



## ORIGINAL ARTICLE

# Longitudinal patterns of disordered eating behaviors in children and adolescents from the Brazilian High-Risk Cohort study for mental conditions

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**Objective:** Disordered eating behaviors (DEB) are dysfunctional changes in eating behavior that do not meet the diagnostic criteria for eating disorders. DEB affect a significant percentage of individuals, yet the topic remains under-researched. The current study investigates the developmental trajectory and psychopathological correlates of DEB in children and adolescents in Brazil.

**Methods:** The sample included 1,583 participants from the Brazilian High-Risk Cohort who were assessed across three waves between 2010 (age 6-12 years) and 2019 (age 12-21 years). Psychopathology was assessed through the Development and Well-Being Assessment, and DEB was assessed through Development and Well-Being Assessment's eating disorder section. Dimensional psychopathology was measured with the Child Behavior Checklist.

**Results:** The participants were divided into dysfunctional and non-dysfunctional eating groups. DEB varied significantly, with few participants having a persistent pattern. DEB were strongly linked to higher internalizing symptoms, especially in girls, but less to externalizing behaviors. DEB increased the likelihood of eating disorders, major depressive disorder, and higher body mass index.

**Conclusion:** This study reveals that DEB are frequent among Brazilian children and adolescents and are linked to psychopathology (especially internalizing symptoms) and body mass index. Future research should investigate the underlying mechanisms of DEB and develop strategies for early detection and effective interventions.

**Keywords:** Disordered eating behaviors; psychopathology; internalizing problems; body mass index

## Introduction

Disordered eating behaviors (DEB) include dieting, binge eating, meal skipping, vomiting, and laxative use.<sup>1-4</sup> While the terminology varies, DEB commonly refers to problematic eating habits. DEB are less frequent and severe than eating disorders (ED) and do not meet the diagnostic criteria for ED.<sup>2,4</sup> However, given the potentially life-threatening nature of ED and the significant association between early childhood eating difficulties and ED,<sup>5</sup> the importance of studying DEB is clear.

DEB can also be useful transdiagnostically, since they identify overlapping symptoms across various ED, thus addressing frequent diagnostic crossover.<sup>6,7</sup> This can lead to more comprehensive interventions, better treatment outcomes, and prevent DEB from escalating into full-syndrome ED. Understanding the frequency and

consequences of DEB is also important to educate adolescents and families about the risks associated with these behaviors, their long-term effects, and other comorbid problems.<sup>8</sup>

A recent systematic review<sup>9</sup> found a 22.36% global prevalence of DEB in children and adolescents. Several Brazilian studies have explored DEB. One study<sup>9</sup> found a 17.3% DEB prevalence in adolescents aged 13 to 19, while another study<sup>10</sup> found a 21.7% prevalence for girls aged 12-16 years. Ferreira and Veiga<sup>11</sup> reported a 37.3% prevalence of binge eating and 24.7% prevalence of strict dieting in this population. In women aged 12-29 years, Nunes et al.<sup>8</sup> found that 10.9% of the total sample had abnormal eating behaviors and 23.8% reported unusual eating patterns. Furthermore, a study<sup>12</sup> found binge eating in 20% and 8.4% of adolescents and adults, respectively; strict dieting or fasting in 18.9 and 2.4% of

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adolescents and adults, respectively; and purging in 3.3 and 2.2% in adolescents and adults, respectively. Research has shown that DEB are also highly prevalent in adults, typically ranging from 10% to 25%.<sup>13-16</sup> However, it is important to note that most research on DEB has focused on specific demographic groups, such as individuals of particular socioeconomic backgrounds,<sup>11</sup> women,<sup>3,8,14</sup> and university students,<sup>13,17,18</sup> indicating that more community-based studies are needed.

The literature also shows a strong relationship between DEB and internalizing (emotional) symptoms<sup>4,19</sup> and diagnoses related to this dimension, such as ED,<sup>5,20</sup> depression,<sup>10,21,22</sup> and anxiety.<sup>4</sup> DEB have also been linked to higher body mass index (BMI),<sup>12,23-25</sup> indicating potential negative impacts on physical health.<sup>26</sup> No significant correlations have been found between DEB and externalizing (behavioral) symptoms in general, though sex differences may influence this relationship.<sup>27</sup> Specifically, attention-deficit/hyperactivity disorder (ADHD) inattentive and impulsive symptoms have consistently predicted subclinical ED symptoms, mainly those associated with addictive eating behavior, while findings regarding hyperactivity symptoms vary.<sup>28,29</sup>

Culbert et al.<sup>30</sup> point out that the disproportionate focus on women and girls in DEB research overlooks its impact on men and boys, as well as and potential sex differences in prevalence and trajectory. Longitudinal studies beginning in pre-adolescence that involve high-risk groups, including comprehensive assessment of biological, psychological, and behavioral indicators, are needed to determine risk factors, developmental trajectories, and sex differences in DEB.<sup>26</sup> A population-based Brazilian cross-sectional study<sup>23</sup> conducted over 5 years found temporal changes in DEB prevalence, including a significant increase in binge eating (18.4%) but only slight variations in other DEB.

More research on early DEB development is needed, since most mental health issues begin in childhood and adolescence.<sup>31,32</sup> The relationship between DEB and psychopathological symptoms during development is unclear, with research mainly focusing on young adults rather than early developmental stages. Furthermore, most longitudinal studies on children and adolescents with community samples come from high-income countries,<sup>33</sup> highlighting the critical need for more research from low- and middle-income countries. In this context, our study aims to investigate the frequency, psychopathological correlates, and trajectory of DEB in children and adolescents in a longitudinal community sample from Brazil. Based on the literature, we expected to find an association between DEB and internalizing symptoms, a higher frequency among girls, and an association with high BMI. A deeper understanding of this topic is crucial for developing targeted early interventions, which could significantly reduce the long-term impact of DEB on mental health and quality of life.

## Methods

This project is based on the Brazilian High Risk Cohort Study for Mental Conditions.<sup>34</sup> Complete protocols and

additional information about the study are available in the Open Science Framework (<https://osf.io/ktz5h/>).

### Sample characteristics

Children and adolescents from 57 schools in Porto Alegre, Rio Grande do Sul and São Paulo, São Paulo were screened, resulting in a representative sample of 2,511 participants: a high-risk group with a family history of mental health issues (n=1,553) and a random group with no history of mental health issues (n=958). So far, the Brazilian High Risk Cohort Study for Mental Condition has completed three assessment stages: baseline (w0; 2010-2011, ages 6-14), the 3-year follow-up (w1; 2013-2014, ages 9-17), and the 6-year follow-up (2017-2019, ages 12-21). Figure 1 illustrates the sample and data collection procedures over time. A more detailed description of the sample is provided in Salum et al.<sup>34</sup>

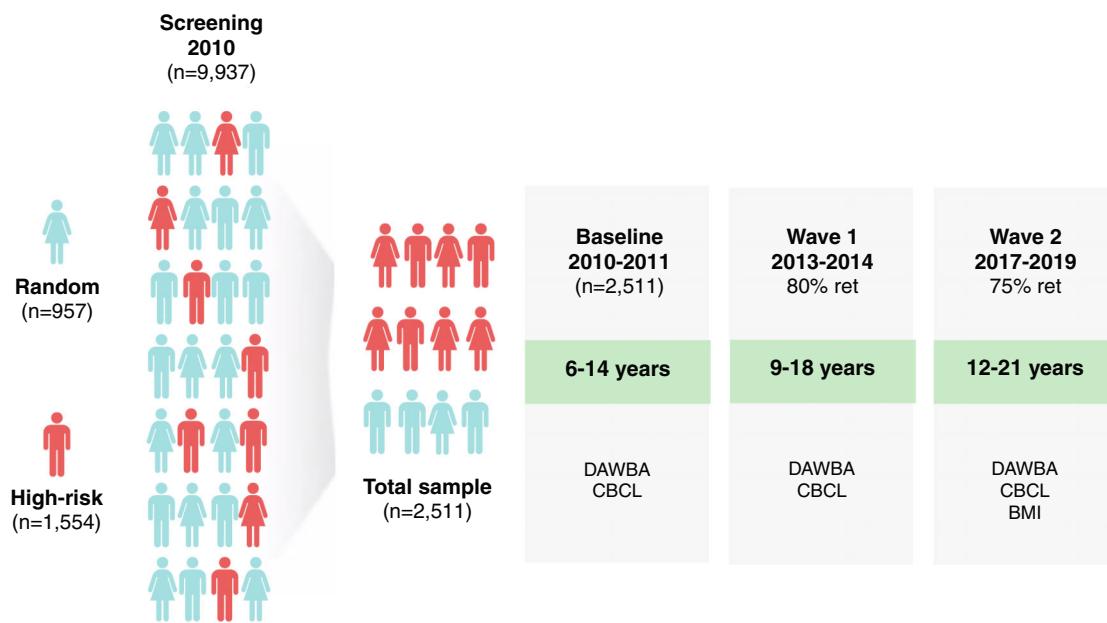
### Procedures

The Development and Well-Being Assessment (DAWBA),<sup>35</sup> which includes both structured and open-ended questions, was used to determine whether the participants met DSM-IV diagnostic criteria. Trained interviewers conducted structured interviews with caregivers, and all diagnoses were subsequently reviewed by psychiatrists.<sup>34</sup> This assessment was repeated at the 3- and 6-year follow-up, as shown in Figure 1. In the same protocol, the Child Behavior Checklist (CBCL)<sup>36</sup> was applied to assess behavioral problems and emotional aspects. At the 6-year follow-up, diagnostic interviews were conducted with caregivers for participants younger than 18 years of age and with the participants themselves if they were over 18 years of age (n=585). Caregivers and cohort participants were interviewed according to the Brazilian High Risk Cohort Study for Mental Condition study protocol to gather additional information on child and family demographics, medical history, academic performance, and major life events.<sup>34</sup> Participant BMI was calculated for the 6-year follow-up based on measurements taken during the data collection visit.

### Measurements

#### Disordered eating behaviors and psychiatric diagnoses

We used the DAWBA<sup>35</sup> to determine mental health diagnoses. The DAWBA ED section was used to assess DEB in our study. These items have been validated and show strong psychometric properties, making them suitable for assessing ED in both clinical and epidemiological contexts.<sup>37,38</sup> Given the lack of standardized instruments for evaluating DEB and the overlap between DEB and ED, we selected this instrument for our research. Its consists of five yes/no questions: i) Has [Name] ever thought he/she was fat, even when people told him/her that he/she was too thin?; ii) Would [Name] be embarrassed if people knew how much he/she eats?; iii) Has [Name] ever vomited on purpose?; iv) Does deciding what to eat, where to eat, or how much to eat get



**Figure 1** Sample characteristics and collected instruments in the Brazilian High Risk Cohort Study for Mental Conditions. BMI = body mass index; CBCL = Child Behavior Checklist; DAWBA = Development and Well-Being Assessment; ret = retention.

in the way of his/her life?; v) If [Name] eats too much, does he/she blame him/herself a lot?).

#### Dimensional psychopathology

The CBCL<sup>36</sup> assesses emotional and behavioral problems in children and adolescents through 113 items scored on a three-point Likert scale (0 = never, 1 = sometimes, 2 = often). It covers a range of issues, including aggressive behaviors, anxiety/depression, attention problems, delinquent behavior, social difficulties, somatic complaints, thought problems, and withdrawal. The CBCL differentiates between internalizing factors (emotional difficulties) and externalizing factors (outwardly expressed behaviors), providing an overall score. In this study, the CBCL was used to examine mental health concerns and their associations with DEB, extending beyond a diagnosis-only approach.

#### Statistical analysis

DEB were assessed using the five initial screening questions of the DAWBA ED section. Confirmatory factor analysis with diagonally weighted least squares and nonlinear least squares was performed to evaluate model fit. A 5-item latent class analysis was conducted to identify distinct groups based on DEB patterns. Models ranging from 1 to 6 classes were evaluated using the Bayesian information criterion, the sample-size adjusted Bayesian information criterion, and the consistent Akaike information criterion. Based on this, the frequency of DEB was assessed in each wave and cumulatively, representing the proportion of individuals with DEB during the follow-up

period. Additionally, logistic regression was used to examine risk factors for DEB, such as age, sex, and socioeconomic status (SES).

The developmental trajectory of DEB was investigated to determine its different patterns over time, and four subgroups were delineated. The incident group consisted of individuals with no DEB at baseline (w0) who developed them later (at w1 and/or w2). The remittent group includes those who initially experienced DEB (at w0 and/or w1) but not in subsequent assessments (at w1 and/or w2). The transient group consisted of individuals who had DEB at baseline (w0), did not have them at the 3-year follow-up (w1), and then experienced a recurrence by the 6-year follow-up (w2). This group also includes those without signs of DEB at baseline, with signs at the 3-year follow-up, and without signs at the 6-year follow-up. Finally, the persistent group included individuals with consistent DEB in each wave (w0, w1, and w2).

We assessed the frequency of diagnoses commonly associated with eating problems in the current literature: ED,<sup>5,20</sup> generalized anxiety disorder,<sup>4</sup> major depressive disorder,<sup>10,21</sup> and ADHD.<sup>28,29</sup> Logistic regression was used to investigate the association between DEB and diagnoses, controlling for age, sex, and SES. To assess psychopathology dimensionally, we used the CBCL, focusing on the dimensions of internalizing, externalizing, attention, and total problems, considering DEB group (DEB or non-DEB) and subgroups (incident, remittent, transient, and persistent). Mixed-design analysis of variance was used to examine the influence of DEB on psychopathology symptoms, considering the effect of time and potential interactions between factors. This was

followed by linear regression analyses to further determine the impact of DEB on psychopathology symptoms and BMI, controlling for age, sex, and SES. Statistical analyses were conducted in R-Studio 4.3.2.

This project was approved by the ethics committees of the Universidade de São Paulo, the Universidade Federal do Rio Grande do Sul, and other local institutions that participated in the data collection. Written informed consent was obtained from all participants and their caregivers.

## Results

### *Estimation and classification of disordered eating behaviors*

Confirmatory factor analysis indicated a well-fitting model, as demonstrated by a non-significant chi-square test ( $\chi^2 = 6.577$ ,  $p = 0.254$ ). Standardized loadings for the latent construct of DEB were significant ( $p < 0.001$ ), ranging from 0.510 to 0.878, indicating a strong association. The alpha coefficient of 0.853 suggested strong internal consistency among the observed variables of the DEB construct, confirming its high reliability. The omega coefficient ( $\omega = 0.669$ ) indicated a moderate level of internal consistency. Model fit indices further supported the model's adequacy, with a comparative fit index of 0.998, a Tucker-Lewis index of 0.997, and a root mean square error of approximation of 0.015. These findings suggest that the model satisfactorily fit the observed data, supporting the validity of the theoretical structure of DEB in this study. Details about the response distribution are shown in Supplementary Table S1.

DEB groups were subsequently classified using latent class analysis, with models 2 to 6 meeting the statistical criteria. The representativeness of different class numbers was assessed, revealing that many classes did not adequately encompass a significant percentage of individuals. These findings suggest that Model 2, which had fewer classes, effectively represented the data (Bayesian information criterion = 6520.217, sample-size adjusted Bayesian information criterion = 6485.267, consistent Akaike information criterion = 6531.217) while avoiding unnecessary complexity. Participants were categorized into a dysfunctional group (DEB group,  $n = 301$ , ~14%) and a non-dysfunctional group (non-DEB group,  $n = 2,210$ , ~86%). This model also showed a good fit in the subsequent waves (w1 and w2), in which latent class analysis was also applied.

### *Frequency of and risk factors for disordered eating behaviors*

DEB frequency and sociodemographic information is detailed in Table 1 for baseline and the 3-year and 6-year follow-ups.

Logistic regression analysis showed that age, sex, and SES were significant risk factors for DEB. The adjusted odds ratio (OR) for age was 1.10 (95%CI 1.03-1.16,  $p = 0.004$ ), indicating a 10% increase in DEB risk per year. The OR for girls was 2.38 (95%CI 1.81-3.13,  $p < 0.001$ ), meaning they are 2.38 times more likely to develop DEB than boys. Lower SES was linked to an increased DEB risk, with an OR of 0.97 (95%CI 0.93-1.01,  $p = 0.029$ ), reflecting a 3% reduction in risk per unit increase in SES.

### *Developmental trajectory of disordered eating behaviors*

The developmental trajectory of DEB was examined based on its presence or absence over time across three waves according to the latent class analysis. The analysis included a subsample of individuals with valid DEB data from the DAWBA items across all waves ( $n=1,583$ ). Four subgroups were formed based on the longitudinal impact of DEB: incident ( $n=130$ , 8.2%; 91 girls, 70%), remittent ( $n=131$ , 8.3%; 78 girls, 59.5%), transient ( $n=95$ , 6%; 53 girls, 55.8%), and persistent ( $n=31$ , 1.9%; 22 girls, 71%). The group without DEB was called non-DEB ( $n=1,196$ , 75.6%, 497 girls, 41.6%). All subgroups are shown in Figure 2.

The cumulative frequency analysis (from baseline to the 6-year follow-up) indicated that approximately 24.5% of the participants experienced DEB.

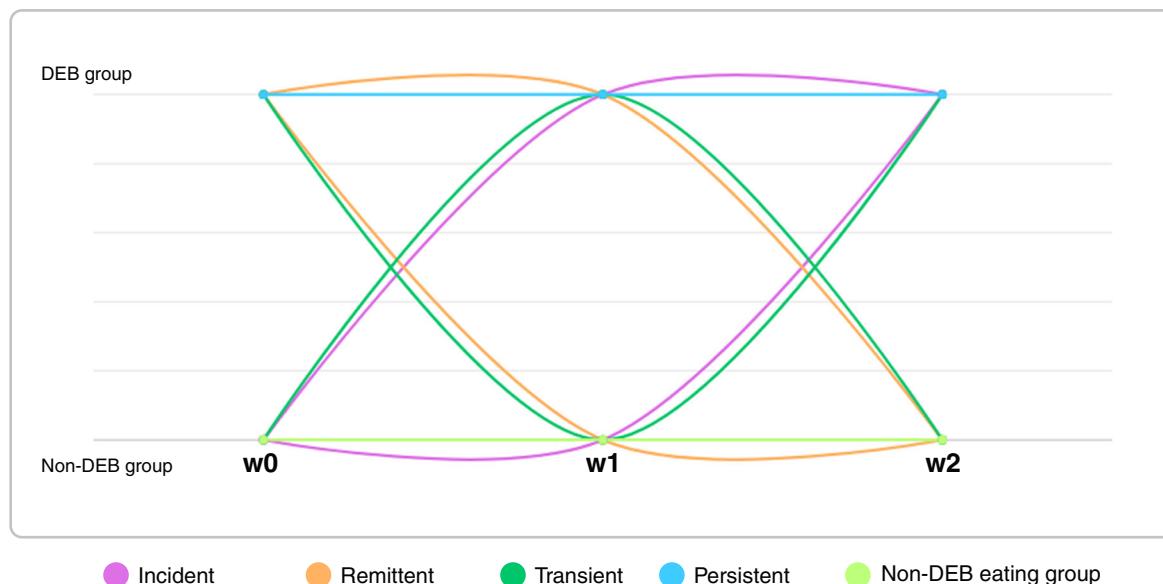
### *Disordered eating behaviors and psychopathology diagnosis*

The frequencies of ED, generalized anxiety disorder, major depressive disorder, and ADHD were investigated. Supplementary Table S2 presents an overview of the frequency of these disorders in relation to sociodemographic information at baseline and the 3-year and 6-year follow-up assessments. SES is reported for w0, since these data were used in the regression analysis. At baseline, according to the Brazilian Economic Classification Criteria proposed by the Brazilian Association of Research Companies in 2010 (2010), 11.8% of participants were categorized as low income, 71.2% as low middle income, and 17% as middle and high income.

**Table 1** Demographics of individuals with disordered eating behaviors in the sample

|                  | Participants n (%) | Age M (SD; range)     | Female sex n (%) | SES M (SD; range)     |
|------------------|--------------------|-----------------------|------------------|-----------------------|
| Baseline         | 191 (12.1)         | 10.7 (1.9; 6.0-13.9)  | 115 (60.2)       | 18.3 (4.4; 6.0-33.0)  |
| 3 year follow-up | 155 (9.8)          | 13.5 (1.7; 10.2-17.5) | 95 (61.3)        | 18.7 (4.6; 7.0-34.0)  |
| 6 year follow-up | 190 (12.0)         | 18.3 (2.0; 13.8-22.9) | 127 (66.8)       | 22.6 (6.2; 10.0-44.0) |

Brazilian Economic Classification Criteria proposed by the Brazilian Association of Research Companies in 2010. Scores of 0-13 correspond to classes D and E (low income), 14-22 to class C (low middle income), and 23-46 to classes B and A (upper middle and high income). M = mean; SES = socioeconomic status.



**Figure 2** Disordered eating subgroups based on developmental trajectory over time. Incident = individuals who developed disordered eating behaviors (DEB) later (at w1 [3-year follow-up] and/or w2 [6-year follow-up]); persistent = individuals with DEB in all waves (w0 [baseline], w1, and w2); non-DEB group = individuals without DEB in any wave; remittent = individuals who initially (at w0 and/or w1) but not subsequently (at w1 and/or w2) had DEB; transient = individuals with intermittent DEB.

Logistic regression analysis revealed that DEB was significantly associated with an increased likelihood of psychopathology development, showing a 2.10-fold higher risk in the DEB group (adjusted OR 2.10, 95%CI 1.64-2.70,  $p < 0.001$ ). DEB were also significantly associated with emotional disorders (adjusted OR 2.11, 95%CI 1.62-2.73,  $p < 0.001$ ), ED (adjusted OR 5.18, 95%CI 1.94-13.83,  $p = 0.001$ ), and major depressive disorder (adjusted OR 2.06, 95%CI 1.53-2.79,  $p < 0.001$ ), but not generalized anxiety disorder (adjusted OR 1.38, 95%CI 0.84-2.26,  $p = 0.203$ ) or ADHD (adjusted OR 1.39, 95%CI 0.72-2.73,  $p = 0.326$ ). The results for all covariates are shown in Supplementary Table S3.

#### *Disordered eating behaviors and psychopathology symptoms*

The effects of DEB and time on CBCL subscale scores (internalizing, externalizing, attention, and total problems) were assessed through mixed-design analysis of variance. The DEB group had higher total problem scores ( $F = 54.191$ ,  $p < 0.001$ ) that were not significantly affected by time ( $F = 2.343$ ,  $p = 0.096$ ) or DEB-time interaction ( $F = 1.446$ ,  $p = 0.236$ ). The DEB group had higher scores for internalizing problems ( $F = 94.786$ ,  $p < 0.001$ ), which were significantly affected by time ( $F = 21.417$ ,  $p < 0.001$ ) but not DEB-time interaction ( $F = 2.705$ ,  $p = 0.067$ ). DEB was also associated with higher externalizing scores ( $F = 18.565$ ,  $p < 0.001$ ), which were not affected by time ( $F = 0.289$ ,  $p = 0.749$ ) or interaction ( $F = 0.969$ ,  $p = 0.380$ ). DEB affected the attention problems dimension ( $F = 17.337$ ,  $p < 0.001$ ), including significant effects of time ( $F = 9.414$ ,  $p < 0.001$ ) and interaction ( $F = 3.561$ ,  $p = 0.029$ ). An exploratory linear regression analysis of other CBCL dimensions

found that DEB were significantly associated with all subscales except rule-breaking problems (Supplementary Table S4).

The multiple linear regression results regarding the effects of DEB and covariates on psychopathology symptoms are detailed in Table 2. Significant associations were found for the total problems dimension ( $F$ -statistic = 10.73,  $p < 0.001$ , adjusted  $R^2 = 0.048$ ), the internalizing problems dimension ( $F$ -statistic = 19.25,  $p < 0.001$ , adjusted  $R^2 = 0.087$ ), the externalizing problems dimension ( $F$ -statistic = 5.25,  $p < 0.001$ , adjusted  $R^2 = 0.022$ ), and the attentional problems dimension ( $F$ -statistic = 7.04,  $p < 0.001$ , adjusted  $R^2 = 0.031$ ).

#### *The trajectory of disordered eating behaviors and psychopathology symptoms*

The results of linear regression analysis regarding the effect of different DEB subgroups and covariates on psychopathology symptoms are detailed in Table 3. Significant results were found for the total problems dimension ( $F$ -statistic = 7.97,  $p < 0.001$ , adjusted  $R^2 = 0.060$ ), which was associated with the incident, persistent, and transient groups but not the remittent group. Significant results were found for the internalizing problems dimension ( $F$ -statistic = 13.91,  $p < 0.001$ , adjusted  $R^2 = 0.106$ ), which was associated with the incident, persistent, and transient groups, but not the remittent group. Significant results were also found for the externalizing problems dimension ( $F$ -statistic = 3.44,  $p = 0.001$ , adjusted  $R^2 = 0.022$ ), which was associated with the incident and transient groups but not the persistent and remittent groups. Finally, significant results were found for the attention problems dimension ( $F$ -statistic = 4.94,  $p < 0.001$ , adjusted  $R^2 = 0.035$ ), which

**Table 2** Linear regression analysis with disordered eating behaviors as a predictor of psychopathology symptoms

| Psychopathology symptoms (CBCL) | $\beta$ | SE    | t value | p-value |
|---------------------------------|---------|-------|---------|---------|
| Total problems                  |         |       |         |         |
| DEB                             | 10.923  | 2.021 | 5.405   | < 0.001 |
| Age                             | -0.948  | 0.759 | -1.247  | 0.213   |
| Sex                             | 1.938   | 1.658 | 1.169   | 0.243   |
| Socioeconomic score             | -0.393  | 0.185 | -2.122  | 0.034   |
| Internalizing problems          |         |       |         |         |
| DEB                             | 5.569   | 0.761 | 7.315   | < 0.001 |
| Age                             | 0.021   | 0.286 | 0.072   | 0.943   |
| Sex                             | 1.999   | 0.625 | 3.202   | 0.001   |
| Socioeconomic score             | -0.061  | 0.070 | -0.873  | 0.383   |
| Externalizing problems          |         |       |         |         |
| DEB                             | 1.924   | 0.741 | 2.597   | 0.010   |
| Age                             | -0.454  | 0.278 | -1.629  | 0.104   |
| Sex                             | 0.317   | 0.608 | 0.522   | 0.602   |
| Socioeconomic score             | -0.195  | 0.068 | -2.874  | 0.004   |
| Attention problems              |         |       |         |         |
| DEB                             | 1.449   | 0.374 | 3.869   | < 0.001 |
| Age                             | -0.261  | 0.141 | -1.854  | 0.064   |
| Sex                             | -0.743  | 0.307 | -2.420  | 0.016   |
| Socioeconomic score             | -0.082  | 0.034 | -2.379  | 0.018   |

CBCL = Child Behavior Checklist; DEB = disordered eating behaviors.

**Table 3** Linear regression analysis with disordered eating behavior trajectory groups as a predictor of psychopathology symptoms

| Psychopathology symptoms (CBCL) | $\beta$ | SE    | t value | p-value |
|---------------------------------|---------|-------|---------|---------|
| Total Problems                  |         |       |         |         |
| Incident group                  | 14.416  | 3.111 | 4.634   | < 0.001 |
| Persistent group                | 23.950  | 6.045 | 3.962   | < 0.001 |
| Remittent group                 | 3.129   | 3.283 | 0.953   | 0.341   |
| Transient group                 | 11.270  | 3.697 | 3.048   | 0.002   |
| Age                             | -0.699  | 0.760 | -0.921  | 0.357   |
| Sex                             | 1.832   | 1.650 | 1.110   | 0.267   |
| Socioeconomic score             | -0.407  | 0.185 | -2.206  | 0.028   |
| Internalizing problems          |         |       |         |         |
| Incident group                  | 7.188   | 1.167 | 6.160   | < 0.001 |
| Persistent group                | 11.912  | 2.268 | 5.253   | < 0.001 |
| Remittent group                 | 2.126   | 1.232 | 1.726   | 0.085   |
| Transient group                 | 5.397   | 1.387 | 3.892   | < 0.001 |
| Age                             | 0.130   | 0.285 | 0.457   | 0.648   |
| Sex                             | 1.943   | 0.619 | 3.139   | 0.002   |
| Socioeconomic score             | -0.069  | 0.069 | -0.994  | 0.320   |
| Externalizing problems          |         |       |         |         |
| Incident group                  | 2.341   | 1.147 | 2.040   | 0.042   |
| Persistent group                | 3.226   | 2.230 | 1.447   | 0.148   |
| Remittent group                 | 0.297   | 1.211 | 0.246   | 0.806   |
| Transient group                 | 2.959   | 1.364 | 2.170   | 0.030   |
| Age                             | -0.403  | 0.280 | -1.438  | 0.151   |
| Sex                             | 0.323   | 0.609 | 0.531   | 0.596   |
| Socioeconomic score             | -0.194  | 0.068 | -2.853  | 0.004   |
| Attention problems              |         |       |         |         |
| Incident group                  | 2.279   | 0.579 | 3.938   | < 0.001 |
| Persistent group                | 2.402   | 1.124 | 2.136   | 0.033   |
| Remittent group                 | 0.408   | 0.611 | 0.668   | 0.504   |
| Transient group                 | 1.253   | 0.688 | 1.822   | 0.069   |
| Age                             | -0.226  | 0.141 | -1.598  | 0.110   |
| Sex                             | -0.767  | 0.307 | -2.498  | 0.013   |
| Socioeconomic score             | -0.081  | 0.034 | -2.369  | 0.018   |

CBCL = Child Behavior Checklist.

was associated with the incident and persistent groups but not with the transient or remittent groups.

#### *Disordered eating behaviors and body mass index*

Linear regression analysis was used to investigate the association between DEB and BMI, including all covariates (age, sex, and SES). The model's results were significant for the general DEB category (DEB vs. non-DEB) ( $F$ -statistic = 30.49,  $p < 0.001$ , adjusted  $R^2 = 0.08$ ). There was a positive association between DEB ( $\beta = 3.245$ ,  $p < 0.001$ ) and age ( $\beta = 0.435$ ,  $p < 0.001$ ) and BMI, but there were no significant effects for sex ( $\beta = 0.235$ ,  $p = 0.451$ ) or SES ( $\beta = 0.041$ ,  $p = 0.227$ ).

The results were also significant for the DEB subgroups ( $F$ -statistic = 26.01,  $p < 0.01$ , adjusted  $R^2 = 0.07$ ), including a positive association between all DEB subgroups and BMI (incident  $\beta = 2.077$ ,  $p < 0.001$ ; transient,  $\beta = 3.900$ ,  $p < 0.001$ ; remittent  $\beta = 3.121$ ,  $p < 0.001$ ; and persistent  $\beta = 6.692$ ,  $p < 0.001$ ). Age was positively associated with BMI ( $\beta = 0.437$ ,  $p < 0.001$ ), but sex ( $\beta = 0.248$ ,  $p = 0.423$ ) and SES ( $\beta = 0.034$ ,  $p = 0.311$ ) did not influence the outcome.

## Discussion

Our study investigated the trajectory of DEB and its associations with psychopathology in a cohort of children and adolescents. DEB varied significantly over time, with only a small proportion of individuals displaying a persistent pattern. DEB were strongly associated with higher rates of internalizing symptoms, particularly among girls, while the association with externalizing behaviors was weaker. DEB also increased the likelihood of developing ED and major depressive disorder. We also found a positive association between DEB and BMI when comparing the DEB group and subgroups (incident, remittent, transient, and persistent).

#### *Disordered eating behaviors: frequency, trajectory, and risk factors*

The frequency of DEB in our cohort was 12.1% at baseline, 9.8% at the 3-year follow-up assessment, and 12% at the 6-year follow-up assessment. These rates are slightly lower than previous reports, which might be attributable to the fact that our sample was from a low-/middle-income country, in contrast to studies conducted in high-income countries<sup>33</sup> or among specific demographic groups,<sup>8,11,13</sup> whose characteristics could differ from the general population. Most Brazilian studies<sup>8-12</sup> on DEB have focused on adolescents and young adults, finding prevalence rates around 20%. In contrast, our data are from individuals in early childhood, which may explain the lower frequency of DEB, given that the onset of eating problems is more common during adolescence.<sup>39</sup> Additionally, the lack of standardized instruments for measuring DEB could also influence the variability of results across studies.

We also examined the developmental trajectory of DEB over time. Our findings suggest that DEB are variable,

with only a small percentage of participants showing a persistent pattern (1.95%) throughout development. In the majority of individuals, DEB fluctuated over time, with 8.21% experiencing incident DEB, 8.27% experiencing remission, and 6% experiencing transient episodes. These findings are consistent with a previous longitudinal study<sup>17</sup> on DEB trajectories in girls, which identified distinct DEB patterns over time.

Contrary to these findings, a 10-year longitudinal study<sup>18</sup> reported that DEB consistently worsened or remained stable over time. Nunes et al.<sup>40</sup> also found similar results on the presence of DEB at the initial evaluation and its persistence 4 years later. It is important to note that their study primarily focused on adolescents and young adults, whereas our sample mainly consisted of children and adolescents. It is important to consider that different developmental stages could influence DEB variability. We found an increased risk of DEB with advancing age, as noted in a previous study,<sup>41</sup> and DEB has also been associated with the onset of puberty.<sup>26,39,42,43</sup>

Our findings also show that girls are more prone to DEB, which is consistent with previous research.<sup>23,44,45</sup> Santana et al.<sup>23</sup> found that girls were more likely to experience DEB, especially strict dieting or fasting, and that this likelihood significantly increased over a 5-year period. Lower SES was also associated with a higher prevalence of DEB, which was consistent with previous research.<sup>46</sup> Several studies have pointed out that an altered relationship with the body is a key risk factor in worsening DEB, including internalization of the thin ideal,<sup>47</sup> concerns about weight gain,<sup>48</sup> and body dissatisfaction.<sup>26,41,46,49</sup>

Despite its subclinical nature, DEB can lead to significant physical<sup>18</sup> and psychological distress.<sup>26,30</sup> Our longitudinal data reveal that nearly a quarter of individuals experience DEB at some point in their lives, which highlights the need for early detection and intervention. Further longitudinal research is needed to clarify how DEB evolve over time across different life stages, enhancing our understanding of its trajectory.

#### *Disordered eating behaviors and psychopathology*

Given the longitudinal nature of our study, we examined the effects of DEB, time, and their interaction on psychopathology. DEB significantly impacted all analyzed dimensions, influencing the total problems, internalizing problems, externalizing problems, and attention problems domains. Time only affected internalizing problems and attention problems, suggesting these dimensions are time-sensitive. The interaction between DEB and time was significant only for the attention problems dimension, suggesting that the effects of DEB on attention difficulties may evolve over time.

Our results indicate that DEB are both an indicator and a risk factor for mental health issues, with DEB subgroups (except the remittent group) significantly affecting the total problems dimension. It is reasonable to expect that the remittent group, who ceased to experience DEB, would not be associated with high symptom levels. A previous study<sup>40</sup> with adolescents and young women found that

DEB were associated with a higher chance of developing a psychiatric diagnosis. Additionally, COVID-19 pandemic research has shown an association between DEB and negative mood changes in young women.<sup>18</sup>

In our sample, DEB were significantly associated with internalizing problems, which is consistent with previous studies linking eating issues to emotional issues.<sup>4,19</sup> Girls were more likely to experience both DEB and internalizing problems, which aligns with other findings that girls have a higher DEB prevalence and likelihood of emotional issues, especially during adolescence.<sup>45,50</sup> All of the DEB subgroups had a significant effect on internalizing symptoms except for the remittent group, which can be explained by the discontinuity of DEB over time in this subgroup and its impact on symptomatology.

We observed a significant association between DEB and ED, which aligns with current research linking these conditions with shared behaviors, such as dieting or binge eating.<sup>20,51</sup> Our analysis revealed that DEB significantly influence ED, increasing their likelihood by 5.18 times. However, it remains unclear whether early life DEB are an early manifestation of ED or if the relationship is more complex. Alvarenga et al.<sup>52</sup> explored DEB in individuals with ED, finding DEB specificities for each type of diagnosed ED, which could indicate that different forms of DEB may lead to varying ED outcomes. This complex relationship and its underlying mechanisms should be clarified in future research to determine whether early intervention in DEB could help prevent ED onset, particularly given the high mortality rates<sup>53,54</sup> linked to these disorders.

There was a strong association between DEB and major depressive disorder, which is in line with the current literature.<sup>10,19,21</sup> Puccio et al.<sup>21</sup> propose that DEB and major depressive disorder may act as mutual risk factors, implying shared underlying mechanisms, which could be investigated in future studies. One study<sup>10</sup> found that 18% of the variance in risk behaviors for ED (called DEB in our study) was explained by depressive symptoms.

DEB did not have a significant effect on generalized anxiety disorder in our study, which is in line with the results of Holm-Denoma et al.<sup>19</sup> In contrast, other authors<sup>4</sup> have discussed the high comorbidity between generalized anxiety disorder and major depressive disorder, suggesting that anxiety may attenuate the strong association between depression and DEB. Comorbidity between these diagnoses may help explain the variability in findings across studies.

The externalizing symptoms dimension does not seem strongly related to DEB, showing only a small predictive effect in our study. Among the DEB subgroups, only the incident and transient groups influenced the externalizing symptoms dimension, although with a smaller effect than the other dimensions. This is consistent with previous studies that have reported a weaker association between DEB and externalizing symptoms, given that male sex may significantly influence the occurrence of these symptoms.<sup>27</sup>

ADHD has been associated with ED, mostly binge eating,<sup>55-57</sup> but research into its relationship with DEB is scarce. In our study, overall ADHD diagnosis was not

significantly influenced by DEB. However, attentional symptoms were associated with DEB, which supports the hypothesis that the attentional aspects of ADHD are specifically linked to DEB habits.<sup>28,29,58</sup> Nevertheless, it is important to explore the complexities of this relationship, particularly given the time-dependent nature of these interactions. Regarding DEB subgroups, only the incident and persistent groups significantly affected this dimension.

#### *Disordered eating behaviors and body mass index*

DEB can affect mental health and has significant implications for physical health<sup>18,26</sup> and higher BMI.<sup>23,25,59</sup> The adverse effects of DEB reach beyond psychological distress, which shows the importance of comprehensive approaches that address both mental and physical well-being. We found a positive association between BMI and DEB, both overall and for different DEB subgroups. This is in line with various studies that have discussed the relationship between a higher BMI and DEB,<sup>8,10,23,24,48</sup> which supports the hypothesis that DEB are associated with changes in BMI over time.

Ferreira et al.<sup>12</sup> found that specific DEB patterns, such as binge eating and strict dieting or fasting, are more closely linked to higher BMI in adolescents, while purging behaviors tend to be associated with being underweight. This suggests that DEB are predominantly related to higher BMI, though some forms of disordered eating may influence BMI in different ways. Interestingly, the same study found no significant relationship between BMI and DEB in adults, which could indicate an age-related effect. Five years later, a follow-up to this population-based cross-sectional study,<sup>23</sup> using probability sampling, confirmed an even stronger association between DEB and higher BMI. These findings emphasize the relationship between DEB and weight gain and suggest that the increase in DEB prevalence could contribute to increasing rates of overweight, as we hypothesized.

The persistent DEB subgroup had the highest estimated coefficient, indicating a significant increase in BMI for these individuals. The other groups also showed significant, albeit more moderate, increases in BMI. It is important to emphasize that although the association between DEB and BMI was statistically significant, the model accounts for only a modest portion of the variation in BMI. Other factors, such as lifestyle, genetics, and environmental influences, also play a significant role in weight gain and should be explored in future studies. More research is needed to deepen our understanding of the mechanisms underlying these associations.

#### *Summary*

Defining and measuring DEB remains challenging due to their complexity and the lack of a universal definition or standardized measurement instruments,<sup>2</sup> which complicates accurate assessment and comparison across contexts and populations. DEB often go unnoticed by individuals and their caregivers, resulting in a lack of professional intervention, which exacerbates their

long-term impact on quality of life. It is also worth noting that no specific treatment protocols exist for DEB.

Our research, whose aim was to deepen understanding of DEB, particularly among children and adolescents, highlights the need for practical interventions focused on early detection and treatment. Early intervention, potentially through public policy, could significantly mitigate the long-term impacts of DEB on mental health and quality of life. Clinicians, educators, and caregivers would benefit from increased awareness and targeted training programs to identify early signs of DEB. Better understanding of DEB could facilitate the development of standardized instruments.

Future longitudinal studies should further investigate the development and trajectory of DEB and their impact on quality of life and mental health symptoms, particularly in low- and middle-income countries. Research should also prioritize the identification and development of effective interventions, especially for children and adolescents.

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## Disclosure

The authors report no conflicts of interest.

## Data availability statement

Anonymized data is available upon request. The Brazilian High-Risk Cohort project is available at <https://osf.io/ktz5h/>.

## Author contributions

IPO: Conceptualization, Data curation, Formal analysis, Writing – original draft.

ACF: Formal analysis, Writing – original draft.

GAS: Funding acquisition, methodology, project administration, and writing – review & editing.

AG: Writing – review & editing.

PMP: Funding acquisition, Project administration, Writing – review & editing.

ECM: Funding acquisition, Project administration, and Writing – review & editing.

DCM: Conceptualization, Supervision.

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All authors have read and approved of the final version to be published.

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## References

- 1 Crejo B da C, Mathias MG. Comer transtornado e o transtorno de compulsão alimentar e as abordagens da nutrição comportamental. *Rev Interciência*. 2021;1:37-44.
- 2 Leal GVDS, Philippi ST, Polacow VO, Cordás TA, Alvarenga MDS. O que é comportamento de risco para transtornos alimentares em adolescentes? *J Bras Psiquiatr*. 2013;62:62-75.
- 3 Reba-Harrelson L, Holle AV, Hamer RM, Swann R, Reyes ML, Bulik CM. Patterns and Prevalence of Disordered Eating and Weight Control Behaviors in Women Ages 25-45. *2009;14:190-8*.
- 4 Thomas KS, Williams MO, Vanderwert RE. Disordered eating and internalizing symptoms in preadolescence. *Brain Behav*. 2021;11: e01904.
- 5 McClelland J, Robinson L, Potterton R, Mountford V, Schmidt U. Symptom trajectories into eating disorders: a systematic review of longitudinal, nonclinical studies in children/adolescents. *Eur Psychiatry*. 2020;63:e60.
- 6 Curzio O, Maestro S, Rossi G, Calderoni S, Giombini L, Scardigli S, et al. Transdiagnostic vs. disorder-focused perspective in children and adolescents with eating disorders: findings from a large multisite exploratory study. *Eur Psychiatry*. 2018;49:81-93.
- 7 Vervaet M, Puttevils L, Hoekstra RHA, Fried E, Vanderhasselt MA. Transdiagnostic vulnerability factors in eating disorders: a network analysis. *Eur Eat Disord Rev*. 2021;29:86-100.
- 8 Nunes MA, Barros FC, Olinto MTA, Camey S, Mari JDJ. Prevalence of abnormal eating behaviours and inappropriate methods of weight control in young women from Brazil: a population-based study. *Eat Weight Disord*. 2003;8:100-6.
- 9 Leal GVDS, Philippi ST, Alvarenga MDS. Unhealthy weight control behaviors, disordered eating, and body image dissatisfaction in adolescents from São Paulo, Brazil. *Braz J Psychiatry*. 2020;42:264-70.
- 10 Fortes LDS, Filgueiras JF, Ferreira MEC. Risk behaviors for eating disorders and depressive symptoms: a study of female adolescents in Juiz de Fora, Minas Gerais State, Brazil. *Cad Saude Publica*. 2014;30:2443-50.
- 11 Souza Ferreira JE, da Veiga GV. Eating disorder risk behavior in Brazilian adolescents from low socio-economic level. *Appetite*. 2008;51:249-55.
- 12 Ferreira JE, de Souza PRB Jr, da Costa RS, Sichieri R, da Veiga GV. Disordered eating behaviors in adolescents and adults living in the same household in metropolitan area of Rio de Janeiro, Brazil. *Psychiatry Res*. 2013;210:612-7.
- 13 de Matos AP, Rodrigues PRM, Fonseca LB, Ferreira MG, Muraro AP. Prevalence of disordered eating behaviors and associated factors in Brazilian university students. *Nutr Health*. 2021;27:231-41.
- 14 Vlachakis D, Vlachakis C. Prevalence of disordered eating attitudes in young adults [Internet]. 2014 [cited 2025 Feb 13]. [peerj.com/preprints/538v1/](http://peerj.com/preprints/538v1/).
- 15 Gauvin L, Steiger H, Brodeur JM. Eating-disorder symptoms and syndromes in a sample of urban-dwelling Canadian women: contributions toward a population health perspective. *Int J Eat Disord*. 2009;42:158-65.
- 16 Wade TD, Wilksch SM, Lee C. A longitudinal investigation of the impact of disordered eating on young women's quality of life. *Health Psychol*. 2012;31:352-9.
- 17 Yu J, Lu M, Tian L, Lu W, Meng F, Chen C, et al. Prevalence of disordered eating attitudes among university students in Wuhu, China. *Nutr Hosp*. 2015;1752-7.
- 18 Gottardi NRDM, Pereira ACDF, Cattafesta M, Salaroli LB, Soares FLP. Disordered eating during COVID-19 pandemic is associated with nutritional status, negative mood changes, and body image in university students. *J Health Psychol*. 2023;28:774-86.
- 19 Holm-Denoma JM, Hankin BL, Young JF. Developmental trends of eating disorder symptoms and comorbid internalizing symptoms in children and adolescents. *Eat Behav*. 2014;15:275-9.
- 20 Herle M, Stavola B, Hübel C, Abdulkadir M, Ferreira DS, Loos RJF, et al. A longitudinal study of eating behaviours in childhood and later eating disorder behaviours and diagnoses. *Br J Psychiatry*. 2020; 216:113-9.
- 21 Puccio F, Fuller-Tyszkiewicz M, Youssef G, Mitchell S, Byrne M, Allen N, et al. Longitudinal bi-directional effects of disordered eating, depression and anxiety. *Eur Eat Disord Rev*. 2017;25:351-8.
- 22 Zhang Z, Robinson L, Jia T, Quinlan EB, Tay N, Chu C, et al. Development of disordered eating behaviors and comorbid depressive symptoms in adolescence: neural and psychopathological predictors. *Biol Psychiatry*. 2021;90:853-62.
- 23 Santana DD, Barros EG, Costa RSD, da Veiga GV. Temporal changes in the prevalence of disordered eating behaviors among

- adolescents living in the metropolitan area of Rio de Janeiro, Brazil. *Psychiatry Res.* 2017;253:64-70.
- 24 Neumark-Sztainer D, Wall M, Larson NI, Eisenberg ME, Loth K. Dieting and disordered eating behaviors from adolescence to young adulthood: findings from a 10-year longitudinal study. *J Am Diet Assoc.* 2011;111:1004-11.
  - 25 Kärkkäinen U, Mustelin L, Raevuori A, Kaprio J, Keski-Rahkonen A. Do disordered eating behaviours have long-term health-related consequences? *Eur Eat Disord Rev.* 2018;26:22-8.
  - 26 Patrick JH, Stahl ST, Sundaram M. Disordered eating and psychological distress among adults. *Int J Aging Hum Dev.* 2011;73:209-26.
  - 27 Slane JD, Burt SA, Klump KL. The road less traveled: associations between externalizing behaviors and eating pathology. *Int J Eat Disord.* 2010;43:149-60.
  - 28 El Archi S, Cortese S, Ballon N, Réveillère C, De Luca A, Barrault S, et al. Negative affectivity and emotion dysregulation as mediators between ADHD and disordered eating: a systematic review. *Nutrients.* 2020;12:3292.
  - 29 Martin E, Dourish CT, Hook R, Chamberlain SR, Higgs S. Associations between inattention and impulsivity ADHD symptoms and disordered eating risk in a community sample of young adults. *Psychol Med.* 2022;52:2622-31.
  - 30 Culbert KM, Racine SE, Klump KL. Research review: what we have learned about the causes of eating disorders – a synthesis of sociocultural, psychological, and biological research. *J Child Psychol Psychiatry.* 2015;56:1141-64.
  - 31 Caspi A, Houts RM, Fisher HL, Danese A, Moffitt TE. The general factor of psychopathology (p): choosing among competing models and interpreting p. *Clin Psychol Sci.* 2024;12:53-82.
  - 32 Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. *Arch Gen Psychiatry.* 2005;62:593-602.
  - 33 López-Gil JF, García-Hermoso A, Smith L, Firth J, Trott M, Mesas AE, et al. Global proportion of disordered eating in children and adolescents: a systematic review and meta-analysis. *JAMA Pediatr.* 2023;177:363-72.
  - 34 Salum GA, Gadelha A, Pan PM, Moriyama TS, Graeff-Martins AS, Tamanaha AC, et al. High risk cohort study for psychiatric disorders in childhood: rationale, design, methods and preliminary results. *Int J Methods Psychiatr Res.* 2015;24:58-73.
  - 35 Goodman R, Ford T, Richards H, Gatward R, Meltzer H. The development and well-being assessment: description and initial validation of an integrated assessment of child and adolescent psychopathology. *J Child Psychol Psychiatry.* 2000;41:645-55.
  - 36 Bordin IAS. Validação da versão brasileira do [Validation of the Brazilian version of the Child Behavior Checklist (CBCL)]. *Rev ABP-APAL.* 1995;17:55-66.
  - 37 O'Logbon J, Newlove-Delgado T, McManus S, Mathews F, Hill S, Sadler K, et al. How does the increase in eating difficulties according to the Development and Well-Being Assessment screening items relate to the population prevalence of eating disorders? An analysis of the 2017 Mental Health in Children and Young People survey. *Int J Eat Disord.* 2022;55:1777-87.
  - 38 Moya T, Fleitlich-Bilyk B, Goodman R, Nogueira FC, Focchi PS, Nicoletti M, et al. The Eating Disorders Section of the Development and Well-Being Assessment (DAWBA): development and validation. *Braz J Psychiatry.* 2005;27:25-31.
  - 39 Baker JH, Thornton LM, Lichtenstein P, Bulik CM. Pubertal development predicts eating behaviors in adolescence. *Int J Eat Disord.* 2012;45:819-26.
  - 40 Nunes MA, Olinto MTA, Camey S, Morgan C, de Jesus Mari J. Abnormal eating behaviors in adolescent and young adult women from southern Brazil: reassessment after four years. *Soc Psychiatry Psychiatr Epidemiol.* 2006;41:951-6.
  - 41 de Souza Cavalcanti AMT, de Arruda IKG, Moreno de Lima EAC, Neto WB, Meirelles Monteiro EML, de Lima LS, et al. Characterization of eating behavior disorders in school-aged children and adolescents: a population-based study. *Int J Adolesc Med Health.* 2016 Jan; 21(29):ijamh.2017.29.issue-3/ijamh-2015-0087/ijamh-2015-0087.xml. doi: 10.1515/ijamh-2015-0087
  - 42 Klump KL, Perkins PS, Alexandra Burt S, McGue M, Iacono WG. Puberty moderates genetic influences on disordered eating. *Psychol Med.* 2007;37:627-34.
  - 43 Moore SR, McKone KMP, Mendle J. Recollections of puberty and disordered eating in young women. *J Adolesc.* 2016;53:180-8.
  - 44 Bor W, Dean AJ, Najman J, Hayatbakhsh R. Are child and adolescent mental health problems increasing in the 21st century? A systematic review. *Aust N Z J Psychiatry.* 2014;48:606-16.
  - 45 Herpertz-Dahlmann B, Wille N, Hölling H, Vloet TD, Ravens-Sieberer U; BELLA study group. Disordered eating behaviour and attitudes, associated psychopathology and health-related quality of life: results of the BELLA study. *Eur Child Adolesc Psychiatry.* 2008;17 Suppl 1: 82-91.
  - 46 Larson N, Loth KA, Eisenberg ME, Hazzard VM, Neumark-Sztainer D. Body dissatisfaction and disordered eating are prevalent problems among U.S. young people from diverse socioeconomic backgrounds: findings from the EAT 2010-2018 study. *Eat Behav.* 2021;42:101535.
  - 47 Fairweather-Schmidt AK, Wade TD. Characterizing and predicting trajectories of disordered eating over adolescence. *J Abnorm Psychol.* 2016;125:369-80.
  - 48 de Macêdo PFC, Brito E, de Magalhães Cunha C, da Purificação Nazaré Araújo M, Martins PC, de Santana MLP. Weight stigma and disordered eating behaviors during the COVID-19 pandemic: the mediating role of weight gain concern and psychological distress. *Eat Weight Disord.* 2023;28:78.
  - 49 de Carvalho PHB, Alvarenga MDS, Ferreira MEC. An etiological model of disordered eating behaviors among Brazilian women. *Appetite.* 2017;116:164-72.
  - 50 Gutman LM, Codiroli McMaster N. Gendered pathways of internalizing problems from early childhood to adolescence and associated adolescent outcomes. *J Abnorm Child Psychol.* 2020;48:703-18.
  - 51 Neumark-Sztainer D, Wall M, Guo J, Story M, Haines J, Eisenberg M. Obesity, disordered eating, and eating disorders in a longitudinal study of adolescents: how do dieters fare 5 years later? *J Am Diet Assoc.* 2006;106:559-68.
  - 52 Alvarenga MS, Koritar P, Pisciolaro F, Mancini M, Cordás TA, Scagliusi FB. Eating attitudes of anorexia nervosa, bulimia nervosa, binge eating disorder and obesity without eating disorder female patients: differences and similarities. *Physiol Behav.* 2014;131:99-104.
  - 53 Smink FRE, van Hoek D, Hoek HW. Epidemiology of eating disorders: incidence, prevalence and mortality rates. *Curr Psychiatry Rep.* 2012;14:406-14.
  - 54 Attia E, Guarda AS. Prevention and early identification of eating disorders. *JAMA.* 2022;327:1029-31.
  - 55 Biederman J, Ball SW, Monuteaux MC, Surman CB, Johnson JL, Zeitlin S. Are girls with ADHD at risk for eating disorders? Results from a controlled, five-year prospective study. *J Dev Behav Pediatr.* 2007;28:302-7.
  - 56 Cortese S, Bernardino BD, Moura M-C. Attention-deficit/hyperactivity disorder (ADHD) and binge eating. *Nutr Rev.* 2008;65:404-11.
  - 57 Villa FM, Crippa A, Rosi E, Nobile M, Brambilla P, Delvecchio G. ADHD and eating disorders in childhood and adolescence: an updated minireview. *J Affect Disord.* 2023;265-71.
  - 58 Baraskewich J, Clime EA. The relation between symptoms of ADHD and symptoms of eating disorders in university students. *J Gen Psychol.* 2022;149:405-19.
  - 59 Kessler RC, Berglund PA, Chiu WT, Deitz AC, Hudson JI, Shahly V, et al. The prevalence and correlates of binge eating disorder in the World Health Organization World Mental Health Surveys. *Biol Psychiatry.* 2013;73:904-14.