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Childhood maltreatment and trauma is common and severe in body dysmorphic disorder

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ABSTRACT

Background: Childhood maltreatment and trauma may be risk factors for the development of body dysmorphic disorder (BDD). However, the limited research to date on these topics has been constrained by either the absence of a matched healthy control group or non-comprehensive assessments.
Methods: This study assessed the prevalence and severity of childhood maltreatment and other traumatic events in 52 BDD participants (56% female) and 57 matched controls (51% female) with no history of mental illness, using the Childhood Trauma Questionnaire and a checklist assessing broader traumatic events.
Results: In comparison with controls, participants with BDD showed a higher prevalence of emotional abuse (61.5% vs. 33.3%) and physical neglect (59.6% vs. 28.1%), as well as more severe overall maltreatment, emotional abuse, and emotional and physical neglect. BDD participants were also more likely to meet cut-offs for multiple types of maltreatment and reported an elevated number and variety of broader traumatic childhood events (e.g., life-threatening illness). In BDD, increasingly severe maltreatment was correlated with greater severity of BDD symptoms, anxiety and suicidal ideation.
Conclusions: These data suggest that childhood maltreatment and exposure to other traumatic events are common and severe in BDD and are cross-sectionally associated with the severity of clinical symptoms. Adversity linked to maladaptive family functioning during childhood may therefore be especially relevant to people with BDD and could relate to social and emotional processing problems in the disorder.

1. Introduction

Exposure to childhood adversities, such as maltreatment and traumatic events, is a well-established risk factor for the development of a broad range of psychopathologies during childhood and in later life [1–3]. Experiencing cumulative childhood adversities is further associated with an increased risk of developing a mental disorder, particularly when different kinds of trauma co-occur (e.g., psychological, physical or sexual abuse/maltreatment, exposure to actual or threatened death or injury to self or others, experiences of domestic violence, family drug use or criminal behaviour, and parental mental health problems) [2,3]. Childhood adversity has been acknowledged as a potentially important risk factor for the development of body dysmorphic disorder (BDD), a severe mental disorder involving a distressing and impairing preoccupation with a perceived flaw(s) in physical appearance [4]. In particular, it has been theorised that emotional abuse may contribute to internalised self-criticism in BDD, while physical or sexual abuse may relate to body-focused shame [5]. More broadly, childhood maltreatment may contribute to the development of an array of psychopathologies via mechanisms involving altered social and emotional processing, and stress-related biological changes [6] that may also relate to the phenomenology of BDD. Examples of such mechanisms include heightened threat perception, threat-based interpretive biases of social situations, emotion regulation difficulties, elevated emotional reactivity to threat, and altered neural development in brain function and structure [7–9].

Empirical investigations of childhood maltreatment in BDD are constrained to only three published studies, each of which has significant methodological shortcomings [10–12]. Firstly, Neziroglu et al. [10] interviewed 50 outpatients with BDD (50% female) to ascertain any history of abuse according to local social services criteria. It was found

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that 38% of the BDD sample met criteria for a history of any abuse, with highest endorsement for having suffered emotional abuse (28%), followed by sexual abuse (22%) or physical abuse (14%). However, as the study did not include a mentally healthy control group, it remains unclear whether these rates are significantly different from those in a demographically-matched mentally healthy population. Moreover, maltreatment rates were not compared between male and female participants.

Didie et al. [11] administered the Childhood Trauma Questionnaire [CTQ; 13] to 75 BDD participants (69.3% female) and classified subscale scores as indicative of maltreatment using Bernstein and colleagues' [13] lowest cut-offs (i.e., at least '*slight to moderate*' severity of maltreatment). Overall, 78.7% of BDD participants reported maltreatment, including emotional neglect (68%), emotional abuse (56%), physical abuse (34.7%), physical neglect (33.3%) and sexual abuse (28%). Greater severity of emotional, physical, or sexual abuse was significantly correlated with a history of suicide attempts across the BDD sample. Abuse scores were similar among male and female participants except for sexual abuse, which was more severe in women. As in the study of Neziroglu et al. [10], there was no control group.

Finally, Buhlmann et al. [12] investigated self-reported emotional, sexual, and physical abuse in 18 outpatients with BDD (22.2% male) and 19 age- and gender-matched mentally healthy controls (15.8% male) using a checklist-style inventory. BDD participants reported having experienced a significantly higher number of traumatic events compared to controls, and were significantly more likely than controls to report physical abuse or sexual abuse by a family member. However, rates of emotional abuse were not significantly different between the two groups. Although this study had the strength of a healthy control group, the sample sizes were modest, and the use of a checklist-style inventory provided no measure of the relative severity of traumatic experiences between study groups. In addition, men were under-represented in this study, and potential abuse differences between male and female participants with BDD were not investigated.

To date, there has been very limited investigation of broader types of childhood traumatic events in BDD, such as significant interpersonal loss, experiencing a life-threatening illness, or exposure to natural disasters. In examining patient-identified events that were perceived to trigger BDD onset, Weingarden et al. [14] reported that 37.6% of BDD participants attributed the onset of BDD a stressful event, including bullying (47.4%) and abuse (8.4%). However, the overall lifetime prevalence of traumatic events (regardless of the event's perceived connection to BDD onset) was not assessed. Relatedly, a study in obsessive-compulsive disorder (OCD) found that patients with comorbid BDD were more likely to report traumatic life events and post-traumatic stress disorder symptoms than those without comorbid BDD [15], though the specific nature of trauma events was not reported. Exposure to traumatic events in childhood are associated with an increased risk of mental illness in general, whilst childhood adversities that are closely associated with maladaptive family functioning, such as family violence, parental mental illness, or parental incarceration, carry a particularly high risk of developing a mental disorder later in life [1]. As such, investigation of broader childhood trauma in BDD in addition to maltreatment experiences may be informative in understanding potential risk factors for BDD.

The current study sought to address limitations of previous research by providing a comparison of childhood maltreatment and exposure to broader traumatic events among a large sample of BDD participants and demographically-matched mentally healthy controls. We had four aims. Firstly, we sought to compare the severity and frequency of self-reported childhood maltreatment between the two groups using the CTQ [13]. Based on existing research [i.e., 10, 11, 12], we hypothesised that BDD participants would report greater frequency and severity of all forms of childhood maltreatment, than controls. Secondly, we sought to explore what other childhood trauma events might be described by people with BDD as compared to healthy controls (e.g., interpersonal loss, family violence, life-threatening illness), using a checklist approach with a free-response option. Given evidence of associations between exposure to childhood adversity and adult psychopathology [1], we expected that participants with BDD would report a greater total number of adverse events than controls. Thirdly, we aimed to investigate potential differences between men and women in terms of childhood maltreatment and exposure to other traumatic events. Based on the only investigation that compared maltreatment among men and women with BDD [11], we anticipated similar maltreatment scores among males and females with the exception of more severe sexual abuse in women. Finally, we sought to explore associations of childhood trauma with clinical characteristics of BDD. Childhood maltreatment and adversity is associated with generally increased psychopathological symptoms [1], and Didie et al. [11] reported significant associations between childhood abuse and a history of suicide attempts in people with BDD. Based on these data, we predicted that more severe maltreatment and increased prevalence of other adversities would correlate with more severe BDD symptoms, depression, anxiety, stress, suicidal ideation, and an increased number of mental disorder comorbidities within the BDD group.

2. Methods

2.1. Participants

The sample comprised 52 BDD participants and 57 healthy controls, recruited through public and online advertisements and via specialised BDD clinics. The BDD group consisted of 23 men and 29 women (mean age = 31.40, SD = 12.08), including both treatment-receiving and non-treatment-seeking participants, with a primary diagnosis of BDD confirmed using the BDD Diagnostic Module for the DSM [16]. The mean age of BDD onset was 17.14 years (SD = 5.92; range 8–46 years). Mean illness duration was 14.26 years (SD = 10.87; range = 1–48 years). Specific body areas of concern are reported in Supplementary Table 1. Screening with the Mini International Neuropsychiatric Interview for DSM-IV or DSM-5, depending on the timing of data collection [MINI; [17]], identified current comorbid diagnoses in 78.8% of the BDD group. These included major depressive disorder (n = 21), panic disorder (n = 12), agoraphobia (n = 5), social anxiety disorder (n = 16), obsessive-compulsive disorder (n = 3), post-traumatic stress disorder (PTSD; n = 2), alcohol use disorder (n = 8), substance use disorder (n = 4), psychotic disorder (n = 1; no active psychosis symptoms within the month of testing), anorexia nervosa (n = 2), bulimia nervosa (n = 4), and generalised anxiety disorder (n = 23). The decision was made to retain the two BDD participants with comorbid PTSD as their exclusion from analyses did not lead to any meaningful changes in the results. The healthy control group consisted of 28 men and 29 women (mean age = 29.42, SD = 8.57) who were recruited from the same geographical region as BDD participants and were matched for age and gender. Healthy controls were screened using the MINI to confirm the absence of a current or past mental disorder diagnosis, and only individuals who reported no significant history of mental health problems were included. All participants were English speaking, with no intellectual disability as estimated by a score > 70 on the Weschler Test of Adult Reading [18], and no self-reported history of neurological disorders upon verbal questioning.

2.2. Materials

2.2.1. Childhood Trauma Questionnaire (CTQ)

The 28-item CTQ [13] was used to assess the prevalence and severity of childhood maltreatment (aims 1 and 3). Five subscales relating to emotional, physical, and sexual abuse, as well as emotional and physical neglect are derived from 25 items (subscale range 5–25). Each item is rated on a five-point Likert scale (1 = *never true,* 5 = *very often true*), with higher scores indicating stronger endorsement of maltreatment. Three items contribute to a minimisation/denial subscale that captures under-

reporting (subscale range 0–3; scores above 1 indicate probable under-reporting). The CTQ has shown good convergent validity with therapist's ratings of maltreatment and corroborative data [13]. Cut-off scores can be used to classify the severity of each type of maltreatment as being *none to minimal, slight to moderate, moderate to severe,* or *severe to extreme* [scoring details in Online Supplement; [13]]. In this study, 'maltreatment' was defined as meeting or exceeding the minimum cut-off score for *slight to moderate* maltreatment, consistent with Bernstein and colleagues' recommendations and the procedures of Didie et al. [11].

2.2.2. Traumatic events checklist

A nine-item checklist with a free-response option was constructed to assess the prevalence of other traumatic events experienced during childhood (aims 2 and 3). Participants were asked the question "Did you suffer any of the following traumatic events in your childhood?" and presented with a list of possible events, such as natural disaster, serious accident or fire, life-threatening illness, or exposure to military combat or war zone (see Online Supplement for full list). Participants marked each item with 'Yes' or 'No'. If they ticked 'Yes' to the item 'Other traumatic event', they were invited to write what the event was. Participants' descriptions of self-identified traumatic events were accepted at face value (i.e., all responses were accepted as trauma events; no secondary evaluation of responses as objectively 'traumatic' or 'not traumatic' was undertaken). During analysis, events that were reported by more than one participant were assigned a representative label and grouped together (e.g., 'witnessed domestic violence/abuse').

2.2.3. Clinical assessments

Clinical assessments were used to address aim 4. The 12-item Yale-Brown Obsessive-Compulsive Scale modified for BDD [BDD-YBOCS; [19]] was used to assess BDD symptom severity (Cronbach's α = 0.83), and the Brown Assessment of Beliefs Scale [20] was used to measure illness insight (Cronbach's α = 0.87). The 42-item version of the Depression, Anxiety and Stress Scale [DASS; [21]] was used to assess depressive, anxious, and stress symptoms within the previous week, with recommended cut-off scores used to classify severity. Lastly, the presence of comorbid mental disorder diagnoses and the severity of current (i.e., within the past month) suicidal ideation was assessed using the MINI 5.0 or 7.0.2, depending on timing of data collection [22].

2.3. Procedure

Written informed consent was obtained from all study participants. Clinical assessments and diagnostic screening were conducted during an in-person lab session. Participants filled out the CTQ and traumatic events checklist after the lab session via a secure online questionnaire platform. Ethical approval for the research was granted by the Alfred Hospital, Swinburne University of Technology, and Australian Catholic University human research ethics committees. The study abided by the Declaration of Helsinki of 1975 as revised in 2008.

2.4. Statistical analyses

To address our first aim, mean scores on the CTQ and the mean number of maltreatment types for which cut-offs were met were compared between the BDD and healthy control groups using one-way ANOVAs. The prevalence of any maltreatment, and of each type of maltreatment, was compared between groups using chi-square tests. Correction for multiple comparisons were applied to these analyses (α = 0.05/14 = 0.004). To address our second aim, the prevalence and mean number of other childhood traumatic events described by BDD and control participants (using the traumatic events checklist tool) were compared using chi-square and ANOVA, respectively. To address our third aim, all preceding analyses were then conducted between male and female participants in the BDD group, and between male and female participants in the healthy control group, with correction for multiple comparisons (α = 0.05/28 = 0.002). Lastly, to address our fourth aim, Pearson bivariate correlations were conducted separately in the BDD and healthy control groups to evaluate associations between the frequency and severity of maltreatment and other traumatic events, and clinical variables of BDD symptom severity, illness insight, depression, anxiety and stress, current suicidal ideation severity, and the number of comorbid mental disorder diagnoses. Effect sizes are reported using Cohen's *d* for comparisons of group means (0.2 = small, 0.5 = medium, 0.8 = large) and Phi (φ) for chi-square tests (0.1 = small, 0.3 = medium, 0.5 = large).

3. Results

3.1. Clinical characteristics

On average, healthy controls reported depression (M = 5.39, SD = 7.61), anxiety (M = 3.18, SD = 5.56) and stress (M = 9.05, SD = 10.52) symptoms within the 'normal' range. In contrast, BDD participants on average reported 'extremely severe' depression (M = 29.71, SD = 22.40) and anxiety (M = 20.96, SD = 16.18), and 'severe' stress (M = 31.48, SD = 18.84). BDD participants demonstrated moderately severe BDD-YBOCS scores (M = 28.10, SD = 7.66) and poor insight on the BABS (M = 13.20, SD = 7.66). An absence of suicidal ideation within the previous month was reported by 53.5% of BDD participants, while 14%, 9.3% and 23.3% reported low, moderate and high risk suicidal ideation, respectively.

3.2. Prevalence and severity of childhood maltreatment (aim 1)

The majority of both BDD (84.6%) and healthy control participants (71.9%) met minimum criteria for at least one kind of maltreatment according to the CTQ, which was not significantly different between the groups, $\chi^2(1) = 2.55$, $p = .110$, $\varphi = 0.15$. Significantly more BDD participants than healthy controls met cut-offs for emotional abuse ($\chi^2(1) = 8.69$, $p = .003$, $\varphi = 0.28$) and physical neglect ($\chi^2(1) = 11.03$, $p = .001$, $\varphi = 0.32$; Table 1), but there were no group differences for the prevalence of physical abuse, sexual abuse, or emotional neglect. In total, 75% of BDD participants and 50.8% of healthy control participants met minimum cut-offs for more than one type of maltreatment on the CTQ (Fig. 1B). On average, BDD participants met criteria for significantly more types of maltreatment (M = 2.65, SD = 1.57) than did healthy controls (M = 1.63, SD = 1.40, $F(1,107) = 12.94$, $p < .001$. d = 0.69).

Regarding severity of maltreatment, one-way ANOVAs demonstrated significantly more severe emotional abuse, emotional and physical neglect, and overall maltreatment in BDD as compared to healthy controls with medium-large effect sizes (Table 1; severity of reported maltreatment experiences according to cut-offs is depicted within each group in Fig. 1A). There were no significant differences in mean severity of physical abuse or sexual abuse, or in minimisation-denial scores. However, scores on the minimisation-denial subscale indicated that 24.6% of healthy controls may have under-reported their maltreatment experiences (scores >1), as compared to only 9.6% of BDD participants.

3.3. Prevalence of broader traumatic childhood events

Data on other childhood traumas as recorded using the checklist and free-text response were available for 45 BDD and 45 healthy control participants (Table 2). Significantly more BDD participants than healthy controls endorsed experiencing at least one traumatic experience in childhood, $\chi^2(1) = 5.95$, $p = .015$, $\varphi = 0.26$. BDD participants also reported significantly more types of traumatic events in childhood (M = 0.82, SD = 1.07) than did controls (M = 0.24, SD = 0.48, $^{W}F(1,61,22) = 10.86$, $p = .002$, d = 0.70).

When summed together with the number of maltreatment types met on the CTQ subscales, BDD participants demonstrated a significantly

Table 1
Childhood Trauma Questionnaire (CTQ) maltreatment prevalence (%) and mean severity scores with statistical comparison of CTQ means between BDD and healthy control participants.

	Healthy controls (n = 57)			BDD (n = 52)			ANOVA (Severity)		
CTQ domain	%[†]	Mean	SD	%[†]	Mean	SD	(df), *F*	*p*	*d*
Emotional abuse	33.3%	7.53	2.35	61.5%	12.19	6.13	(1, 64.6), [W]26.54	<.001[*]	0.99
Physical abuse	28.1%	6.54	2.04	40.4%	7.92	4.07	(1, 73.7), [W]4.86	.031	0.42
Sexual abuse	19.3%	5.28	0.92	22.9%	6.33	3.68	(1, 56.8), [W]3.98	.051	0.38
Emotional neglect	54.4%	10.82	4.58	76.9%	13.42	4.61	(1, 107), 8.71	.004[*]	0.57
Physical neglect	28.1%	6.79	2.19	59.6%	8.21	2.87	(1, 107), 8.55	.004[*]	0.55
Minimisation-denial[‡]	–	0.60	1.03	–	0.22	0.70	(1, 89), 4.32	.041	0.44
Total score	–	36.96	8.81	–	48.08	16.01	(1, 77.6), 19.63	<.001[*]	0.85

[†] Percentage of participants meeting minimum cut-off scores for maltreatment as recommended by Bernstein et al. [13].
[‡] Missing data for 6 BDD and 12 healthy controls due to an administration error.
[W] Welch's F ratio.
[*] Significant at $p \leq .004$ (after Bonferroni correction).

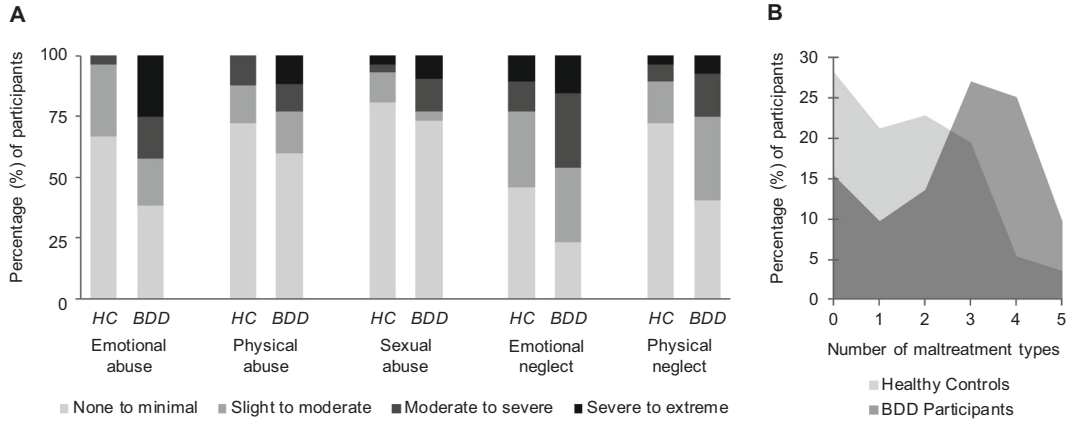

Fig. 1. Panel A depicts the severity of maltreatment on the five CTQ subscales in BDD and healthy control participants, classified according to cut-offs recommended by Bernstein et al. [13]. HC = Healthy controls, BDD = Body dysmorphic disorder participants. Panel B depicts the proportion of participants who met minimum cut-offs for zero, one, two, three, four or all five maltreatment types as per the five CTQ subscales.

Table 2
Prevalence of self-reported childhood traumatic events as reported on the checklist and free-text response items among the BDD and healthy control participants.

	Healthy controls (n = 45)		BDD (n = 45)	
Traumatic events reported	n	%	n	%
Any	10	22.2%	21	46.7%
Natural disaster (e.g., bushfire, flood, etc.)	1	2.2%	1	2.2%
Life-threatening illness or injury	1	2.2%	4	8.9%
Sexual assault by a stranger	1	2.2%	1	2.2%
Sexual contact before age 18 with someone ≥5 years older	6	13.3%	6	13.3%
Parental death or abandonment[†]	3	6.7%	3	6.7%
Witnessed domestic violence/abuse[†]	2	4.4%	3	6.7%
Witnessed/exposed to completed suicide, attempted suicide, or self-harm[†]	1	2.2%	4	8.9%
Witnessed violence to pets by family member[†]	–	–	1	2.2%
Homelessness[†]	–	–	1	2.2%
Witnessed other traumatic events (unspecified)[†]	–	–	2	4.4%
Severe bullying[†]	–	–	1	2.2%
Torture[†,‡]	–	–	1	2.2%

[†] Categories created from free-text responses.
[‡] Torture by a family member as part of broader physical/emotional abuse. No participants endorsed items for military combat or war zone exposure, imprisonment, physical assault by strangers, or serious accidents.

higher total number of traumatic and maltreatment experiences ($M = 3.44$, $SD = 2.21$, range = 0 to 8) than healthy controls ($M = 2.04$, $SD = 1.57$, range = 0 to 5, $F(1, 79.3) = 12.01$, $p = .001$, $d = 0.73$).

3.4. Comparisons among men and women

In the BDD group, 82.6% of males and 86.2% of females met cut-offs for at least one kind of maltreatment. In the healthy control group, these rates were 82.1% for males and 62.1% for females. After correction for multiple comparisons, no significant differences were found among males and females within either group for maltreatment prevalence and severity, according to the CTQ total and subscale scores (see Online Supplement for descriptive statistics). Regarding childhood traumatic events as recorded on the checklist and free-text response items, there were no significant differences between men and women in either group in the proportion of participants reporting at least one traumatic event in childhood or the total number of different traumatic events reported.

3.5. Correlations of maltreatment and other traumatic events with clinical variables

Within the BDD group, greater overall maltreatment severity (CTQ total score) was significantly correlated with more severe BDD symptoms, suicidal ideation and anxiety symptoms (Table 3). Having met cut-offs for more maltreatment types on the CTQ was also significantly correlated with more severe BDD symptoms and a greater likelihood of additional comorbid mental disorder diagnoses in the BDD group. For the CTQ subscales, greater severity of physical abuse and physical

Table 3
Correlations among maltreatment severity, cumulative maltreatment types and trauma events with clinical variables in BDD and healthy control participants.

	Emotional Abuse	Physical Abuse	Sexual Abuse	Emotional Neglect	Physical Neglect	CTQ Total	Cumulative maltreatment types[†]	Cumulative traumatic events[‡]
Body dysmorphic disorder group								
BDD severity	.22	.17	.14	.31*	.25	.29*	.28*	.07
Insight	.06	−.07	−.01	.17	.25	.09	.06	−.05
Suicidal ideation	.22	.16	.20	.31*	.29	.31*	.25	.12
Comorbidities[§]	.06	.07	.27	.10	.15	.16	.29*	.15
Depression	.07	.06	.08	.17	.17	.14	.11	−.09
Anxiety	.20	.30*	.22	.16	.51**	.34*	.22	.27
Stress	.15	.01	.21	.10	.28*	.21	.13	.12
Healthy control group								
Depression	.18	−.14	.02	.17	−.00	.12	.02	−.01
Anxiety	.31*	.20	−.02	.26*	.10	.29*	.12	.39*
Stress	.37*	.22	.02	.30*	−.02	.30*	.17	.35*

* $p < .05$.
** $p < .001$.
† Number of CTQ maltreatment types for which minimum cut-offs were met.
‡ Number of separate traumatic events reported on the trauma checklist and free-response item.
§ Number of current comorbidities.

neglect were significantly correlated with more severe anxiety, while greater emotional neglect was significantly associated with more severe BDD symptoms and suicidal ideation in BDD. In the healthy controls, greater overall maltreatment severity, as well as greater emotional abuse and emotional neglect, were significantly correlated with more severe anxiety and stress.

4. Discussion

This investigation provides the largest comparison to date of self-reported childhood maltreatment and trauma in BDD as compared to healthy individuals. While general childhood maltreatment was commonly reported by both BDD and control participants, the BDD group reported a greater prevalence of clinically significant emotional abuse and physical neglect with medium effect size, as well as more severe emotional abuse, emotional and physical neglect, and overall maltreatment, with medium-large effect size. BDD participants also reported having experienced more forms of maltreatment and more traumatic events during childhood. However, no gender differences were found across these analyses. Correlational data demonstrated significant associations between increased maltreatment severity (both overall and in sub-dimensions) and increased severity of a variety of clinical characteristics in both the BDD and healthy control groups.

The current findings support our first hypothesis by suggesting that childhood maltreatment, particularly emotional abuse and emotional and physical neglect, is more prevalent in people with BDD than in mentally healthy controls. These findings add weight to previous research studies that did not include a healthy control group but had reported high rates of emotional abuse and/or emotional neglect in BDD [10,11]. Our findings regarding the prevalence of maltreatment in BDD correspond closely to those reported by Didie et al. [11], although our BDD sample showed a comparatively greater prevalence of physical neglect. In comparison, the maltreatment rates reported by participants in our study exceeded those reported by Neziroglu et al. [10], although methodological differences (i.e., use of therapist interviews and local social services abuse criteria) may have resulted in the exclusion of milder maltreatment in that study. Our findings also differ from an investigation by Buhlmann et al. [12], in which physical and sexual abuse (but not emotional abuse) were reported by significantly more BDD participants than healthy controls. Conversely, our data suggest that emotional abuse and physical abuse or neglect are more common and severe in BDD than controls, while sexual abuse is not.

In line with our second hypothesis, our findings demonstrate that individuals with BDD are more likely than controls to report having experienced other traumatic events during their childhood, as well as a greater number of different traumatic experiences. Almost half of the BDD group, as compared to approximately one-fifth of the control group, reported a traumatic childhood event. While certain types of events appeared to be equally common in BDD and control participants (e.g., natural disaster, parental death or abandonment), other events were more commonly reported by BDD participants (or were only reported by BDD participants). These such events included experiencing a life-threatening illness, witnessing self-harm or suicidal actions, homelessness, severe bullying, family violence toward pets and torture by a family member. Taken together with the finding of significantly more severe emotional abuse and emotional and physical neglect in BDD than controls, these data suggest that people with BDD are more likely than people without a history of mental health concerns to have experienced particularly 'risky' family environments in early life, and/or formidable obstacles to typical biological and/or psychosocial development (e.g., illness). 'Risky' family environments are characterised by aggression and conflict, deficient nurturing and cold, unsupportive and neglectful relationships [23]. It is well established that such environments are associated with increased vulnerability to poor psychological, physical and psychosocial development across the lifespan, which can manifest as physical or mental health disorders [23,24]. While there has been very little investigation of family functioning in BDD, it has been reported that people with BDD tend to exhibit insecure attachments and report low perceived parental care as compared to healthy controls ([5], p. 117). Our current finding of significant correlations between BDD symptom severity and emotional neglect severity, overall maltreatment severity, and increased cumulative types of maltreatment, may further suggest that problematic caregiving in early life could be a pertinent risk factor for the development of BDD.

Increased exposure to childhood maltreatment and traumatic events in BDD, as suggested by our findings, may also be relevant in explaining certain core characteristics of the disorder. Specifically, altered social processing (characterised by heightened threat vigilance and hostile attribution biases) and altered emotional processing (i.e., poor emotion regulation, heightened emotional reactivity) are considered to be two core mechanisms whereby childhood trauma may lead to the development of psychopathology [6,24]. BDD is strongly associated with a threat-focused orientation in social information processing [25], as evidenced by negative or hostile interpretive biases in ambiguous situations [26], and a tendency to misinterpret facial expressions as angry or contemptuous [27]. Preliminary data also suggests that individuals with BDD may use maladaptive strategies for processing their own emotions [28,29], or may have difficulties in regulating and self-soothing their

own distress [25]. As such, increased research focus on abuse or trauma-related mechanisms that may underpin altered social and emotional processing in BDD may prove fruitful in enhancing aetiological and treatment models of the disorder.

Though we had hypothesised that female participants in both the BDD and control groups would report more severe sexual abuse than male participants, our findings demonstrated a lack of significant gender differences in both groups for all maltreatment and trauma parameters. These results are inconsistent with previous BDD research which showed a significantly higher prevalence of childhood sexual abuse in female BDD participants (n = 52) as compared to males (n = 23) [11]. Our findings also differ from general population surveys that suggest sexual and emotional abuse is more severe in women, while physical abuse is more severe in men [30]. Though the reason for these discrepancies is unclear, one potential factor might relate to population-level differences across studies (i.e., the current study was conducted in Australia, while the aforementioned research was conducted in North America). Nevertheless, BDD generally affects men and women in equal proportions and with more similarities in clinical presentation than differences [31,32], which could relate to our findings of similar maltreatment reports among men and women. However, the muscle dysmorphia (MD) subtype of BDD, which is associated with increased psychopathology and substance/anabolic steroid abuse, is most often found in men [33]. While we did not systematically screen for MD in this study, other research has shown that among recreational bodybuilders, increased MD symptoms are positively associated with severity of childhood emotional abuse, emotional neglect, and overall maltreatment [34]. As such, individuals with MD might exhibit similar maltreatment histories of maltreatment as men with 'general' BDD as reported in this study, but further research is necessary to investigate potential areas of difference.

Our correlational results also suggest that increased self-reported experiences of childhood maltreatment and trauma are associated with a variety of current state-based clinical symptoms in both BDD and healthy control participants, though with slightly differing patterns of associations between the two groups. Given that such state-based symptoms may fluctuate dramatically over time, the finding of weak-to-moderate associations between current symptoms and self-reported childhood maltreatment is not unexpected, yet still suggests some degree of consistency across participants. Importantly for the BDD group, the overall severity of perceived childhood maltreatment was significantly correlated with greater severity of BDD symptoms, anxiety, and suicidal ideation. Moreover, meeting criteria for multiple maltreatment types was correlated with more severe BDD symptoms and an increased number of current comorbid mental disorder diagnoses. Though directional inferences cannot be made from these cross-sectional data, the results show that an increased perception of childhood maltreatment coincides with increasingly severe or complex symptomatology in adulthood. These data may suggest that maltreatment is a potent risk factor for BDD, and/or that participants who experience severe BDD symptoms may have a more negatively biased recollection of past events as compared to when in a less symptomatic state. Prospective research will be necessary to investigate these potential relationships.

This study has several limitations. Childhood trauma data was retrospectively self-reported and was not bolstered by corroborative data or detailed follow-up interviews. We were therefore unable to confirm reported events or implement a standardised coding procedure to objectively categorise reported events. In this respect, it must be noted that cut-off scores on the minimisation-denial subscale of the CTQ suggested that up to 24.6% of healthy controls in the current sample may have been under-reporting their maltreatment experiences. However, healthy controls may be more likely than those with BDD to employ a 'rose-tinted' bias when recalling events from their childhood, as with other self-serving biases [35]. On the other hand, individuals with BDD may have a bias toward recalling negative emotional information, which may lead to either a more realistic recollection of events, or an increasingly negative perception of past events. Future research might aim to use more rigorous assessment methods such as corroborative data and detailed interviews, to confirm and cross-evaluate self-reported traumatic experiences. Furthermore, we did not examine the relative frequency of reported maltreatment experiences over time, and thus we were unable to differentiate isolated abusive or traumatic experiences from those that involved a consistent, long-term, or repetitive quality. Such differences may be important in ascertaining relative risk for psychopathological associations and should be addressed in future research studies. In addition, inclusion of a clinical control group (e.g., anxiety disorders) in future research will be important in delineating the degree to which findings of childhood maltreatment in BDD may represent transdiagnostic, rather than disorder-specific risk factors. Finally, our conservative alpha adjustments may have resulted in reduced statistical power to detect differences of small effect size, in exchange for providing more rigorous Type I error control. However, the current study also had several strengths, including dual examination of both maltreatment experiences and more broadly defined traumatic events, use of a well-matched healthy control group, a broadly generalisable BDD sample (i.e., inclusive of both treatment-receiving and non-treatment-seeking individuals), and an equal proportion of male and female participants in both study groups.

The findings of this study suggest several areas for further research. Investigation of mechanisms related to the development of BDD in people who have been exposed to childhood trauma or maltreatment will be important for enhancing aetiological models of BDD, and may aid in providing coherent explanations for the emergence of poor social and emotional processing in the disorder. Investigation of early family functioning, particularly experiences relative to emotional abuse or neglect, may prove especially informative. This may also include examination of whether appearance-related themes (e.g., parental criticism of looks) are particularly common among abuse histories in people with BDD. In addition, investigation of the ways in which people with BDD may or may not perceive childhood trauma or abuse as being relevant to their current distress could be useful for enhancing current treatments.

In sum, people with BDD are more likely than those who have never had a mental disorder to report having experienced more severe childhood maltreatment and more traumatic events in childhood, particularly concerning emotional abuse and emotional and physical neglect. The overall pattern of results further suggests that 'risky' family environments may represent an area that merits further investigation in BDD. While the relevance of traumatic experiences is being increasingly acknowledged in BDD literature [36], there is still a paucity of empirical investigation in this area. In particular, the examination of the specific processes which might confer an increased risk for BDD following childhood trauma or maltreatment will be an important area for further research development.

Declaration of conflicting interests

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Appendix A. Supplementary data

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