redução significativa das respostas atribuídas pelos adolescentes no momento pós-intervenção ($p<0,05$), assim como para a EHA, na questão 3: medo – de escuro, de desconhecidos, de multidão, de ser abandonado, de animais grandes, de trânsito”, com valores inferiores ($p<0,05$), após as intervenções interdisciplinares.

Conclusão: As intervenções interdisciplinares resultaram em melhoras na imagem corporal em relação à percepção do estado físico, bem como em uma diminuição do medo apresentado pelos adolescentes. As 12 semanas de intervenções apresentaram ligeiras mudanças no comportamento dos adolescentes analisados no presente estudo.

Palavras-chave: comportamento alimentar, pesquisa interdisciplinar, saúde do adolescente.