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Correlation between quality of life and motivational regulations for the practice of physical exercises in adolescents with asthma

Correlação entre a qualidade de vida e as regulações motivacionais para a prática de exercícios físicos em adolescentes com asma

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Abstract

Background: motivation to exercise in adolescents with asthma may affect exercise adherence and quality of life. **Aim:** to evaluate motivational regulations for exercise and their association with quality of life in adolescents with asthma. It was hypothesized that these variations are interconnected. **Methods:** the study assessed motivation (including intrinsic and extrinsic motivations, amotivation and the self-determination index - SI) using the Behavioral Regulation In Exercise Questionnaire-2 - BREQ-2, and quality of life through the Pediatric Asthma Quality of Life Questionnaire - PAQLQ (covering limitations of physical activity, symptoms and emotions), as well as the Pediatric Quality of Life Inventory - PedsQL (covering physical, emotional, social, school and psychosocial functioning) among 145 adolescents with stable disease status. Spearman's correlation coefficient was used, with a significance level set at 5%. **Results:** the adolescents were 56% male, 14±2 years and FEV1 91±13% predicted, Amotivation 0.5(0-1.2), External regulation 0.5(0-1.5), Introjected regulation 0.6(0-1.3), Identified regulation 2.2(1.5-3), Intrinsic motivation 2.7(1.7-3.7) and BREQ-2 SI 7.2(2.1-13. 9). The PAQLQ total score correlated with BREQ-2 Introjected Regulation and Intrinsic Motivation (r=-0.17 and r=0.16). The Emotions domain of the PAQLQ correlated with External and Introjected Regulation of the BREQ-2 (r=-0.17 and r=-0.23). The PedsQL total score correlated with External Regulation, Identified Regulation, Intrinsic Motivation and the IA of the BREQ-2 (r=-0.17, r=0.28, r=0.31 and r=0.26; P =0.05 for all). **Conclusion:** the quality of life of adolescents with asthma showed a weak correlation with the motivational regulation of these individuals for the practice of physical exercises.

Keywords: Asthma; Quality of Life; Behavior.

Resumo

Introdução: a motivação para praticar exercícios em adolescentes com asma pode impactar a adesão ao exercício e qualidade de vida. **Objetivo**: avaliar as regulações motivacionais para exercício e sua associação com a qualidade de vida em adolescentes com asma. Foi levantada a hipótese de que essas variáveis estão relacionadas. **Métodos**: o estudo avaliou a motivação (motivações intrínsecas e extrínsecas, amotivação e índice de autodeterminação - IA) utilizando o Behavioural Regulation In Exercise Questionnaire-2 - BREQ-2, e a qualidade de vida por meio dos questionários Pediatric Asthma Quality of Life Questionnaire - PAQLQ (limitações da atividade física, sintomas e emoções) e Pediatric Quality of life Inventory - PedsQL (físico, emocional, social, função escolar e psicossocial) entre 145 adolescentes com situação estável da doença. Foi utilizado o coeficiente de correlação de Spearman. O nível de significância foi de 5%. **Resultados**: os adolescentes eram 56% do sexo masculino, 14±2 anos e VEF1 91±13% predito. A pontuação total do PAQLQ foi 5,7 (5-6,3)pts, do PedsQL 79,3(66,3-89,1)pts, da Amotivação 0,5(0-1,2)pts, Regulação externa 0,5(0-1,5)pts, Regulação introjetada 0,6(0-1,3)pts, Regulação identificada 2,2(1,5-3)pts, Motivação intrínseca 2,7(1,7-3,7)pts e do IA do BREQ-2 7,2(2,1-13,9) pts. A pontuação total do PAQLQ correlacionou-se com Regulação Introjetada e Motivação Intrínseca do BREQ-2 (r=-0,17 e r=0,16). O domínio Emoções do PAQLQ correlacionou-se com Regulação Externa e Introjetada do BREQ-2 (r=-0,17 e r=-0,23). A pontuação total do PedsQL correlacionou-se com Regulação Externa, Regulação Identificada, Motivação Intrínseca e o IA do BREQ-2 (r=-0,17, r=0,28, r=0,31 e r=0,26; P=0,05 para todos). **Conclusão**: a qualidade de vida de adolescentes com asma correlacionou-se de maneira fraca com as regulações motivacionais para exercício físico destes indivíduos.

Palavras-chave: Asma; Qualidade de Vida; Comportamento.

INTRODUCTION

Asthma is a chronic inflammatory disease characterized by hyperresponsiveness of the lower airways and variable airflow limitations. It is the third leading cause of hospitalization among children and young adults in Brazil and the average worldwide prevalence of asthma among adolescents (13 and 14 years old) reached 13.7% in 2006[1]. The most prevalent symptoms, such as cough, fatigue, dyspnea, wheezing, and chest tightness, restrict their activity of daily living and exercise. Among these symptoms, the sensation of dyspnea is one of the major factors limiting asthmatics' ability to exercise. Psychological factors, respiratory muscle strength, bronchoconstriction, and pulmonary hyperinflation can also interfere with the capacity and functional status of these patients[2].

Managing asthma is associated with a better quality of life, which leads to less damage to social life, as well as physical and emotional changes[3]. Moreover, subjective feelings reflect how asthma symptoms limit patients' ability to perform moderate to vigorous activities of daily living[4]. Regular physical activity improves exercise tolerance and reduces feelings of dyspnea and the use of medication[5].

According to the World Health Organization (WHO), children and adolescents between 5 and 17 should participate in moderate to vigorous intensity activities for 60 minutes every day[6]. Participation in sports activities is associated with a variety of benefits, such as improved cardiorespiratory capacity, motor coordination, and self-esteem. It is therefore crucial to encourage children to exercise from an early age, as this is a critical stage for developing future habits. However, some studies continue to show that children with asthma exercise less than their peers, although this is not a consensus[7-9]. These findings draw attention to a possible difference in behavior between asthmatics and the general population in terms of this type of activity.

The WHO defines quality of life as "a person's perceptions of their position in life, within the context of the culture and value systems in which they live, and in terms of their goals, expectations, standards, and concerns". Quality of life measures can provide information on the extent to which chronic illnesses interfere with the patient's social, emotional, and physical domains, from the individual's perspective[10].

Studies have found that patients with asthma have a poor quality of life, which is more prevalent in severe asthma, although it also affects those with moderate asthma. Regardless of severity, asthma impacts physical, psychological, and social aspects, leading to restrictions in daily life and a worse state of health than people without the disease[10].

Motivation is the factor that drives individuals to interact in the environment. It consists of biological, cognitive, and social regulations and is linked to habit adherence and maintenance. This motivation can be intrinsic, defined as the internal factors that motivate and relate to pleasure. Exploratory and curiosity-driven activities are examples of intrinsically motivated behavior, as they do not depend on external incentives or pressures. Meanwhile, extrinsic motivation refers to actions performed with goals and not out of one's own will[11].

Motivational regulation can be analyzed in a broader context, where individuals can progress from a less self-determined state to a more self-determined one, and vice versa. Currently, the Self-Determination Theory (SDT)[12], which identifies the degree to which motivation is less or more self-determined by the individual[13]. It has been highlighted as a more detailed approach to the study of motivational aspects involving the practice of physical exercise, considering that motivation can manifest itself in different ways, thus suggesting that more self-determined people are more likely to engage in certain behaviors because they acknowledge more autonomous reasons for carrying them out than those with low self-determination[12]. This scenario points to the importance of a study investigating whether the quality of life of these patients is linked to their motivation to exercise[11].

Given the importance of adopting and maintaining physical exercise in this population, it is crucial to study the role of behavioral variables such as motivation. This study aimed to investigate whether quality of life is linked to motivation to exercise in adolescents with asthma.

METHODS

This is a subgroup analysis of a cross-sectional, bicentric study conducted at the Pitágoras Unopar Anhanguera University (Londrina, Brazil) and the Nove de Julho University (São Paulo, Brazil). Subjects were prospectively recruited between May 2021 and December 2022, at routine medical appointments at the Pulmonology Outpatient Clinic of the Hospital das Clinics of the State University of Londrina and the Allergy, Clinical Immunology, and Rheumatology Outpatient Clinic of the Department of Pediatrics of the Federal University of São Paulo, inviting all those who met the inclusion criteria for the study, as well as direct invitations to guardians. All the adolescents with asthma were assessed in a single face-to-face consultation lasting approximately 40 minutes, after informed written consent had been obtained from their legal guardians and the adolescents had signed a consent form.

The study had the following inclusion criteria: adolescents aged between 12 and 19 years[14], native Brazilians, whose had a parent or guardian present at the appointment, and who had a clinical diagnosis of asthma according to GINA (Global Initiative for Asthma)[15]. The following exclusion criteria were applied: the patient's and/or family's wish to discontinue the study; adolescents with chronic diseases that could interfere with their ability

to understand the questionnaire; adolescents with other chronic respiratory diseases; and other chronic diseases.

Ethical matters

This study was approved by the Research Ethics Committees of Pitágoras Unopar Anhanguera University (number: 33873520.9.2002.0108) and Nove de Julho University (number: 33873520.9.0000.5511).

Assessments

Initial Assessment: General data was collected, such as age, weight, height, lifestyle habits, personal history, and self-reported (or reported by the guardian) comorbidities to characterize the sample.

Pulmonary function: Assessed by spirometry following international recommendations[16]. Patients underwent pre- and post-bronchodilator maneuvers. The following variables were recorded: forced vital capacity (FVC), forced expiratory volume in the first second (FEV1), FEV1/FVC ratio, and forced expiratory flow (FEF25-75).

Quality of life: The following questionnaires were applied to assess quality of life: Pediatric Asthma Quality of Life Questionnaire (PAQLQ) and Pediatric Quality of Life Inventory (Peds-QL).

The Pediatric Asthma Quality of Life Questionnaire (PAQLQ) comprises 23 questions divided into three domains: physical activity limitations (5 questions), symptoms (10 questions), and emotions (8 questions). The answers are measured on a 7-point scale, with 1 indicating maximum loss and 7 indicating no loss[17]. The overall PAQLQ score is the average of the answers to each of the 23 questions, calculated by adding all the questions together and dividing them by 23. The resulting overall score ranged from 1 to 7 (1 = severe impairment, 4 = moderate impairment, and 7 = mild impairment)[18,19]. This questionnaire has now been translated and validated for the Brazilian Portuguese language, targeting children and adolescents with asthma[17].

The Pediatric Quality of Life Inventory (Peds-QL) integrates specific merits of generic approaches and scales for specific diseases.It has been translated and validated into Portuguese[20]. The version of the instrument for children aged eight and older contains 23 items, divided into four domains: physical, emotional, social, and school function. A fifth domain, psychosocial, is the sum of the last three. Each item has five response options on a Likert scale (never: 0 to almost always: 4), values that are later operationalized and transformed into an inverse linear scale from 0 to 100, where the highest score represents the best state. The questions are asked regarding the last month.

Behavioral Regulation for Physical Exercise: Assessed through the Behavioral Regulation in Exercise Questionnaire-2 – BREQ-2, aimed at measuring the different internal and external motivational regulations, as well as amotivation, related to the practice of physical exercise. It consists of 19 Likert-type subscales with 5 response options from 0 (I do not feel this way) to 4 (I often feel this way). The 19 subscales comprise 5 different constructs: amotivation, external regulation, introjected regulation, identified regulation, and intrinsic motivation. The self-determination index (SI) is also calculated from this scale. The index can vary from -24 (lowest self-determination) to 20 (highest self-determination). The version used was translated into Brazilian Portuguese and validated for adolescents[21,22].

Statistical analysis: Data were plotted in Excel, statistical analysis was carried out in the Statistical Package for the Social Sciences (SPSS) version 22.0, and graphs were drawn in GraphPad Prism 6.0. The data were described as mean, standard deviation, median, and interquartile range. Initially, the Shapiro-Wilk test was used to check data distribution. Correlations were calculated using the Spearman or Pearson correlation coefficient. The value of $P<0.05$ was considered statistically significant.

Sample size calculation: Considering a power of 95% and a bilateral alpha of 0.05, 139 participants were needed to achieve a correlation with a minimum value of 0.30. Considering a 5% sample loss, a total of 145 participants were recruited.

RESULTS

The sample consisted of 154 adolescents with asthma, but 9 were excluded from the study as they were unable to answer the questionnaires completely, resulting in 145 adolescents. Most were male and had preserved lung function. Table 1 provides an overview of the participants' general characteristics, indicating that adolescents in general have a moderate quality of life and find more autonomous reasons for practicing physical exercise according to motivational regulations. Table 2 shows the guardians' personal information, most of whom are mothers with high school education and a low family income. Correlations revealed that the total score of the PAQLQ questionnaire showed weak correlations with the Introjected Regulation and Intrinsic Motivation domains of the BREQ-2 (Figure 1). The emotions domain of the PAQLQ showed weak correlations with the External and Introjected Regulation of the BREQ-2 (Figure 2). In addition, the total score of the Peds-QL showed weak correlations with External Regulation, Identified Regulation, Intrinsic Motivation, and the Self-Determination index of the BREQ-2 (Figure 3). None of the other correlations were statistically significant.

DISCUSSION

This study investigated the motivational reasons for practicing physical exercise in adolescents with asthma and

Table 1. Participants' data.

	n=145
Sociodemographic, anthropometric, and clinical data	
Sex (boys/ girls) [%]	82/63 [56/44]
Age (years old)	14±2
Body mass index (kg/m^2)	22.90±7.18
Time since diagnosis (years)	8.68 ± 4.04
Asthma control	
Well controlled n (%)	67 (42)
Partially controlled n (%)	54 (35)
Not controlled n (%)	24 (16)
Asthma severity	
Mild n (%)	96 (66)
Moderate n (%)	36 (24)
Severe n (%)	13 (8)
Lung Function	
FEV_1 (%predicted) pre BD	89.83±14.62
FVC (liters) pre BD	98.10±10.98
FEF 25-75% (liters/second) pre BD	76.13±23.86
FEV_1 /FVC (%) pre BD	90.41±12.44
FEV_1 (%predicted) post BD	95.33± 15,51
FVC (liters) post BD	102.03±13.67
FEF 25-75% (liters/second) post BD	85.52±22.38
FEV_1 /FVC (%) post BD	94.66±12.76
Quality of life	
Pediatric Asthma Quality of Life Questionnaire PAQLQ (points)	5.7 (5.0-6.3)
PAQLQ symptoms domain (points)	6.0 (5.0-6.8)
PAQLQ emotions domain (points)	5.5 (4.5-6.8)
PAQLQ physical activity limitation domain (points)	5.5 (5.3-6.6)
Pediatric Quality of Life Inventory Peds-QL (points)	79.3 (66.3-89.1)
Physical domain Peds-QL (points)	84.7 (67.3-93.4)
Emotional domain Peds-QL (points)	81.5 (66.3-92.9)
Social domain Peds-Ql (points)	84.7 (69.5-94.0)
School function domain Peds-QL (points)	88.0 (69.0-94.5)
Psychosocial domain Peds-QL (points)	81.5 (68.4-93.4)
Behavior Regulation for Physical Exercise	
Behavioral Regulation in Exercise Questionnaire-*2* BREQ-2	
Amotivation (points)	0.5 (0.0-1.2)
External regulation (points)	0.5 (0.0-1.5)
Introjected regulation (points)	0.6 (0.0-1.3)
Identified regulation (points)	2.2 (1.5-3.0)
Intrinsic motivation (points)	2.7 (1.7-3.7)
Self-determination index (points)	7.2 (2.1-13.9)

Data expressed as mean ± standard deviation and median (interquartile range); n: number of participants; %: percentage; FEV1: Forced expiratory volume in the 1st second; FVC: Forced vital capacity; FEF 25-75%: Intermediate forced expiratory flow; BD: bronchodilator.

Table 2. Legal guardians' data.

	n=145
Guardian present	
Mother n (%)	124 (85)
Father n (%)	12 (8)
Others n (%)	9 (6)
Guardian's education	
Incomplete Elementary school n (%)	22 (15)
Complete elementary school n (%)	7 (4)
Incomplete high school n (%)	16 (11)
Complete high school n (%)	73 (50)
Incomplete higher education n (%)	3 (2)
Complete higher education n (%)	24 (16)
Family income	
Up to R$1,908 n (%)	59 (40)
Between R$1,908 and R$2,862 n (%)	51 (35)
Between R$2,862 and R$5,724 n (%)	32 (22)
Between R$5,724 and R$9,540 n (%)	2 (1)
Between R$9,540 and R$14.310 n (%)	1 (0.6)

n: number of participants; % percentage.

quality of life based on the Self-Determination Theory[12]. We found that individuals who engage in physical exercise with a more autonomous – or self-determined – motivation tend to show greater mental health and well-being. However, those motivated by controlled motivations or for less self-determined reasons benefit to a lesser degree[12,13].

According to our findings, motivational regulation showed a weak correlation with quality of life in adolescents with asthma. The correlations found between the PAQLQ and the motivational regulations for physical exercise assessed by the BREQ-2 were expected. This is because the PAQLQ questionnaire is divided into several domains, and the emotional function domain addresses individuals' feelings regarding asthma symptoms[17]. It is expected that the more external reasons are identified, the lower the ability to perform physical exercise and the worse the quality of life[18,19]. However, to date, no other study confirming these findings is available in the literature.

The correlation between the Peds-QL and the motivational regulations for practicing physical exercise assessed by the BREQ-2 was also expected. Furthermore, the main complaint of adolescents with asthma concerns respiratory symptoms triggered by the characteristics of asthma and its pathophysiology in the respiratory system[15]. An instrument that better assesses perceptions of the impact of the disease and the functioning of treatment in the physical, mental, and social dimensions can lead to better performance in physical activities[20]. However, to date, this is the first study to show a relationship between this outcome and motivational regulation.

In addition, most of the sample consisted of boys, which is in line with previous research. Male children have a different anatomy of the lower respiratory tract due to its smaller diameter, greater airway tone, and lower pulmonary flow. This anatomical difference changes with age, leading to a higher incidence of the disease, and according to age[17-19].

The relationship between excess weight and asthma can be interpreted in two ways. First, weight gain can make it difficult to exercise and triggers the clinical signs of the disease. Second, being overweight can aggravate asthma by reducing the elasticity of the respiratory

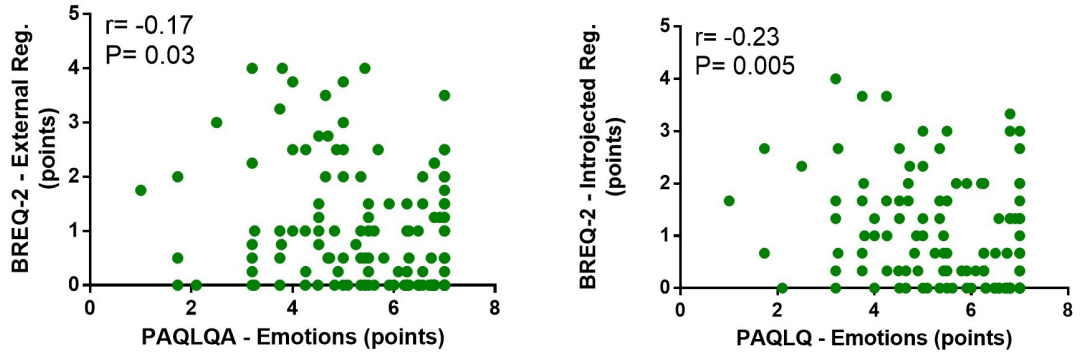

Figure 1. Statistically significant correlations between the Pediatric Asthma Quality of Life Questionnaire (PAQLQ) total score and the Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2) Introjected Reg. and Intrinsic Motivation.

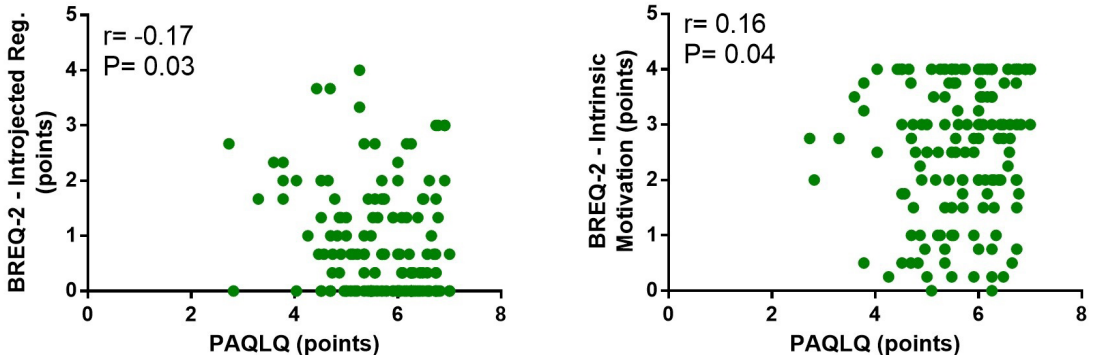

Figure 2. Statistically significant correlations of the Emotions domain of the Pediatric Asthma Quality of Life Questionnaire (PAQLQ) with External and Introjected Regulation of the Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2).

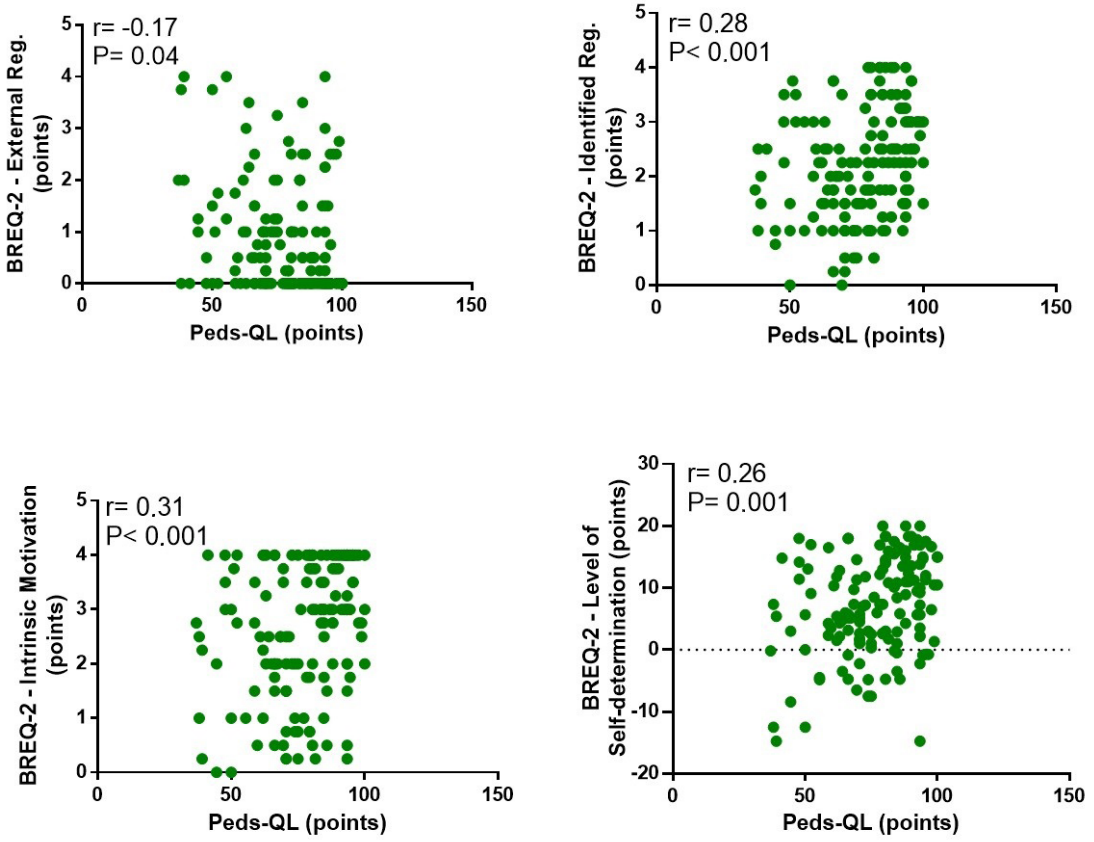

Figure 3. Statistically significant correlations between the Pediatric Quality of Life Inventory (Peds-QL) total score and the External Regulation, Introjected Regulation, Intrinsic Motivation, and Self-determination index of the Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2).

system, increasing the effort required to breathe, and reducing functional residual capacity (FRC). In addition, breathing with lower lung volumes can increase airway responsiveness. Thus, asthma can lead to the development of excess weight or obesity, while excess weight can make the symptoms more severe[23].

In terms of family income, this sample revealed a higher prevalence of patients living on a lower monthly income. Studies have shown a relationship between asthma and allergen sensitization in low-income populations[24]. Contact with allergens is one of the factors responsible for inflammation in allergic diseases, such as asthma and allergic rhinitis. Environmental control would be a form of prevention to reduce intradomestic allergen aerosols in patients who have this sensitization[25]. In addition, low-income populations often live in substandard housing and cluster together, which is associated with asthma diagnosis[26].

In Brazil, the low level of education of the population can interfere with adherence to asthma treatment. For adolescents, the education background of their parents or guardians can also play a significant role. Most parents of asthmatic children do not have satisfactory levels of knowledge about the disease and end up believing in popular myths about asthma, which hinders their understanding and acceptance of medical treatment[27]. Only parents who have children with asthma considered to be severe tend to seek out more information about the disease, directly interfering with the incentive to practice physical activities[26].

Other studies have also shown several weak correlations in attempting to correlate adherence to treatment and adolescents feeling the need to worry about their condition, adherence with disease control, and between adherence and quality of life. The only correlation found in one study was between disease control and quality of life. This indicates that patients tend to have emotional problems, which affect asthma symptoms. The more worries they have, the worse their quality of life will be[28].

In addition, the emotional state and behavior of these adolescents are linked to the quality of life of their parents[29]. This psychological distress is a key target for intervention to improve medication adherence, since motivation is a predictor of adherence to pharmacological treatment. Therefore, patients with greater self-efficacy are associated with greater motivation, and hence better acceptance of taking care of themselves[30].

The main limitations of our study concern the lack of adolescents from all social classes in the sample and the absence of data on the quantification of daily physical activities performed by the participants.

Our findings will contribute to the literature by helping health professionals in understanding the relationship between motivations to exercise and the quality of life of adolescents with asthma. Considering that the correlations observed here were only weak, further studies exploring the relationship between motivational regulation and other relevant outcomes for the asthma population will add relevant information to these results.

CONCLUSION

The quality of life of adolescents with asthma showed a weak correlation with their motivational regulation. Further studies could implement behavior change strategies aimed at achieving intrinsic motivation to practice physical exercise to investigate whether there is, in fact, a relevant impact on the quality of life of these adolescents.

FUNDING

Nothing to declare.

CONFLICT OF INTEREST

Nothing to declare.

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