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Original Article

Anxiety, Depressive Symptomatology, and Perfectionism Traits and Their Relationship with Disorders of Gut–Brain Interaction in Children

Andreea Cristiana Milea Milea,[1] **Carmen Jovaní Casano**,[2] **Mónica Rubio Sánchez**,[2] **and Jesús Lucas Garcia**[2]

[1]Department of Pediatrics, FISABIO- Castellón General University Hospital, Castelló de la Plana, Spain
[2]Department of Pediatrics, Castellón General University Hospital, Castelló de la Plana, Spain

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Correspondence to
Carmen Jovaní Casano
Department of Pediatrics, Castellón General University Hospital, Avda Benicàssim, 128, 12004 Castelló de la Plana, Castelló, Spain.
Email: carmenjovanicasano@gmail.com

ORCID iDs
Andreea Cristiana Milea Milea
https://orcid.org/0009-0004-8481-6193
Carmen Jovaní Casano
https://orcid.org/0000-0002-0719-2864
Mónica Rubio Sánchez
https://orcid.org/0009-0006-3420-4740
Jesús Lucas Garcia
https://orcid.org/0000-0001-7842-6624

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ABSTRACT

Purpose: Disorders of the gut–brain interaction (DGBIs), formerly known as functional gastrointestinal disorders, are a set of recurrent or chronic digestive symptoms that are not explained by structural or biochemical alterations. The pathophysiology of these disorders is not completely known, but it is believed that different environmental, genetic, social, or psychological factors may generate them. Therefore, the sphere of mental health must be taken into consideration. Our objective was to determine the prevalence of disorders of the gut–brain interaction, anxiety, depressive symptomatology, and perfectionist traits in children and adolescents aged 10–14 years and to analyze the relationship between psychological features and abdominal pain.
Methods: This cross-sectional descriptive-analytical observational study included 447 students (51.9% female) aged between 10–14 (median age=12.26) years from four schools in the province of Castellón.
Results: Notably, 37.1% of the students had some type of DGBI. Children with depressive symptoms had 4.69 times higher odds of presenting with some type of DGBI, and children with anxiety had 2.86 times higher odds of presenting with some type of DGBI. Students who exhibited only socially prescribed perfectionism had 2.07 times higher odds of presenting with some type of DGBI.
Conclusion: Children aged 10–14 years who had depressive symptomatology, perfectionist personality traits (specifically socially prescribed perfectionism), and anxiety (only in children over 12 years) were more likely to have DGBIs.

Keywords: Disorders of the gut–brain interaction; Functional gastrointestinal disorders; Functional abdominal pain disorders; Anxiety; Depression; Perfectionism; Child

INTRODUCTION

Several studies have confirmed that the levels of anxiety and depression in children and teenagers have increased since the coronavirus disease 2019 pandemic [1,2]. According to some studies, the prevalence of this type of symptomatology is associated with a higher

probability of functional gastrointestinal disorders (FGIDs) [3,4]. However, whether psychological factors precede or follow FGIDs remains uncertain [5,6].

FGIDs, more recently termed disorders of gut–brain interaction (DGBIs), are a set of recurrent or chronic digestive symptoms that are not explained by structural or biochemical alterations. It is currently diagnosed based on the Rome IV pediatric criteria. These criteria have different symptomatology groups, depending on the age of the individual. The prevalence rate of these disorders is approximately 20–40% among school-aged children [7]. Abdominal pain-related DGBIs (AP-DGBIs) include disorders such as functional dyspepsia (FD), irritable bowel syndrome (IBS), abdominal migraine (AM) and functional abdominal pain-not otherwise specified (FAP-NOS) [8].

The pathophysiology of these disorders is not completely known, and the approaches to their management has evolved over time, currently being viewed from a biopsychosocial perspective [9].

Moreover, certain personality traits, such as perfectionism, which is defined as the self-critical evaluation and an excessive preoccupation with making mistakes [10], could also be possible triggers for AP-DGBIs. However, no scientific literature has analyzed the relationship between AP-DGBIs and perfectionist personality traits. To date, no study on this topic has been conducted in Spanish children/adolescents.

The main objective of this study was to determine the prevalence of AP-DGBIs, anxiety, depressive symptomatology, and perfectionism trait in children and adolescents aged 10–14 years in the province of Castellón and to analyze the relationship between psychological features and abdominal pain.

MATERIALS AND METHODS

Participants

The study population comprised 745 students. Overall, 6 students were excluded because they did not meet the established age limit, 2 because of language barriers, and 290 because they did not provide informed consent, resulting in a participation rate of 60%. Consequently, 447 children and adolescents (51.9% female and 48.1% male) aged between 10 and 14 years were included from four schools in the province of Castellón participated. Of them, 190 (51% female) students were aged between 10 and 12 years and 257 (52% female) were aged between 12 and 14 years. All the records were collected from October 2022 until April 2023. We contacted the school, and families were sent the study information sheet (which included the description and objective of the study), along with informed consent. Only children whose parents signed informed consent forms were included in the study.

Measures

Demographics

All students completed a demographic questionnaire designed by the authors of the study. This questionnaire collected information on participant's date of birth, sex, residence (rural or urban), presence of any diagnosed medical illness, request for help from a mental health professional, satisfaction with their family environment, school absenteeism due to abdominal pain, difficulties in social interactions, and presence of a stressful life event

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during the last 3 months. Stressful events including loss, mourning, change of home or school, bullying, mistreatment or sexual abuse, poor academic grades, and frequent arguments with their parents were assessed. Moreover, we analyzed adverse childhood experiences, which encompassed instances of abuse, neglect, and traumatic events during childhood that had a direct impact on the long-term health of adolescents and adults by a specific question. The questionnaire was filled out by the children.

Abdominal pain-related disorders of gut–brain interaction

The diagnosis of AP-DGBIs was based on a questionnaire developed by the authors using the Rome IV pediatric criteria. All criteria were transformed into a question with a dichotomous answer option (Yes/No), respecting temporal criteria and eliminating technical health concepts to facilitate response by the students.

The only change introduced in the authors' questionnaire, in comparison with the Rome IV criteria, was the category of FD. For diagnosing FD, at least two of the three questions had to be answered affirmatively (unlike the Rome IV criteria, which require affirmative response for one of the three criteria). This modification was made because most students were expected to easily answer a single question affirmatively. Thus, the specificity of the questionnaire increased at the cost of decreasing sensitivity, thereby increasing the consistency and internal validity. All other criteria were strictly followed, as previously published [8].

The questionnaire is included as a supplementary material for reference. We tried to be as faithful as possible to the original version of the diagnostic criteria developed by the ROMA IV. However, this questionnaire has not yet been validated.

Anxiety

The Children's Anxiety Scale (SCAS), developed by Spence [11], is a self-report measure used to assess symptoms related to separation anxiety, social phobia, obsessive–compulsive disorder, agoraphobia, generalized anxiety, and fear of physical injury in children. This scale comprises 38 items with four Likert-type response options—never (0), sometimes (1), often (2), and always (3) and can be filled out by children and adolescents aged 8–15 years. In addition, this scale has six positive filler items to reduce negative response bias. However, these items were not considered in the scoring process. The 0–3 ratings on the SCAS are summed for the 38 anxiety items to provide a total score (maximum=114), with high scores reflecting greater anxiety symptoms.

In particular, scores are interpreted differently depending on sex and age. For boys aged 8–11 years, a total score of 40 or higher indicates elevated levels of anxiety, whereas for girls aged 8–11 years, a total score of 50 or higher indicates high levels of anxiety. For boys aged 12–15 years, a total score of 33 or higher indicates high levels of anxiety, whereas for girls aged 12–15 years, a total score of 40 or higher indicates high levels of anxiety.

The SCAS has undergone extensive psychometric validation to measure anxiety symptoms in children and adolescents. Specifically, in a study conducted by Spence [11], the scale exhibited high internal consistency, with Cronbach's alpha values above 0.90 for the total score and between 0.70 and 0.90 for subscale scores. Additionally, test-retest reliability over a 6-month period is moderate to robust, with coefficients between 0.60 and 0.70, supporting the scale's stability over time.

Depression symptomatology

The Children's Depression Inventory (CDI) [12] is a questionnaire that evaluates depressive symptoms in children and adolescents aged 7–15 years. It contains 27 items with three response options (0=absence of symptomatology, 1=mild symptomatology, and 2=depressive symptomatology). The total score ranges from 0 to 54 points. The cutoff point is 19, which indicates a mild depressive symptom. Individuals with a score of 27 or more points are considered to have severe depressive symptoms. This instrument can be used individually in a clinical population or group for research purposes or as a screening measure.

The internal consistency of the CDI has been demonstrated to be high in community and clinical samples. In community samples, Cronbach's alpha values typically range from 0.75 to 0.94 [13], and split-half reliability ranges from 0.73 to 0.89 [14]. In clinical samples, Cronbach's alpha ranges from 0.71 to 0.89 [15], and split-half reliability ranges from 0.57 to 0.84 [16].

Perfectionism

The Child and Adolescent Perfectionism Scale (CAPS) is a questionnaire developed by Flett et al. [17] to evaluate perfectionism. However, in this study we used the version adapted by Ossa-Cornejo et al. [18], which contains 19 items. The items use a Likert-type scale with four options—false (0) to very true (4)—obtaining scores for three subtypes of perfectionism—self-oriented striving (SOP-S), self-oriented perfectionism-critical (SOP-C), and socially prescribed perfectionism (SPP). A score of 14 or higher indicates SOP-C, 16 or above indicates SPP, and 9 or above indicates SOP-S.

The CAPS has demonstrated excellent internal consistency, with a Cronbach's alpha of 0.89 for the overall scale, indicating a high level of general reliability. Moreover, the reliability of the individual dimensions is satisfactory, with Cronbach's alpha values ranging from 0.722 to 0.794, suggesting adequate consistency in measuring the distinct subtypes of perfectionism.

Procedure

First, a meeting was arranged with the respective principals of all schools to explain the research proposal and main objectives. For schools that accepted the conditions, we provided written informed consent for the parents and an information sheet about the project for the parents and children. This document detailed all aspects of the research process, including the study's objectives, procedures, and the voluntary nature of participation. Moreover, the contact email address of the principal investigator was included in this sheet, allowing parents and students to raise any questions or concerns related to the study. When the signed consent forms were returned to the schools, classroom teachers assigned a sequential number to each student. This number was recorded alongside whether the student had parental consent to participate. Students used the assigned number to identify themselves on the questionnaires instead of providing any personal information. This process ensured anonymity and confidentiality. The research was conducted only after obtaining written informed consent from all the parents or legal tutors of the students. Data were collected during group sessions at the schools, lasting approximately 50–55 minutes. During these sessions, the research team provided clear instructions and remained available to address any question or concern raised by the students. Furthermore, we reminded the students that their participation was voluntary and that they had the right to withdraw at any time without any consequences. This ensured that all students fully understood the research process.

Ethics

The study was approved by the Ethics Committee of Castellon General University Hospital in October 2022. In addition, it received the approval and authorization of the Regional Education Department to pass the questionnaires to minors. Throughout the research, anonymity and confidentiality were ensured, guaranteeing the right to privacy and intimacy of the participants of the study, in accordance with the Organic Law 3/2018 of December 5 on Personal Data Protection and guarantee of digital rights. This study was conducted in accordance with the Declaration of Helsinki and Standards of Good Clinical Practice.

Statistical analyses

The statistical analyses were performed using Stata/IC 13.1. The normality of the numerical variables was assessed using the Kolmogorov–Smirnov or Shapiro–Wilk test, depending on the number of samples. The nonparametric Mann–Whitney U-test was used to analyze the relationship between categorical and numerical variables. Furthermore, the chi-square test was used for bivariate analysis of categorical variables, and multivariate logistic regression analysis was used to predict the relationship between dependent and independent variables. The magnitude of the effect is indicated with odds ratios (ORs) and 95 a confidence intervals (CIs). Statistical significance was set at $p<0.05$.

RESULTS

The study population comprised 447 students (51.9% female and 48.1% male) from four schools in the province of Castellón. The median age was 12.26 (interquartile range [IQR]=11.24–13.39) years. The sociodemographic characteristics are shown in **Table 1**.

We found that 40.9% of the students had experienced a stressful life event during the last 3 months and 18.6% requested help from a mental health professional. Moreover, 47.4% of the students stated that they missed school several times during the year because of abdominal pain (**Table 1**).

Table 1. Sociodemographic characteristics of the study participants

Variable	Value (N=447)
Sex	
Female	232 (51.9)
Age (yr)	
<12	190 (42.5)
Medical disease diagnosed	61 (13.6)
Help received from a mental health professional	83 (18.6)
School absenteeism due to abdominal pain	
Never	231 (51.7)
Sometimes	212 (47.4)
Most of the time	3 (0.7)
Always	1 (0.2)
Satisfaction with the family environment	
Not satisfied	3 (0.7)
Not very satisfied	29 (6.5)
Quite satisfied	113 (25.3)
Very satisfied	302 (67.5)
Stressful life event during the last 3 months	183 (40.9)
Traumatic childhood event	88 (19.7)

Values are presented as number (%).

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Regarding functional abdominal pain disorders, 37.1% of the students experienced some type of AP-DGBIs. The most prevalent AP-DGBI was FD, occurring in 30.4% of the students, either alone or in combination with another AP-DGBI. Only 6.0% of the students presented with IBS, either alone or together with another subtype. The prevalence rate of AM was 7.8%, occurring either alone or combined with another AP-DGBI. The prevalence of FAP-NOS was 1.8% (**Fig. 1**).

As shown in **Fig. 2**, female students experienced some type of AP-DGBI more frequently than male students (OR=2.17 [95% CI: 1.47–3.22]). In addition, children over 12 years of age were more likely to have some form of AP-DGBI than those under 12 years of age (OR=1.71 [95% CI: 1.15–2.55]) (**Fig. 2**).

Notably, 13% of the students presented with depressive symptoms, which were more predominant among female students than among male students (18.9% vs. 6.5%) (p<0.05) (**Fig. 3**). Depression was more frequent among students aged >12 years than among those aged <12 years (15% vs. 9.4%), although this association was at the limit of statistical significance (p=0.061).

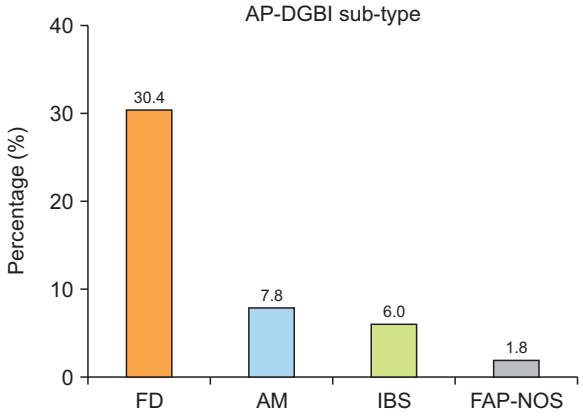

Fig. 1. Abdominal pain disorders of the gut–brain interaction subtypes.
AP-DGBI: abdominal pain disorders of gut–brain interactions, FD: functional dyspepsia, AM: abdominal migraine, IBD: irritable bowel disease, FAP-NOS: functional abdominal pain-not otherwise specified.

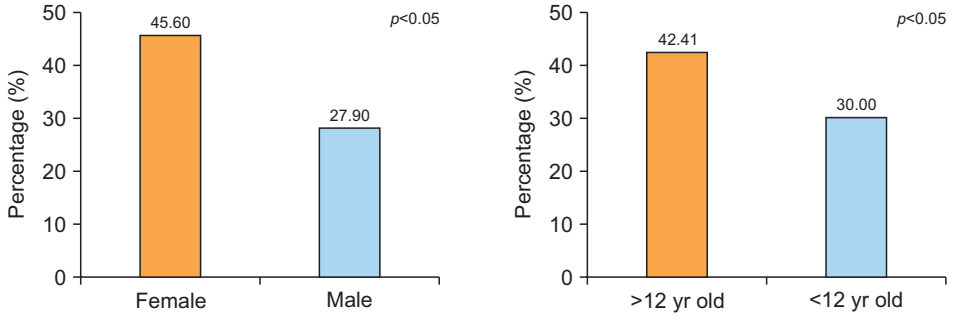

Fig. 2. Prevalence of abdominal pain disorders of gut–brain interaction.

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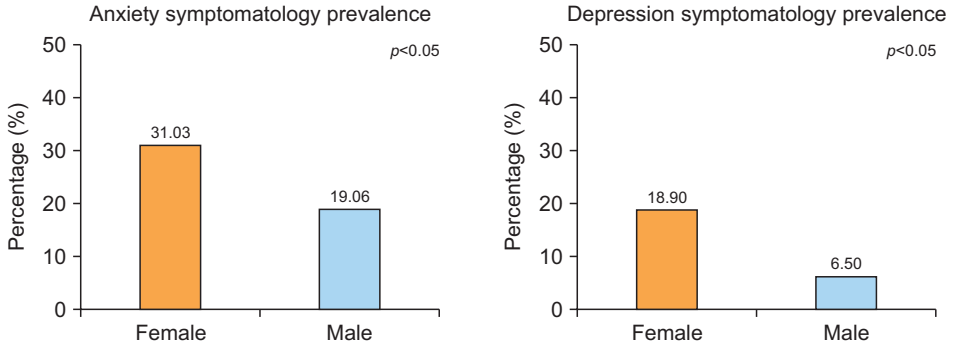

Fig. 3. Prevalence of anxiety and depression symptomatology.

Table 2. Univariate and bivariate inferential analyses

Variable	Outcome	Raw OR (95% CI)	Adjusted OR* (95% CI)
Sex	AP-DGBI	2.17 (1.47–3.22)	1.47 (0.95–2.28)
Age: 12 yr		1.71 (1.15–2.55)	1.50 (0.97–2.32)
Anxiety		3.29 (2.11–5.11)	2.86 (1.82–4.50)
Depression symtomatology		5.61 (3.04–10.37)	4.69 (2.5–8.70)
Sex	Anxiety	1.91 (1.23–2.96)	1.45 (0.90–2.34)
Age: 12 yr		2.04 (1.29–3.21)	1.89 (1.15–3.09)
Depression symtomatology		9.62 (5.22–17.73)	8.50 (4.54–15.91)
Sex	Depression symptomatology	3.37 (1.78–6.33)	2.77 (1.41–5.44)
Age: 12 yr		1.76 (0.98–3.18)	1.20 (0.63–2.31)
Anxiety		5.61 (3.04–10.37)	8.50 (4.54–15.91)
Sex	Socially prescribed perfectionism	2.18 (1.38–3.44)	1.55 (0.95–2.55)
AP-DGBI		3.21 (2.04–5.06	2.07 (1.22–3.41)
Anxiety		3.21 (2.04–5.06)	2.49 (1.47–4.24)
Depression symtomatology		4.11 (2.57–6.60)	2.54 (1.32–4.91)

AP-DGBI: abdominal pain disorders of gut–brain interactions, OR: odds ratio, CI: confidence interval.
*OR was adjusted for other variables.

Furthermore, 25.27% of the students experienced anxiety, which was more frequent in female students than in male students (31.03% vs. 19.06%) (**Fig. 2**). In terms of age, those aged >12 years had a higher prevalence of anxiety than those aged <12 years (30.7% vs. 17.9%) (p<0.05).

In the multivariate analysis adjusted for confounding variables, children with depressive symptoms were identified to have 4.69 times higher odds of presenting with some type of AP-DGBI than those without this symptomatology (OR=4.69 [95% CI: 2.5–8.7]). Similarly, children with anxiety had 2.86 times higher odds of exhibiting some type of AP-DGBI than those without anxiety (OR=2.86 [95% CI: 1.82–4.5]).

Regarding perfectionism, we initially observed a relationship between this variable and anxiety, depression, and sex (p<0.05). Thereafter, we performed multivariate analysis adjusted for confounding variables (depression, anxiety, and sex). We observed that children who exhibited SPP had 2.07 times higher odds of exhibiting some type of FAPD compared to those who do not have this subtype of perfectionism (OR=2.07 [95% CI: 1.22–3.41]) (**Table 2**).

No significant association was found between SOP-S and the occurrence of any type of AP-DGBI (p=0.708). However, SOP-C showed an association with functional abdominal pain disorder that was at the limit of statistical significance (p=0.082). The median score for students without AP-DGBI on the perfectionism scale was 28 (IQR: 18-39) and the median score for those with FAPD was 36 (IQR: 25-47) (p<0.001).

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Table 3. Estimation of the effect of traumatic and stressful events on the AP-DGBI and anxiety and depression symptomatology

Variable	Outcome	Raw OR (95% CI)	Adjusted OR* (95% CI)
Traumatic event	AP-DGBI	2.76 (1.71–4.44)	1.37 (0.78–2.41)
	Anxiety	6.60 (3.99–10.93)	3.90 (2.23–6.84)
	Depression symptomatology	9.65 (5.29–17.59)	4.77 (2.42–9.39)
Stressful live event	AP-DGBI	4.29 (2.85–6.45)	2.87 (1.84–4.49)
	Anxiety	6.10 (3.80–9.81)	4.02 (2.38–6.77)
	Depression symptomatology	7.05 (3.61–13.76)	2.82 (1.43–5.57)

AP-DGBI: abdominal pain disorders of gut–brain interactions, OR: odds ratio, CI: confidence interval.
*OR was adjusted for other variables and sex.

Children who experienced a traumatic event in their childhood had 3.9 times higher odds of presenting with anxiety than those who did not experience such a traumatic event (OR=3.9 [95% CI: 2.23–6.84]). Similarly, children who experienced a traumatic or stressful event in their childhood had 4.77 times higher odds of having depressive symptoms than those who did not experience such an event (OR=4.77 [95% CI: 2.42–9.39]). However, experiencing a childhood trauma was not associated with AP-DGBI (p=0.232).

Children who experienced a stressful live event in the last 3 months had 4.02 times probability of presenting with anxiety (OR=4.02 [95% CI: 2.38–6.77]) and 2.82 times higher odds of presenting with depressive symptoms than those who have not suffered these events (OR=2.82 [95% CI: 1.43–5.57]). Furthermore, children who experienced a stressful life event in the last 3 months had 2.87 times higher odds of having functional abdominal pain disorder than those who did not experience such an event (OR=2.87 [95% CI: 1.84–4.49]) (**Table 3**).

Finally, we observed that a diagnosis of a medical organic disease or disorder was not significantly related to anxiety, depression, or FAPD.

DISCUSSION

In this study, our findings revealed a correlation between some psychological traits, such as anxiety, depressive symptoms, and perfectionism, and AP-DGBIs, also known as functional abdominal pain disorders. These disorders were first described in the pediatric population by the Rome foundation in 2016 [8].

In a recent systematic review [19], the prevalence of FGID in children aged 4–18 years was 21.8% (range: 19–40%). In our study, we observed a higher prevalence rate at 37.1%, although it is important to emphasize that this prevalence specifically refers to functional gastrointestinal disorders related to abdominal pain, a subcategory of FGID.

This finding could be explained by the fact that our study population was restricted to children aged 10–14 years, preadolescents, and adolescents, who often experience psychological difficulties. Additionally, we also found that children aged >12 years were more likely to present with some form of AP-DGBI than children aged <12 years (OR=1.71)

Although our results support the existing literature, they also provide novel insights. The observed increase in prevalence in a narrower age range (10–14 years) suggests that early adolescence may be a particularly sensitive period for the emergence of AP-DGBIs,

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potentially mediated by psychological factors such as anxiety, depression, and perfectionism, specifically SPP.

Moreover, various studies have demonstrated that functional gastrointestinal disorders negatively impact the quality of life of children and their families, affecting their social interactions and leading to higher rates of school absenteeism [20,21]. Similarly, a study conducted by Youssef et al. [22] reported that adolescents who experienced daily abdominal pain exhibited a high rate of school absenteeism for 10 or more days per year compared to those with minimal or no abdominal pain. In addition, Calsbeek et al. [23] observed that abdominal pain caused by organic diseases can impact school attendance, with adolescents experiencing such disorders exhibiting higher rates of absenteeism. These findings are consistent with those of our study, in which 47.4% of the students reported occasionally missing school because of abdominal pain.

Waters et al. [24] found that children with anxiety disorders were significantly more likely to have symptoms of functional gastrointestinal disorders than those without anxiety disorders, which is consistent with our findings. Specifically, 40.7% of children with anxiety had symptoms of AP-DGBIs compared to 5.9% of children without anxiety. Moreover, another study confirmed that approximately 80% of the students aged 8–15 years who visited primary care with recurrent abdominal pain had comorbid psychopathology, with anxiety being the most common diagnosis [25]. In addition, various studies have found that the prevalence of anxiety disorders in children with recurrent abdominal pain ranges from 42% to 85% [26-28]. Therefore, recurrent abdominal pain is associated with psychological problems, particularly anxiety disorders. These findings are consistent with those of our study, which demonstrated that children with anxiety are 2.86 more likely to experience some form of AP-DGBI than children without anxiety (OR=2.86 [95% CI: 1.82–4.5]).

Additionally, our results revealed a higher prevalence of anxiety among children older than 12 years than in those younger than 12 years. This may be due to the fact that adolescence is a period where teenagers are subjected to increased social and academic stressors. Moreover, the physiological changes occurring at this stage can lead to emotional dysregulation [20,29,30].

Children aged between 8–18 years with recurrent abdominal pain have been observed to be more likely to feel ineffective and helpless, making them more vulnerable to depression. Stabell et al. [31] reported that the prevalence of depression was high among adolescents with abdominal pain and IBS. Specifically, in this study, adolescents with IBS and abdominal pain had three times higher odds of depression compared to controls. Similarly, our study demonstrated that students with depressive symptoms had 4.69 times higher odds of having some type of AP-DGBI than those without such symptoms (OR=4.69 [95% CI: 2.5–8.7]).

Furthermore, our findings indicate that experiencing a stressful life event during the last 3 months is a predisposing factor for anxiety and depressive symptomatology and for developing functional abdominal pain disorders. This has already been pointed out in Newton's study [6], where variables such as anxiety, depression, stress, and coping strategies were found to be related to the development of AP-DGBIs.

Through our study findings, we emphasize the importance of investigating and treating the psychological factors at the earliest signs of potential functional disorders.

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Only a few studies have investigated the relationship of abdominal pain and psychological problems in community-based samples, similar to our present study. Gulewitsch et al. [32] published a similar study using parental reports of their children's abdominal complaints, based on the Rome III criteria, and found that 7.7% of children aged 6–10 years met the criteria for at least one Rome III AP-related FGID. This prevalence is much lower than that of our study population, likely because our cohort included children aged 11–14 years—an age more sensitive to functional disorders.

Few studies have examined the effects of perfectionist traits in children or adolescents in relation to psychosomatic queries. Perfectionism has been shown to be predictive of symptoms of somatic complaints, depression, anxiety and suicidal tendency in children [33-35]. Piercy et al. [36] in their study involving 90 adolescents with inflammatory bowel concluded that perfectionism is related to an increase in externalizing and internalizing symptoms. A meta-analysis concluded that the relationship between perfectionistic concerns and depressive symptoms is reciprocal, with perfectionistic concerns predicting increased depressive symptoms, and vice versa. In contrast, the relationship between perfectionistic striving and depressive symptoms is unidirectional, such that perfectionist striving confers vulnerability to depressive symptoms [37]. These findings highlight the importance of evaluating all psychological and personality traits together.

In the present study, we observed correlations between perfectionism and the variables anxiety and depression. However, only children who exhibited SPP were more likely to have some type of AP-DGBI.

The literature exploring the relationship between perfectionism and AP-DGBIs remains scarce. However, our study provides new insights by demonstrating that not all forms of perfectionism affect functional digestive disorders in the same way. Specifically, we found that SPP—the tendency to perceive that others demand perfection—is the only subtype associated with a higher BF distinction is crucial, as it highlights a potential psychosocial mechanism underlying these disorders, which has received little attention in previous research.

SPP has also been associated with next-day binge eating disorders; however, this eating disorder has not been observed to be associated with self-oriented or other-oriented perfectionism [38]. It (i.e., perceived social pressures and expectations to be perfect) represents a chronic source of pressure that elicits feelings of helplessness and hopelessness at extreme levels [39]. In this context, the authors described SPP and its relationship with distress, illness, dysfunction, and impairment. They concluded that SPP is a significant public health concern requiring sustained prevention and intervention. SPP problems extend to physical, mental, and social functioning. Several studies reported a growing prevalence of this perfectionism subtype in recent years [40].

Gershfeld-Litvin et al. [41] examined 50 children and adolescents with somatic symptom disorder, focusing on psychological functioning (depression and anxiety) and psychological characteristics (perfectionism and alexithymia); however, they were unable to demonstrate a clear role of perfectionism in gastrointestinal symptoms, possibly due to limited sample size. However, our study was able to establish this association.

Our study provides novel insights into the role of SPP in relation to AP-DGBIs and the significant consequences it may have for children and their families. Moreover, this relationship appeared to be particularly pronounced during adolescence, a developmental stage marked by increased social pressure and emotional vulnerability, suggesting that SPP may play a crucial role in the emergence of AP-DGBI.

Randall et al. [42] investigated how academic goal orientation, school motivational climate, and school engagement are related to pain and somatic symptoms in adolescents, demonstrating that adolescents with higher ego goal orientation and a performance-focused school climate experienced more somatic symptoms and pain, with headache and abdominal pain being the most frequently reported symptoms. While existing studies, such as that of Randall et al. [42], has explored how academic variables such as ego orientation and motivation affect adolescent pain and somatic symptoms, a significant gap remained in directly examining the link between SPP and abdominal pain. Therefore, our study contributes to new discoveries, as we have directly analyzed this relationship, offering a deeper understanding of how SPP may influence abdominal pain and other somatic symptoms in adolescents.

This study provides relevant and original information on the relationship between functional digestive disorders and perfectionism, one of the most frequent personality traits observed in children with recurrent abdominal pain [43]. However, further studies should be conducted in this area because of the limited literature available on this topic.

Strengths and limitations

This study has several strengths, such as the use of multivariate analysis, which enhanced the validity and reliability of the findings. Moreover, we provided relevant and new information about the relationship between functional abdominal pain disorders, more recently known as AP-DGBIs, and perfectionism, a topic that has been scarcely explored, specifically involving Spanish children and adolescents. Another relevant aspect of our research lies in our emphasis on psychological aspects when attending to children with AP-DGBI, highlighting the significant impact of these disorders on their daily lives, as evidenced by the high rates of school absenteeism.

However, the study also has some limitations that must be acknowledged, such as the possible lack of sincerity and accuracy of the results obtained from the self-completed questionnaires. Additionally, a recall bias may have existed, as students were asked about the symptoms they have experienced within of the past 6 months. Furthermore, the diagnostic tool used to identify AP-DGBI, while based strictly on the Rome IV pediatric criteria, has not yet been formally validated. Another limitation of this study was the lack of evidence to rule out organic etiologies. Finally, the diagnosis of anxiety or depression cannot be based merely on the responses to a single-day questionnaire; for this reason, we referred to depressive and anxiety symptomatology rather than depression or anxiety throughout the article.

Conclusions

Based on our findings, we can conclude that children aged 10–14 years who present with depressive symptomatology, perfectionist personality traits (specifically SPP), and anxiety (only in those aged ≥12 years) are more likely to experience AP-DGBIs. Given these associations, assessing the presence of possible emotional disorders is crucial in patients

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with AP-DGBIs, alongside analyzing the perfectionist personality traits that may be present to consider appropriate psychological interventions. Therefore, the implementation of psychological interventions could offer significant benefits. Moreover, this could reduce the use of unnecessary medications that may generate an undesired therapeutic cascade. Additionally, this could reduce the need for invasive diagnostic procedures that may not be clinically warranted. These types of interventions would save resources for the National Health System and improve school and work attendance by lowering the rates of absenteeism rates among children and parents.

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