



# Body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms in a large sample of adolescents

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## Abstract

Few studies have investigated body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms in adolescents and how they relate to mental health, quality of life, suicide attempts, and non-suicidal self-harm. We used a quota sampling procedure and contacted 100 secondary centres in the Southeast of Spain, of which 34 participated in the study. A sample of 5,345 adolescents (12–18 years) completed dimensional measures of body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms. The proportion of adolescents with clinically significant symptoms within each symptom type was estimated and associations with other indicators of mental health examined. Clinically significant body-dysmorphic symptoms were reported by 3.7%, hoarding by 0.9%, hair-pulling by 0.7%, and skin-picking by 1.8%. Body-dysmorphic symptoms were more common in girls and in those over 14 years of age. Body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms were moderately to strongly associated with obsessive-compulsive symptoms, internalizing symptoms, externalizing symptoms, and poor quality of life. Those with significant body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms were much more likely to have attempted suicide and engaged in non-suicidal self-harm during the last twelve months than those without such symptoms. Body-dysmorphic symptoms showed the strongest associations with internalizing symptoms and poor quality of life. Limitations are the sole use of self-report and a sample from only two regions in Spain, but findings suggest that body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms are common and impairing during adolescence.

**Keywords** Obsessive-compulsive · Body-dysmorphic · Hoarding · Hair-pulling · Skin-picking · Adolescents.

## Introduction

In DSM-5, Body Dysmorphic Disorder (BDD), Hoarding Disorder (HD), trichotillomania/Hair Pulling Disorder (HPD), and excoriation/Skin Picking Disorder (SPD) were included alongside Obsessive-Compulsive Disorder (OCD) in a new chapter called Obsessive-Compulsive and Related

Disorders (OCRDs) (American Psychiatric Association, 2013). All disorders revolve around repetitive and compulsive behaviours and affected individuals have reduced or no control over symptoms, avoid places or people because of the symptoms, and experience distress or impairment (American Psychiatric Association, 2013). The literature on body-dysmorphic, hoarding, hair-pulling, and skin-picking during adolescence is very small.

BDD onset before adulthood in 60–70% of all adults with the disorder (Bjornsson et al., 2013). Similarly, the mean age of onset of hoarding symptoms is 13.4 years, with 60% reporting symptom onset before age 12, and 80% before age 18 (Postlethwaite et al., 2019). The age of onset of HPD shows a bimodal distribution in childhood, with one peak around age 7 to 8, and one in early puberty (Duke et al., 2010; Franklin et al., 2008), with an earlier onset in girls (Grant et al., 2020). Although very few studies exist, SPD has been reported to have a peak onset around 13 years of age (Ricketts et al., 2018). Thus, several sources show that

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a large proportion of individuals with BDD, HD, HPD, and SPD experience their first symptoms during adolescence, making research with this age group important.

In adults, the prevalence of BDD has been estimated to 1.9%. In adolescents, the estimated prevalence is 2.2% (Veale et al., 2016) and clinically significant body-dysmorphic symptoms have been estimated to 1.0–2.0% in twin cohorts of 15- and 18-year-olds (Enander et al., 2018). Recent research has found that 2.0% and 1.7% have probable BDD in two independent twin samples in Sweden, at ages 18 ( $N=6,027$ ) and 24 ( $N=3,454$ ), respectively (Krebs et al., 2022). Other studies with general community samples show that clinically significant body-dysmorphic symptoms (using the DSM-IV criteria) is 1.7% in 12–18-year-olds (Schneider et al., 2017) and 3.6% in 15–21-year-olds using the DSM-5 criteria (Möllmann et al., 2017). BDD may be more prevalent in girls than in boys (Enander et al., 2018; Veale et al., 2016), but this has not been universally observed (Möllmann et al., 2017; Schneider et al., 2017).

The prevalence of HD is around 2.5% in adults (Postlethwaite et al., 2019). In adolescents, around 10.0% report hoarding behaviours and the prevalence of HD has been estimated to 1.0–2.0%, being more common in girls (Akıncı et al., 2021; Burton et al., 2016; Ivanov et al., 2013). A large community study ( $N=16,718$ , aged 6–17 years) showed that 8.9% reported hoarding symptoms (Burton et al., 2016).

The prevalence of HPD in general adult samples have been estimated to 0.6–3.0% (Duke et al., 2010; Grant et al., 2020; Solley & Turner, 2018) and in a recent US study that included 10,169 adults, no significant prevalence differences between genders emerged (Grant et al., 2020). Around 2.0–3.0% of adults meet diagnostic criteria for current SPD, with a female preponderance (Grant & Chamberlain, 2020; Machado et al., 2018), while 14.0% reports elevated skin-picking behaviours (Solley & Turner, 2018), and some form of skin-picking behaviour is present in around 60.0% of all individuals (Hayes et al., 2009), but with noticeable skin damage only in 16.6% (Keuthen et al., 2010).

Few studies have examined the prevalence of HPD and SPD in children and adolescents, but one study estimated hair-pulling and skin-picking behaviours to 10.5% and 24.8%, respectively, with 2.9% and 8.3% exhibiting clinically significant symptoms (Selles et al., 2015). Another study reported lifetime hair-pulling and skin-picking symptoms to 2.8% and 3.5%, respectively, with no gender differences (Moreno-Amador et al., 2018). Similar rates for boys and girls have been reported also in other studies (Franklin et al., 2008; Panza et al., 2013), while a study using interviews with 17-year-olds reported higher rates for girls (King et al., 1995).

Taken together, prevalence studies of body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms and

disorders during adolescence are few, and firm conclusions are hindered by differences in age groups, samples (e.g., community, clinical), and instruments. Further, no study has examined all four symptom types simultaneously in a large sample of adolescents, which would be useful to compare the frequency of the different types of symptoms.

Psychiatric comorbidity is common in children and adolescents with BDD and includes OCD, affective disorders, anxiety, depression, eating disorders, self-injury, suicide attempts, and appearance-related suicidal ideation (e.g., Krebs et al., 2022; Möllmann et al., 2017; Rautio et al., 2022; Schneider et al., 2017). Adolescent BDD has also been linked to low body satisfaction, poor self-esteem, and functional impairment (Boroughs et al., 2010), including higher risk of school dropout (Rautio et al., 2022). Adults with HD show high rates of psychiatric comorbidity (Frost et al., 2011) and have poorer perceived physical health and lower occupational and social functioning (Nordsletten et al., 2018). Few studies have examined psychiatric comorbidity in pediatric HD, but a comorbid psychiatric disorder may be present in around half of all cases, with specific phobia, social anxiety disorder, attention deficit hyperactivity disorder, and autism spectrum disorder being most common (Akıncı et al., 2021; Ivanov et al., 2013). In addition, adolescents with hoarding symptoms have more obsessive-compulsive symptoms and more inattentive and hyperactive/impulsive symptoms than adolescents without hoarding symptoms (Burton et al., 2016).

More than half of adults with HPD or SPD have at least one comorbid psychiatric disorder (Duke et al., 2010; Grant & Chamberlain, 2020; Grant et al., 2020), and hair-pulling and skin-picking symptoms have been linked to poor quality of life (Odlaug et al., 2010; Ricketts et al., 2018) as well as suicidal ideation and suicide attempts (Lovato et al., 2012; Seedat & Stein, 1998). In children and adolescents with HPD, the rates of comorbid depression and anxiety disorders may be lower than in adults (Panza et al., 2013), but higher than in peers (Franklin et al., 2008). Youth with hair-pulling and skin-picking behaviours are more distressed than their peers and experience interference as well as higher levels of internalizing and externalizing symptoms, and poorer adaptive functioning (Selles et al., 2015). Girls with HPD report greater distress and impairment than boys (Franklin et al., 2008; Panza et al., 2013) and higher rates of concurrent anxiety disorders and depression (Franklin et al., 2008). Physical and psychological quality of life is significantly impaired in adults with SPD (Machado et al., 2018). In addition, hair loss and skin lesions can cause social isolation and overall reduced quality of life (Odlaug et al., 2010). To the best of our knowledge, relationships between hair-pulling/skin-picking symptoms and quality of

life, non-suicidal self-harm, and suicide attempts have not been examined in adolescents.

To increase the knowledge about body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms in adolescence, this study aims to examine the proportion of clinically significant symptoms of each type in a large general sample of adolescents from Spain, and how the different symptom types relate to obsessive-compulsive, internalizing and externalizing mental health symptoms, quality of life, and recent suicide attempts and non-suicidal self-harm.

## Method

### Participants and procedure

The sample consisted of 5,345 adolescents aged 12–18 years that attended secondary education. Table 1 presents sociodemographic information. The study was approved by the Universidad Miguel Hernández Project Evaluation Committee (DPS.JPR.02.17). First, a quota sampling was carried out in two areas in the South-East of Spain: The Province of Alicante (PA) belonging to the Valencian Community and the Autonomous Community of Region of Murcia (RM). We selected secondary schools based on ownership (public/non-public schools) and regional geographical areas (9 areas in PA and 12 in RM). Second, we contacted by telephone and via email the school centres with most students matriculated per course to guarantee the maximum number of participants. Whether a centre declined participation, we asked the next centre on the list. After 100 centres were contacted, 13 from PA and 21 from RM accepted and the final sample included centres where the adolescents answered the OCRDs measures (see Table 1). In the final set of centres, a majority were public (2/3) and the rest were non-public (1/3), mirroring the distribution of public/non-public centres in both regions and in the rest of Spain. Centres from 17 of the 21 geographic areas participated and the sample ( $N=5,345$ ) consisted of 2.15% of the total population of adolescents registered within both regions. Unfortunately, the response rate within each centre was unknown because the centres did not provide information about how many students did not participate. Three doctoral students were hired as research coordinators responsible for recruitment and these were supervised by the two main researchers in the project. Several master students supported the in-class assessments with guidance of the research coordinators.

The first phase of the study took place in the educational centres between October 2018 and April 2019. Inclusion criteria were (1) 12–18 years old, (2) studying in the centres where we applied the survey, (3) providing their own and one of the guardians' informed consent, and (4) being fluent

in Spanish. Adolescents who met the inclusion criteria individually completed online questionnaires in classrooms during school in the presence of research coordinators that provided instructions and responded to questions. The full survey took approximately 30 minutes to complete. If a participant interrupted the survey completion, they were expelled from the classroom and excluded from the study. Participation was voluntary and participants did not receive any incentive for their collaboration and were informed that confidentiality would be broken only if their responses indicated risk of suicide. In addition, in order to promote the participation of the centres, we sent to each centre a feedback report including results about mental health scores per class and an individual risk warning in case of finding risk for suicide.

### Measures

#### Body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms

Spanish versions of the DSM-5 Dimensional Scales (OCRD-D; LeBeau et al., 2013) were used to assess body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms (Body Dysmorphic Disorder Dimensional Scale, BDD-D; Hoarding Disorder Dimensional Scale, HD-D; Hair Pulling Disorder Dimensional Scale, HPD-D; Skin Picking Disorder Dimensional Scale, SPD-D). These scales were originally adapted from the Yale Brown Obsessive Compulsive Scale (Y-BOCS; Goodman et al., 1989a, b) and the Florida Obsessive Compulsive Inventory (FOCI; Storch et al., 2007). In the present study, we transformed the brief description of each disorder into two questions about lifetime presence of core symptoms. These two questions constituted an introduction to the symptomatology and the respondent were asked to report on symptom severity during the past 7 days. The same items are used for BDD-D, HPD-D, and SPD-D (time/frequency, distress/discomfort, control, avoidance, and functional impairment) while HD-D assesses difficulties with discarding things instead of time/frequency and difficulties using living areas instead of control. All items are rated on a 5-point Likert scale (0–4) with higher scores indicating more severity. The Spanish versions of the scales show good internal consistency, convergent and divergent validity, and unidimensional factor structures in adolescents (Moreno-Amador et al., 2018). In the present study, the scales showed adequate to good internal consistency (BDD-D,  $\alpha=0.85$ ; HD-D,  $\alpha=0.73$ ; HPD-D,  $\alpha=0.87$ ; SPD-D,  $\alpha=0.84$ ).

**Table 1** Sociodemographic characteristics of the sample

Variables	Values
Age, M (SD)	14.17 (1.46)
Age < 14, <i>n</i> (%)	2701 (50.5%)
Age ≥ 14, <i>n</i> (%)	2644 (49.5%)
Gender	
Girls, <i>n</i> (%)	2712 (50.9%)
Boys, <i>n</i> (%)	2612 (49.1%)
Country/region of origin	
Spain, <i>n</i> (%)	5017 (93.9%)
Rest of Europe, <i>n</i> (%)	114 (2.1%)
America, <i>n</i> (%)	138 (2.6%)
Africa, <i>n</i> (%)	49 (0.9%)
Asia, <i>n</i> (%)	25 (0.5%)
Education level, mother	
Primary, <i>n</i> (%)	580 (15.0%)
Secondary, <i>n</i> (%)	2126 (55.1%)
Superior, <i>n</i> (%)	1154 (29.9%)
Education level, father	
Primary, <i>n</i> (%)	544 (16.2%)
Secondary, <i>n</i> (%)	2020 (60.0%)
Superior, <i>n</i> (%)	795 (23.7%)
Location of centres	
Province of Alicante, <i>n</i> (%) students, <i>n</i> centres, <i>n</i> cities/villages	2172 (40.6%), 12, 10
Region of Murcia, <i>n</i> (%) students, <i>n</i> centres, <i>n</i> cities/villages	3173 (59.4%), 20, 16
Type of centre according to its source of financing	
Public, <i>n</i> (%)	3462 (66.6%)
Concerted, <i>n</i> (%)	1469 (27.5%)
Private, <i>n</i> (%)	314 (5.9%)
Type of centre according to its religiosity	
Non-denominational / Lay, <i>n</i> (%)	4618 (86.4%)
Catholic, <i>n</i> (%)	727 (13.6%)

### Obsessive-compulsive symptoms

The Short Obsessive-Compulsive Disorder Screener (SOCS; Uher et al., 2007) is a seven-item self-report measure and was used to assess OCD symptoms. The first five items assess checking, touching, cleanliness/washing, repeating, and exactness symptoms; and the two final items assess impairment of and resistance to the symptoms. We used the Spanish version of SOCS which have been validated with Spanish children and adolescents exhibiting a unidimensional factor structure and acceptable internal consistency ( $\alpha > 0.74$ ) (Piqueras et al., 2015). In the present study, the scale showed acceptable internal consistency ( $\alpha = 0.70$ ).

### Quality of life

The KIDSCREEN-10 Index (Ravens-Sieberer et al., 2010) was used to assess quality of life. It is a unidimensional scale that measures health-related quality of life (HRQoL) in healthy and chronically ill children and adolescents (Ravens-Sieberer et al., 2010). We used the Spanish version

of the scale (Aymerich et al., 2005), which showed good internal consistency in the present study ( $\alpha = 0.85$ ).

### Internalizing symptoms

To assess internalizing mental health symptoms, we used the Social-Emotional Distress Survey (SEDS-S; Dowdy et al., 2018). The SEDS-S is a behavioural screening questionnaire designed to measure internalizing distress using 10 Likert items rated on a 4-point scale. The original validation study found that the SEDS-S distress factor was significantly associated with symptoms of anxiety and depression, and a significant negative association with life satisfaction. No Spanish validation of this scale has been published, but it showed good internal consistency ( $\alpha = 0.88$ ) in the present study.

### Externalizing symptoms

Externalizing symptoms were assessed using the Youth-Pediatric Symptom Checklist-17 (PSC-17-Y; Jellinek &

Murphy, 1999) which is a self-report screening measure widely used by pediatricians and mental health professionals and recently validated with Spanish adolescents showing good psychometric properties (Piqueras et al., 2021). PSC-17-Y includes 17 items and is divided into three symptom domains: internalizing (i.e., depression and anxiety), externalizing (i.e., disruptive behaviour), and attention deficit hyperactivity. For this study, we pooled the subscales for externalizing and attention deficit hyperactivity into a subscale capturing broad externalizing symptoms. The items of this subscale showed acceptable internal consistency ( $\alpha=0.74$ ).

### Current suicide attempts and non-suicidal self-harm

Information about suicide attempts and non-suicidal self-harm was assessed by means of a self-report instrument based on the Suicidal behaviors and self-injury assessment instrument developed as part of the UNIVERSAL study (Ballester et al., 2019), which in turn was developed from the combination of the Columbia-Suicide Severity Rating Scale (C-SSRS; Posner et al., 2011) and the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock et al., 2007), and that has demonstrated accuracy in Spanish young university students (Ballester et al., 2019). We used this information to classify participants into those who had attempted to commit suicide during the last twelve months (yes/no) and those who had engaged in non-suicidal self-harm during the last twelve months (yes/no). The non-suicidal self-harm item included examples, such as cutting or burning oneself with no intention of dying.

### Data analysis

Different cut-off scores were applied to the data and the proportion under/over each cut-off was estimated for the full sample and for boys/girls and those under and over 14 years, respectively. The 14-year-age split was selected because it created equally large groups (i.e., median split) and mirrored the median age of onset for OCRDs (Solmi et al., 2022). Associations between the OCRD Dimensional Scales and obsessive-compulsive symptoms, internalizing and externalizing symptoms, and quality of life were examined using linear regression models. In these models, the body dysmorphic, hoarding, hair-pulling, and skin-picking scales were entered as independent variables (separately) and the different symptom/quality of life scales as the dependent variable. Associations with suicide attempts and non-suicidal self-harm during the last twelve months (coded as yes or no) were examined using chi-squared tests and logistic regressions. Age and gender were included as covariates in all the above regression models. Gender and

age group differences were examined using chi-squared tests. The correlation between age and body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms was estimated using Spearman's rho. An alpha level of 0.05 was used as an indicator of statistical significance in all analyses. All analyses were conducted with SPSS version 25 except when calculating the 95% CIs for the standardized betas in the regression models which were calculated in R.

### Determining cut-off scores

The Dimensional Scales are adapted from the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) and four of the five domains are identical to the Y-BOCS domains (time, distress, control, interference) while the Y-BOCS resistance domain is replaced by avoidance, using the same 0–4 Likert scale with the same response descriptions. There are currently no established cut-off scores for clinically significant symptoms for the scales used in this study. However, recent psychometric work with the Y-BOCS have provided cut-off scores that are invariant across age groups and countries for OCD (Cervin et al., 2022). Of note, these cut-offs were established using interview-rated Y-BOCS and not self-report as we use in this study. Self-reported scores may increase the risk of false positives in the context of psychiatric symptoms. To obtain a conservative yet empirically validated cut-off score, we analysed the large OCD dataset from the Cervin et al. (2022) study ( $N=3,809$ ) to find a score that yielded less than 10.0% false positives. This score was 20 (specificity: 91%, sensitivity: 72%), which translates to a score of 10 on the corresponding 5-item scales used here. To further protect against false positives, we decided that individuals with clinically significant symptoms also needed to score at least a 2 on the interference item, indicating at least moderate interference. Thus, a score  $\geq 10$  points combined with a score  $\geq 2$  on the interference item was used as our main cut-off score indicating clinically significant symptoms and we consider this to be a conservative score for identifying the frequency of youth with clinically significant symptoms. The proportion of participants that affirmed lifetime presence of the core symptoms of each disorder is also reported. Last, based on recent work showing that a score equal to or above 14 points on the Y-BOCS separates sub-clinical from clinical OCD (Cervin et al., 2022), we report the proportion that scores above the corresponding 7 points on each scale (with no specific criterium for interference), which was considered a less conservative cut-off.

**Table 2** Means and standard deviations of each dimensional measure and proportion of participants above cut-offs in the full sample and in girls/boys and age groups

Symptomatology	Full sample	Girls	Boys	Age < 14	Age ≥ 14
<b>Body-dysmorphic</b>					
BDD Dimensional Scale, <i>M</i> ( <i>SD</i> ) [0–20]	2.55 (3.12)	3.14 (3.39)	1.92 (2.66)	2.25 (3.02)	2.85 (3.20)
Proportion affirming both lifetime core symptoms, <i>n</i> (%)	1481 (27.7%)	1026 (37.8%)	446 (17.1%)	544 (20.1%)	937 (35.4%)
Proportion ≥ 7 points, <i>n</i> (%)	588 (11.0%)	410 (15.1%)	174 (6.7%)	255 (9.4%)	333 (12.6%)
Main cut-off (≥ 10 points and ≥ 2 on interference), <i>n</i> (%)	197 (3.7%)	136 (5.0%)	59 (2.3%)	78 (2.9%)	119 (4.5%)
<b>Hoarding</b>					
HD Dimensional Scale, <i>M</i> ( <i>SD</i> ) [0–20]	1.37 (2.22)	1.43 (2.22)	1.29 (2.21)	1.29 (2.11)	1.45 (2.33)
Proportion affirming both lifetime core symptoms, <i>n</i> (%)	915 (17.1%)	540 (19.9%)	370 (14.2%)	421 (15.6%)	494 (18.7%)
Proportion ≥ 7 points, <i>n</i> (%)	208 (3.9%)	113 (4.2%)	92 (3.5%)	88 (3.3%)	120 (4.5%)
Main cut-off (≥ 10 points and ≥ 2 on interference), <i>n</i> (%)	49 (0.9%)	22 (0.8%)	25 (1.0%)	15 (0.6%)	34 (1.3%)
<b>Hair-pulling</b>					
HPD Dimensional Scale, <i>M</i> ( <i>SD</i> ) [0–20]	0.46 (1.67)	0.46 (1.64)	0.44 (1.63)	0.41 (1.53)	0.51 (1.80)
Proportion affirming both lifetime core symptoms, <i>n</i> (%)	383 (7.2%)	222 (8.2%)	157 (6.0%)	155 (5.8%)	228 (8.6%)
Proportion ≥ 7 points, <i>n</i> (%)	101 (1.9%)	53 (2.0%)	43 (1.6%)	45 (1.7%)	56 (2.1%)
Main cut-off (≥ 10 points and ≥ 2 on interference), <i>n</i> (%)	38 (0.7%)	19 (0.7%)	16 (0.6%)	17 (0.6%)	21 (0.8%)
<b>Skin-picking</b>					
SPD Dimensional Scale, <i>M</i> ( <i>SD</i> ) [0–20]	1.57 (2.70)	1.76 (2.83)	1.35 (2.47)	1.27 (2.48)	1.87 (2.85)
Proportion affirming both lifetime core symptoms, <i>n</i> (%)	2361 (44.2%)	1418 (52.4%)	932 (35.7%)	940 (34.9%)	1421 (53.8%)
Proportion ≥ 7 points, <i>n</i> (%)	337 (6.3%)	203 (7.5%)	129 (4.9%)	134 (5.0%)	203 (7.7%)
Main cut-off (≥ 10 points and ≥ 2 on interference), <i>n</i> (%)	97 (1.8%)	55 (2.0%)	38 (1.5%)	41 (1.5%)	56 (2.1%)

## Results

### Proportion of adolescents with clinically significant symptoms

**Body-dysmorphic symptoms.** Of the 5,345 participants, 3.7% (95% CI: 3.2–4.2%) scored above our cut-off for clinically significant body-dysmorphic symptoms (see Table 2 for full results). This proportion was larger in girls than boys ( $X^2 = 28.6, p < .001$ ) and in those above versus those under 14 years ( $X^2 = 9.8, p = .002$ ). Almost a third of all participants affirmed lifetime presence of the core body-dysmorphic symptoms and 11.0% had a score equal to or above 7 points. There was a small but significant correlation between age and body-dysmorphic symptoms ( $r = .160, p < .001$ ).

**Hoarding symptoms.** For hoarding symptoms, 0.9% (95% CI: 0.7–1.2%) scored above our main cut-off, with no statistically significant difference between girls/boys ( $X^2 = 0.3, p = .569$ ). The proportion of clinically significant hoarding symptoms was higher in those above versus those under 14 years ( $X^2 = 7.9, p = .005$ ). Almost a fifth of all participants affirmed lifetime presence of the core hoarding symptoms and 3.9% had a score equal to or above 7 points. There was a small but significant correlation between age and hoarding symptoms ( $r = .044, p = .001$ ).

**Hair-pulling symptoms.** For hair-pulling symptoms, 0.7% (95% CI: 0.5–1.0%) scored above our main cut-off and this proportion was not statistically significantly different in boys/girls ( $X^2 = 0.2, p = .691$ ) or in those above/under 14 years ( $X^2 = 0.5, p = .473$ ). Almost one in ten affirmed lifetime presence of the core hair-pulling symptoms and 1.9% had a score equal to or above 7 points. There was a small but significant correlation between age and hair-pulling symptoms ( $r = .042, p = .002$ ).

**Skin-picking symptoms.** For skin-picking symptoms, 1.8% (95% CI: 1.5–2.2%) scored above our main cut-off and this proportion was not statistically significantly different in boys/girls ( $X^2 = 2.5, p = .110$ ) or in those above/under 14 years ( $X^2 = 2.7, p = .100$ ). Almost half of all participants affirmed lifetime presence of the core skin-picking symptoms and 6.3% scored equal to or above 7 points. There was a small but significant correlation between age and skin-picking symptoms ( $r = .179, p < .001$ ).

### Associations with mental health and quality of life

Linear regression results are presented in Table 3. All associations between body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms and obsessive-compulsive, internalizing and externalizing symptoms, and quality of life were statistically significant and in the expected direction. The strongest associations emerged between body-dysmorphic

**Table 3** Associations between body-dysmorphic, hoarding, hair-pulling, and skin-picking and obsessive-compulsive symptoms, internalizing symptoms, externalizing symptoms, and quality of life estimated using linear regression

	Obsessive-compulsive symptoms		Internalizing symptoms		Externalizing symptoms		Quality of life	
	Standardized regression coefficient (95% CI)	<i>p</i>	Standardized regression coefficient (95% CI)	<i>p</i>	Standardized regression coefficient (95% CI)	<i>p</i>	Standardized regression coefficient (95% CI)	<i>p</i>
<b>Model 1</b>								
Body-dysmorphic symptoms	0.40 (0.37, 0.42)	<0.001	0.52 (0.50, 0.55)	<0.001	0.30 (0.27, 0.32)	<0.001	-0.46 (-0.48, -0.43)	<0.001
Age	0.05 (0.03, 0.08)	<0.001	0.12 (0.10, 0.15)	<0.001	0.09 (0.07, 0.12)	<0.001	-0.15 (-0.18, -0.13)	<0.001
Boy vs. girl	-0.00 (-0.03, 0.02)	0.74	-0.07 (-0.09, -0.04)	<0.001	0.10 (0.07, 0.12)	<0.001	0.08 (0.06, 0.10)	<0.001
	$R^2 = 16.4\%$		$R^2 = 32.4\%$		$R^2 = 10.0\%$		$R^2 = 27.1\%$	
<b>Model 2</b>								
Hoarding symptoms	0.36 (0.33, 0.39)	<0.001	0.32 (0.30, 0.35)	<0.001	0.28 (0.25, 0.31)	<0.001	-0.26 (-0.29, -0.24)	<0.001
Age	0.09 (0.07, 0.12)	<0.001	0.18 (0.16, 0.21)	<0.001	0.12 (0.10, 0.15)	<0.001	-0.20 (-0.22, -0.18)	<0.001
Boy vs. girl	-0.07 (-0.10, -0.05)	<0.001	-0.16 (-0.18, -0.14)	<0.001	0.05 (0.02, 0.07)	<0.001	0.16 (0.14, 0.19)	<0.001
	$R^2 = 14.5\%$		$R^2 = 16.8\%$		$R^2 = 9.6\%$		$R^2 = 14.4\%$	
<b>Model 3</b>								
Hair-pulling symptoms	0.20 (0.18, 0.23)	<0.001	0.26 (0.23, 0.28)	<0.001	0.18 (0.15, 0.21)	<0.001	-0.20 (-0.22, -0.17)	<0.001
Age	0.10 (0.07, 0.12)	<0.001	0.18 (0.16, 0.21)	<0.001	0.13 (0.10, 0.15)	<0.001	-0.21 (-0.23, -0.18)	<0.001
Boy vs. girl	-0.08 (-0.11, -0.06)	<0.001	-0.17 (-0.19, -0.14)	<0.001	0.04 (0.01, 0.06)	0.005	0.17 (0.14, 0.20)	<0.001
	$R^2 = 5.7\%$		$R^2 = 12.8\%$		$R^2 = 5.0\%$		$R^2 = 11.2\%$	
<b>Model 4</b>								
Skin-picking symptoms	0.29 (0.26, 0.31)	<0.001	0.32 (0.29, 0.34)	<0.001	0.26 (0.23, 0.28)	<0.001	-0.26 (-0.28, -0.23)	<0.001
Age	0.07 (0.04, 0.09)	<0.001	0.15 (0.13, 0.18)	<0.001	0.10 (0.07, 0.12)	<0.001	-0.18 (-0.21, -0.15)	<0.001
Boy vs. girl	-0.06 (-0.08, -0.03)	<0.001	-0.15 (-0.17, -0.12)	<0.001	0.06 (0.03, 0.08)	<0.001	0.15 (0.13, 0.18)	<0.001
	$R^2 = 9.7\%$		$R^2 = 16.4\%$		$R^2 = 8.1\%$		$R^2 = 13.8\%$	

symptoms and internalizing symptoms, body-dysmorphic symptoms and poor quality of life, body-dysmorphic symptoms and obsessive-compulsive symptoms, and hoarding symptoms and obsessive-compulsive symptoms, with all these associations being moderate to strong.

### Associations with suicide attempts and non-suicidal self-harm

Those above the main cut-off for body-dysmorphic symptoms were much more likely to report that they had attempted suicide during the last twelve months than those below the cut-off (19.8% vs. 2.1%). This difference was statistically significant ( $X^2 = 194.03$ ,  $p < .001$ ), also when accounting for age and gender (OR = 9.17,  $p < .001$ ). Similarly, those above the main cut-off for body-dysmorphic

symptoms were more likely to have engaged in non-suicidal self-harm during the last twelve months (27.2% vs. 5.1%;  $X^2 = 155.45$ ,  $p < .00$ ; age and gender adjusted OR = 6.07,  $p < .001$ ). The adolescents above the main cut-off for hoarding symptoms were also more likely to have attempted suicide during the last twelve months than those below the cut-off (16.3% vs. 2.6%;  $X^2 = 29.89$ ,  $p < .001$ ; age and gender adjusted OR = 8.39,  $p < .001$ ) and to have engaged in non-suicidal self-harm (28.6% vs. 5.6%;  $X^2 = 46.61$ ,  $p < .001$ ; age and gender adjusted OR = 6.75,  $p < .001$ ). Very similar results emerged for hair-pulling symptoms (suicide attempt: 23.5% vs. 2.6%;  $X^2 = 55.61$ ,  $p < .001$ ; age and gender adjusted OR = 14.01,  $p < .001$ ; non-suicidal self-harm: 28.6% vs. 5.7%;  $X^2 = 33.20$ ,  $p < .001$ ; age and gender adjusted OR = 5.64,  $p < .001$ ) and skin-picking symptoms (suicide attempt: 18.0% vs. 2.5%;  $X^2 = 79.07$ ,  $p < .001$ ; age

and gender adjusted  $OR = 8.16$ ,  $p < .001$ ; non-suicidal self-harm: 19.1% vs. 5.6%;  $X^2 = 29.06$ ,  $p < .001$ ; age and gender adjusted  $OR = 3.40$ ,  $p < .001$ ).

## Discussion

BDD, HD, HPD, and SPD are assumed to onset during adolescence, but few studies have investigated the frequency of clinically significant symptoms within each symptom class in a large sample of adolescents. In this study, more than 5,000 Spanish adolescents from secondary education completed validated dimensional measures of body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms.

Clinically significant body-dysmorphic symptoms were present in 3.7% of adolescents and more common in girls and in older adolescents. Our estimate is similar to previous studies with adolescents (Möllmann et al., 2017; Schneider et al., 2017). However, previous studies have been inconclusive regarding gender and age differences, while we found strong evidence suggesting higher rates in girls and in those over 14 years. This suggests that mid to late adolescence, especially for girls, may be a key period for onset of BDD, which adds to prior research showing that most adults with BDD experience symptom onset before adulthood (Bjornsson et al., 2013). Recent research conducted with a sample of non-clinical adolescents from Australia (Schneider et al., 2019) found that girls and boys reported similar severity of body-dysmorphic symptoms but with gender-specific concerns regarding body parts, which is in agreement with the latest results found in adults with BDD (Malcolm et al., 2021). This latter study showed that adult women reported significantly more distress related to behavioural body-dysmorphic symptoms and a poorer insight of the illness than adult men (Malcolm et al., 2021). More research in adolescents is needed in order to explain the difference by gender in terms of aetiology, as this might be crucial in the detection and diagnosis of BDD.

Around one in hundred adolescents (0.9%) reported clinically significant symptoms of hoarding. This is similar but in the lower range compared to previous estimates (Akıncı et al., 2021; Ivanov et al., 2013). It may be that the combination of symptom severity and interference generated a lower estimate, with our less conservative cut-off showing that 3.9% had clinically significant symptoms. Difficulties using living areas may be mitigated by parents to children with hoarding symptoms, which may explain the much lower frequency when the interference criterion was applied. In prior studies, HD in adolescence has been more prevalent in girls (Akıncı et al., 2021; Burton et al., 2016; Ivanov et al., 2013), but we found no gender differences. However, we found that hoarding symptoms were more frequent in those

over 14 years of age. More research is needed to elucidate the onset of HD and the influence of age and gender, and it is possible that regional/cultural factors may affect age and gender differences.

Clinically significant symptoms of hair-pulling were reported by 0.7%, with no significant difference between boys/girls and age groups. Few studies have estimated prevalence/frequency rates in adolescents, but our estimate is very similar to the 0.5% estimate from an Israeli study with 794 17-year-olds which included interviews (King et al., 1995). Our less conservative cut-off yielded a frequency of 1.9%. Lifetime presence of the core hair-pulling symptoms was higher (7.2%), but still quite rare. Altogether, clearly interfering hair-pulling symptoms appear to be quite uncommon in adolescents, at least in this region in Spain.

We know of no studies that have estimated the frequency of clinically significant skin-picking symptoms in general adolescent samples. In this study almost half of all adolescents (44.2%) confirmed lifetime skin-picking behaviours, which is in line with previous research with children, adolescents, and adults (Hayes et al., 2009; Keuthen et al., 2010; Selles et al., 2015). The proportion that affirmed clinically significant symptoms was much lower (1.8%), but still, clinically significant skin-picking symptoms were the second most common symptoms (after body-dysmorphic symptoms) in our study.

Compared to prevalence rates of BDD, HD, HPD, and SPD in adult studies, our estimates were similar for skin-picking symptoms, higher for body-dysmorphic symptoms, and lower for hoarding and hair-pulling symptoms (Grant & Chamberlain, 2020; Grant et al., 2020; Keuthen et al., 2010; Postlethwaite et al., 2019; Veale et al., 2016). These findings point towards etiological differences in the onset of different OCRDs, with clinically significant hoarding and hair-pulling symptoms increasing in adulthood while body-dysmorphic symptoms may peak during adolescence. However, longitudinal studies from childhood into adulthood is needed to draw firm conclusions. It would be helpful for the field to settle around the same measures and work to establish sound benchmarks for how scores on these measures correspond to disorder severity.

Clear associations emerged between body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms and obsessive-compulsive, internalizing, and externalizing symptoms, poor quality of life, suicide attempts, and non-suicidal self-harm. This in line with previous studies showing that BDD, HD, HPD, and SPD coexist with a wide range of emotional and affective problems (e.g., Akıncı et al., 2021; Ivanov et al., 2013; Rautio et al., 2022; Selles et al., 2015), including suicide attempts (Pellegrini et al., 2021) and poor quality of life (e.g., Odlaug et al., 2010; Ricketts et al., 2018). Our findings also support that comorbidity may



be present early in life. Previous research has shown that OCRD symptoms tend to persist and worsen over time (e.g., for HPD, Franklin et al., 2008; Panza et al., 2013) and that adults have more comorbidity and impairment than youth (e.g., for HPD, Panza et al., 2013). Longitudinal studies are needed to clarify whether these problems are causes or consequences of the disorders, or both.

Body-dysmorphic symptoms were more strongly associated with internalizing symptoms and poor quality of life than hoarding, hair-pulling, and skin-picking symptoms. Given the estimated frequency of adolescents with clinically significant body-dysmorphic symptoms in this study and the clear association with broad emotional problems, body-dysmorphic symptoms may constitute a significant mental health challenge for adolescents. However, we found no evidence that body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms were more strongly related with obsessive-compulsive symptoms than with internalizing and externalizing symptoms, which contrasts with the current DSM classification, where these symptoms are supposed to be more closely related to OCD than to anxiety disorders (American Psychiatric Association, 2013).

All types of symptoms were clearly associated with an increased risk of suicide attempts and non-suicidal self-harm, and our results for body-dysmorphic symptoms are in line with a recent large study with 18-year-olds showing that among those with probable BDD, 27.7% had tried to commit suicide sometime during their life (assessed using a single dichotomous item, as in our study) compared to 6.0% of those without probable BDD (Krebs et al., 2022). The proportion in our sample, 18.7% and 2.1%, respectively, can be explained by differences in time period (last 12 months in the present study) and age (younger age in the present study).

Several limitations merit mentioning. First, the lack of information concerning the centres which did not participate, as well as on the adolescents who decided not to participate, makes it impossible to estimate to which degree this sample is representative of the broader population of Spanish adolescents. Further, our results may best generalize to Spanish adolescents (although several results were very similar to those from previous studies) as cultural factors may affect the frequency and expression of these symptoms. Second, self-reported measures were used, limiting the certainty that respondents correctly interpreted the items; future studies should include diagnostic interviews. Third, no established cut-offs were available, and we relied on prior research with similar but not identical measures. Fourth, DSM hoarding criteria are difficult to assess in adolescence since adolescents seldom control their living areas. Fifth, few adolescents affirmed hair-pulling symptoms,

resulting in little variation in scores and thus less power to establish relations with other symptoms and quality of life.

This is the first study to simultaneously examine the frequency of clinically significant body-dysmorphic, hoarding, hair-pulling, and skin-picking symptoms in a large adolescent sample using the Dimensional Scales of the DSM-5. The results indicate that, at least in this Spanish communitarian population, 3.7% of adolescents experience significant body-dysmorphic symptoms, 0.9% significant hoarding symptoms, 0.7% significant hair-pulling symptoms, and 1.8% significant skin-picking symptoms. These symptoms may be much more common than what would be expected at such young ages, since the rates are very similar to those reported in previous studies with adult samples. All symptom types were clearly associated with other mental health symptoms and poor quality of life. Furthermore, youth scoring above the clinical cut-offs of the symptom scales were much more likely to report that they had tried to commit suicide and engaged in non-suicidal self-harm during the last twelve months. Considering that these disorders appear to have a fluctuating and often lifelong course, high comorbidity with other symptoms, a relatively long delay in help-seeking (e.g., 9 years for HPD, Seedat & Stein 1998), low lifetime rates of mental health treatment (e.g., around 40.0% for BDD, Schulte et al., 2020), and that an early onset is associated with poor prognosis, greater comorbidity, and greater societal costs (Patel et al., 2007), it is imperative to improve early detection of these difficulties and conduct research on how to best identify and treat these symptoms already during adolescence.

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**Authors' contribution statements** The original project was conceived and designed by José A. Piqueras and Juan C. Marzo. Investigation and data collection were performed by Beatriz Moreno-Amador and Raquel Falcó. The study was conceived by Beatriz Moreno-Amador and Matti Cervin. Data analysis was performed by Beatriz Moreno-Amador and Matti Cervin. The first draft of the manuscript was written by Beatriz Moreno-Amador and Matti Cervin, with several edits from Raquel Falcó, José A. Piqueras, and Juan C. Marzo. All authors agreed with the final submitted manuscript.

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**Data Availability** The datasets generated during and/or analysed during the current study are available from the corresponding author upon reasonable request.

**Ethics approval** The study was approved by the Universidad Miguel Hernández Project Evaluation Committee (DPS.JPR.02.17). Participants had to provide their own and one of the guardians' written informed consents. Participation was voluntary and participants did not receive any incentive for their collaboration and were informed that confidentiality would be broken only if their responses indicated risk of suicide.

**Conflict of Interest** Dr. Cervin receives royalties from Springer for editorial work outside of the submitted work. The other authors have no conflicts of interest relevant to this article to disclose.

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