Obsessive–compulsive or addiction? Categorical diagnostic analysis of excoriation disorder compared to obsessive-compulsive disorder and gambling disorder

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A B S T R A C T

Excoriation disorder (ED) is currently classified in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders' Obsessive–compulsive and Related Disorders section (OCRD). However, there remain debates regarding whether ED is related to obsessive–compulsive disorder (OCD) or whether it is better conceptualized as a behavioral addiction. The present research compared the diagnostic overlap and psychiatric comorbidities of 121 individuals seeking treatment for ED ($n = 40$), OCD ($n = 41$) and gambling disorder (GD) ($n = 40$). ED was more likely to overlap with OCD ($n = 14$) than GD ($n = 3$). Compared to OCD, ED had similar frequencies of other body focused repetitive behaviors (BFRBs), but higher frequency of addictive behaviors (Odds Ratio – OR = 11.82). In comparison to GD, ED had similar frequencies of addictive behaviors, but higher frequency of BFRBs (OR = 19.67). The results support the recent classification of ED as an OCRD. However, ED presents an association with behavioral addictions that suggests a mixed impulsive-compulsive nature. A limitation of the present research was the use of a non-validated semi-structured clinical interview to diagnose impulse control disorders. Future research should examine other characteristics (e.g., epidemiology, neurobiology, genetics, treatment response) to further investigate whether ED should remain classified as an OCRD.

1. Introduction

Excoriation disorder (ED) was first reported in 1875 by British dermatologist Erasmus Wilson (1875), who named it "Neurotic Excoriation." Presently, ED's nomenclatures include "skin picking", "skin picking disorder", "pathological skin picking" and "self-inflicted skin picking" (Grant and Stein, 2014; Odlaug and Grant, 2010). The term excoriation disorder was first proposed in the fifth edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013) and is now the most commonly used term. ED is characterized by repetitive and excessive behaviors such as scratching, squeezing, and picking on healthy skin, which may result in significant lesions, skin damage and psychological distress (Snorrason et al., 2012). Individuals with ED often exhibit an uncontrollable urge to scar the skin and failure to control these repetitive behaviors (Grant and Odlaug, 2009; Stein et al., 2010; Chamberlain et al., 2006; Wilhelm et al., 1999).

There is considerable variation in the prevalence of ED which ranges from 1.4% to 5.4% (Stein et al., 2010; Keuthen et al., 2010; Teng et al., 2002). Furthermore, females account for 60–80% of ED cases, with onset occurring in adolescence. Specifically, the onset of ED tends to be 12.4 years old in clinical samples (Siddiqui et al., 2012; Calikusu et al., 2012; Leibovici et al., 2014; Keuthen et al., 2000) and 15 years old in the general community (Wilhelm et al., 1999; Teng et al., 2002). ED frequently co-occurs with other psychiatric disorders, including elevated rates of suicidality (Odlaug and Grant, 2010; Wilhelm et al., 1999). For example, Odlaug and Grant (2010) found that 15% of ED patients had experienced involuntary psychiatric hospitalization and 11.5% had previously attempted suicide. Furthermore, in a clinical sample of 33 ED patients, the most common comorbid disorder was obsessive–compulsive disorder (OCD, 52%), followed by alcohol abuse/addiction (39%) and body dimorphic disorder (BDD, 32%)

(Wilhelm et al., 1999). These patterns of comorbidity were also found in a sample of University students (Leibovici et al., 2014). Comorbid anxiety and mood disorders are also frequent in ED, specifically, social phobia, generalized anxiety disorder, and major depressive disorder (Machado et al., 2018).

1.1. Obsessive–compulsive or addiction? The classification issue of excoriation disorder

ED as a psychiatric diagnosis was first mentioned in DSM-IV as "skin picking" and placed within the Impulse Control Disorders (ICDs) not otherwise classified section, however, without any specific diagnostic criteria (APA, 1994). The ICD section also included disorders such as intermittent explosive disorder, kleptomania, pyromania, pathological gambling, and trichotillomania. In a revised version of the fourth edition of the DSM (DSM-IV-TR), ICDs were defined as disorders characterized the failures to resist impulses, which may result in personal or interpersonal harms (APA, 2000). In other words, individuals experience tension or increasing arousal before committing the impulsive act, followed by pleasure, gratification, or relief from the urge when engaging in ICDs.

The fifth and latest edition the DSM-5 (APA, 2013), brought a radical change of the ICD section. First, the section on ICDs was relabeled as Disruptive, Impulse-Control and Conduct Disorders. Skin picking disorder was renamed to ED and gained specific diagnostic criteria. Importantly for the present research, ED (along with trichotillomania) was moved to the obsessive–compulsive related disorders (OCRD) under the subgroup of body-focused repetitive behaviors (BFRB). Secondly, pathological gambling was renamed to gambling disorder (GD) and moved to the Substance-related and Addictive Disorders section, becoming the first behavioral addiction formally recognized. The remaining disorders previously classified as ICDs remained in the new section with the addition of oppositional defiant disorder, conduct disorder and antisocial personality disorder. These changes were made with the goal of providing a more precise and narrow scope of impulsive disorders, characterized by behaviors that violate the rights of others and conflict with societal norms (APA, 2013).

Despite the merit of building a less heterogeneous group of disorders, the reconfiguration of the DSM-5 classification system was not without controversy. While the reclassification of GD as an addiction remains largely uncontested, the addition of ED and trichotillomania in the OCRD section has been questioned on several grounds. Although EDs reclassification as an OCRD was due to their proposed clinical and neurological similarities (Stein et al., 2016), this classification is not without debate (Van Ameringen et al., 2014). In fact, the DSM-5 itself points out that in ED *"the repetitive behaviors are not triggered by obsessions or preoccupation"* (APA, 2013), which is in contrast to the hallmark symptom in OCD. Secondly, previous studies reporting OCD and BFRB share genetic factors have been questioned (Züchner et al., 2009). For example, Bienvenu et al. (2009) found that although the *Sapap3* gene was associated with BFRB, including ED, it was not associated with OCD. Lastly, OCD and BFRBs respond differentially to both psychological and pharmacological treatments (Abramowitz and Jacoby, 2015). While exposure and response prevention is the gold-standard treatment for OCD (Abramovich and Cooperman, 2015), habit reversal remains the primary treatment for ED (Leppinik et al., 2016). Furthermore, although selective serotonin reuptake inhibitors (SSRIs) have demonstrated efficacy in the treatment for OCD, SSRIs have yet to demonstrate treatment efficacy for ED (Abramowitz and Jacoby, 2015).

Rather than a disorder related to OCRDs, ED has also been proposed to be a behavioral addiction (BA) (Odlaug and Grant, 2010). This conceptualization is based on several lines of research, including the high comorbidity rates of addiction found in people with ED (Snorrason et al., 2012; Machado et al., 2018). Secondly, ED shares key characteristics to BAs including the continued engagement in the behavior despite harm, the presence of urges, the hedonic value associated with

the behavior and elevated levels of impulsivity (Odlaug and Grant, 2010; Oliveira et al., 2015). Lastly, ED and addictions appear to show similar treatment response, including both psychological (such as 12-step programs) and pharmacological treatments, such as naltrexone and topiramate (Grant et al., 2010).

Yet, to our knowledge, no study to date has directly compared ED to OCRDs. The goal of the present study was to address this empirical gap by comparing ED with two clinical paradigms of OCRD and BAs, OCD and GD, respectively, to assess whether ED is more related to OCRDs or BAs. To this end, we assessed the diagnostic overlap and patterns of comorbidity in ED, OCD, and GD. Patterns of comorbidity may provide more insight into the classification of ED as psychiatric disorders that share related phenomenological features and are more likely to co-occur (Abramowitz and Jacoby, 2015). Indeed, if ED is an OCRD, it should overlap with OCD to a greater extent than with GD, including in psychiatric comorbidities. Additionally, both ED and OCD should have a greater association with other BFRBs compared to people with GD. Conversely, if ED shares underlying similarities to BAs, then it would be expected to overlap with GD, as well as with other addictive disorders and share similar psychiatric comorbidity profiles with addictions. The present research directly tested this empirical assertion.

2. Methodology

2.1. Participants

Participants were recruited from the Instituto de Psiquiatria, Hospital das Clinicas, Faculdade de Medicina, Universidade de Sao Paulo (HCFMUSP) from 2014 to 2017. Eligible patients (i.e., meeting diagnostic criteria for one of three target disorders according to the DSM-5) seeking treatment were invited to participate. In our study, two individuals were excluded because of illiteracy, one patient was acutely psychotic, two had comorbidities with dermatological lesions and one patient's primary concern was not ED despite their self-inflicted skin legions in the ED sample. For the GD sample: 78 individuals dropped out, one did not sign the informed consent, one was acutely psychotic, one patient did not understand the research protocol due to language barriers and one patient did not meet criteria for GD. Finally, 18 individuals in the OCD sample did not finish the protocol and one patient had bipolar disorder. As bipolar disorder is a diagnostic exclusion criterion for GD, participants who met diagnostic criteria for bipolar disorder, assessed using the Mini International Neuropsychiatric Interview (MINI) (Sheehan et al., 1998; Amorim, 2000), were excluded from our sample. The final sample consisted of 121 participants: ED ($n = 40$), OCD ($n = 41$), and GD ($n = 40$). Patients were explicitly informed that treatment was not contingent upon research participation and written informed consent was obtained from all participants. Ethical approval was obtained from Research Ethics Board of Faculdade de Medicina, Universidade de Sao Paulo (HCFMUSP).

2.2. Measures

A semi-structured interview collected demographic characteristics of the participants, such as, gender, age, ethnicity, marital status, years of formal education, religious affiliation and work status. Additionally, clinical information including the onset of the disorders, prescribed medication, tobacco use as well as the presence of other BFRB (lip and cheek biting, nail biting and hair pulling) were assessed during the semi-structured interview. Trained psychiatrists assessed all participants.

The OCD diagnosis was verified using the MINI, a brief semi-structured interview that assesses for the presence of major psychiatric disorders (Sheehan et al., 1998; Amorim, 2000). Main psychiatric comorbidities including major depressive disorder (MDD), panic disorder, agoraphobia, social phobia, post-traumatic stress disorder (PTSD), general anxiety disorder (GAD), alcohol abuse/addiction, drug abuse/

addiction and suicide risk were also assessed using the MINI.

In the absence of internationally validated instruments for checking diagnostic operational for ED and GD, we used a semi-structured clinical interview modeled after the Structured Clinical Interview for the DSM (SCID) (First, 2004), based upon the DSM-5 criteria for both disorders. This structured clinical interview, called the SCID-ICD, has been used on previous contributions from our research group for ICDs, BFRBs and BAs (Cassetta et al., 2018; Kim et al., 2018; Nicoli de Mattos et al., 2016). Psychiatric comorbidity assessment with a special focus on ICDs, BFRBs and BAs was performed using the SCID-ICD and included: binge eating, compulsive buying disorder, hypersexuality disorder, Internet use disorder, videogame use disorder, intermittent explosive disorder, non-suicidal self-injury disorder and kleptomania.

2.3. Statistical analysis

Univariate analyses were first conducted to assess for potential differences in demographic and clinical characteristics across the three groups. Chi-square test was used for categorical variables and Kruskal–Wallis test was used for ordinal or continuous variables, given the non-normal distribution of our data. Second, we explored the overlap (i.e., co-occurrence) between the three disorders. Finally, in order to avoid inflating comparisons between groups, we gathered the psychiatric comorbidities into five clusters, according to the usual clustering of the most commonly comorbid disorders group for ED: mood disorders (in this case solely MDD, because bipolar disorder was an exclusion criterion in this study), any anxiety disorder, any grooming behavior, any addictive behavior, and any ICDs (Wilhelm et al., 1999). We conducted single factor multinomial logistic regressions for each cluster and their respective components, with ED, OCD, or GD diagnosis as the dependent variable. The variables that reached significance ($p < 0.05$) at the univariate analysis were added to the models in order to control for demographic and clinical differences with continuous variables entering as covariates and categorical variables as cofactors. Finally, to account for the risk of inflating the alpha error by conducting multiple comparisons, a multinomial logistic regression was conducted with covariates and all variables that reached significance at the single factor multinomial logistic regressions as the independent variables. Special care was taken to avoid model instability by adding too many independent factors into the multinomial logistic regressions. To this end, we took Tabachnik and Fidell's (2001) advice for adjusting the number of factors within each model according to the sample size using the formula: $N = 50 + 8v$, where N stands for the full sample size and v for the total number of independent factors added to the model. Thus, given our N of 121 participants, no model should exceed a maximum of 8 factors per regression, which was the case in our analyses.

3. Results

3.1. Demographic and clinical profiles

There were several demographic differences between the three groups (see Table 1). ED patients were younger than GD and more likely to be women than GD and OCD patients. Additionally, they were less likely to report a Catholic affiliation than OCD patients and more likely to report having no mainstream religion or any religion at all when compared to both OCD and GD participants.

Similarly, differences were found between the three groups on clinical characteristics, with the GD group reporting the latest onset of their disorder. Most of OCD participants were taking prescribed medications and presented with more prescriptions for SSRIs and antipsychotic medications compared to ED and GD patients (Table 1).

3.2. Diagnostic overlap

Of the 121 participants 18 (14.9%) met criteria for two diagnoses and two (1.7%) met criteria for ED, OCD and GD. Overall, 14 met criteria for both ED and OCD, three met for GD and ED, and one participant met for OCD and GD. Within the ED group, four of the 40 participants also met criteria for OCD (10%), while no ED participants met criteria for GD. Of those meeting criteria for GD, 3 (7.5%) also met criteria for ED, and 1 (2.5%) met criteria for OCD. Within those meeting criteria for OCD, 12 (29.3%) met criteria for ED, and 2 (4.9%) met criteria for GD (Fig. 1).

Upon further exploration of the association between ED and OCD, we found that ED was more frequently reported as a secondary comorbid condition (29.3%) than the reverse. In other words, only four individuals in the ED group (10.0%) met criteria for secondary OCD ($\chi^2(2) = 4.74$, $p = 0.029$). The estimated odds ratio for this difference was 3.72 (95% CI: 1.09 – 12.78).

3.3. Behavioral and comorbidity clusters comparison

All multinomial regression models for the behavioral and comorbidity variables and their clusters had disorder onset included as a covariate, and gender, religion, use of SSRIs and antipsychotic medication added as cofactors. ED differentiated from OCD by a higher frequency of addictive behaviors in general (odds ratio (OR) = 11.82, $p = 0.024$) and specifically by a higher frequency of tobacco use (OR = 12.53, $p = 0.036$). ED differentiated from GD by a higher frequency of lip and cheek biting (OR = 19.67, $p = 0.016$). The comparison for binge eating frequency amongst the groups only reached significance ($p = 0.060$), but the estimated odds ratios from the 2×2 group comparison suggested a lower frequency of binge eating behavior in ED compared to GD individuals (OR = 0.11, $p = 0.030$). No individual from the OCD group reported problems with alcohol or drugs, thus, it was not possible to estimate the odds ratios for this group. No differences were found regarding alcohol or drug abuse/addiction for ED and GD. However, ED differentiated from both OCD and GD with a higher frequency of GAD (OR = 5.10, $p = 0.044$ and OR = 5.23, $p = 0.036$, respectively). ED individuals did not report PTSD, hypersexuality, or videogame use disorder, hence the comparison was conducted only between OCD and GD, with no differences being found between these groups. In addition, kleptomania was reported by three individuals from the OCD group, but it was not found amongst the ED and GD group, therefore no comparison was conducted for this comorbidity. Finally, moderate to severe suicide risk was significantly different between the groups, with a higher proportion in the GD group compared to the OCD group. As only one individual from the OCD group reported suicide, the OR estimate was inflated (OR = 139, $p = 0.007$). In the post-hoc comparison of suicide risk, ED had lower rates compared to GD but higher rates compared to OCD, on both cases with marginal significance levels (OR = 23.30, $p = 0.088$ and OR = 0.17, $p = 0.093$, respectively). Table 2 summarizes the main results.

The final multinomial regression model included the control variables and three variables that reached significance at the single regression models (GAD, lip and cheek biting, and suicide risk). The addictive behavior cluster was not included due to significant covariance with suicide risk ($\chi^2(1) = 4.21$, $p = 0.040$). Tobacco use was not included for the same reason ($\chi^2(1) = 7.03$, $p = 0.008$). The final model correctly classified 35 ED individuals (87.5%), 36 OCD individuals (87.8%) and 35 GD (87.5%) individuals, with an overall classification accuracy of 87.6% (Model fit: $\chi^2(20) = 185.90$, $p < 0.001$, Nagelkerke's pseudo $R^2 = 0.88$). All three factors significantly contributed to the model: GAD ($\chi^2(2) = 14.89$, $p = 0.001$), lip and cheek biting ($\chi^2(2) = 14.27$, $p = 0.001$) and suicide risk ($\chi^2(2) = 20.08$, $p < 0.001$). ED participants presented with greater rates of GAD in comparison to the OCD group (Wald's $\chi^2(1) = 3.79$, $p = 0.052$). In

Table 1

Demographic and clinical profiles of excoriation disorder, obsessive–compulsive disorder and gambling disorder.

Characteristics	ED (n = 40)			OCD (n = 41)			GD (n = 40)			Test	P
	n	%	M (Min/Max)	n	%	M (Min/Max)	n	%	M (Min/Max)		
Age			38.5 (21–79)			40 (21–59)			50 (26–74)	$\chi^2(2) = 18.36$[a]	< 0.001[b]
Sex										$\chi^2(2) = 0.21$[c]	0.010[d]
Male	5	12.5		16	39.0		16	40.0			
Female	35	87.5		25	61.0		24	60.0			
Ethnic group										$\chi^2(2) = 3.91$[c]	0.141
Caucasian	32	80.0		26	63.4		32	80.0			
Non-Caucasian	8	20.0		15	36.6		8	20.0			
Marital Status										$\chi^2(2) = 0.02$[c]	1.000
Single	23	57.5		23	56.1		23	57.5			
In a relationship	17	42.5		18	43.9		17	42.5			
Years of formal education			15 (3–22)			14 (7–21)			11 (2–26)	$\chi^2(2) = 18.36$[a]	0.061
Religion										$\chi^2(6) = 1.95$[c]	0.002[e,f]
Catholic	13	32.5		27	65.9		20	50.0			
Evangelical	6	15.0		7	17.1		7	17.5			
Spirits	4	10.0		5	12.2		7	17.5			
Others/without religion	17	42.5		2	4.9		6	15.0			
Work status										$\chi^2(2) = 1.77$[a]	0.412
Employed	20	50.0		24	51.5		19	47.5			
Does not work (retired, housewife, or student)	20	50.0		15	38.5		21	52.5			
Onset age			13 (5–59)			17 (5–54)			49 (26–73)[a]	$\chi^2(2) = 54.76$[a]	< 0.001[g]
Medication prescribed											
SSRIs	9	22.5		34	82.9		17	42.5		$\chi^2(2) = 30.77$[c]	<0.001[h]
Other anti-depressants	5	12.5		9	22.0		6	15.0		$\chi^2(2) = 1.41$[c]	0.494
Benzodiazepine/hypnotic drugs	2	5.0		4	9.8		6	15.0		$\chi^2(2) = 2.24$[c]	0.333
Antipsychotics	1	2.5		15	36.6		3	7.5		$\chi^2(2) = 20.81$[c]	<0.001[i]
Mood Stabilizers	2	5.0		2	4.9		0	0		$\chi^2(2) = 2.04$[c]	0.360
Others	4	10.0		6	14.6		6	15.0		$\chi^2(2) = 0.54$[c]	0.762

[a] Kruskal–Wallis test.
[b] Post-hoc analysis for age: ED < OCD and GD.
[c] Qui-square test.
[d] Post-hoc analysis for Female: ED > OCD and GD.
[e] Post-hoc analysis for Catholic: ED < OCD.
[f] Post-hoc analyses for Others/without religion: ED > OCD and GD.
[g] Post-hoc analyses for Onset age: GD > ED and OCD.
[h] Post-hoc analyses for SSRI: OCD > ED and GD Post-hoc analyses for antipsychotics: OCD > ED and GD.
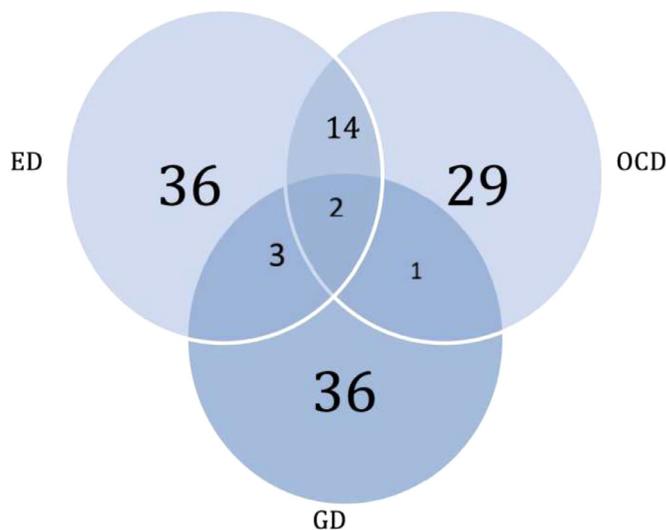

Fig. 1. Venn diagram of the diagnostic overlap between excoriation disorder (ED), obsessive–compulsive disorder (OCD) and gambling disorder (GD).

comparison to GD, ED presented with higher frequency of GAD (Wald's $\chi^2(1) = 9.41$, $p = 0.002$), lip and cheek biting (Wald's $\chi^2(1) = 7.55$, $p = 0.006$) and lower frequency of suicide risk (Wald's $\chi^2(1) = 7.77$, $p = 0.005$).

4. Discussion

The aim of the present research was to assess whether ED was related to OCRDs or BAs. To this end, we compared the diagnostic overlap and psychiatric comorbidities of ED with OCD and GD, the prototypical OCRD and BA respectively.

In preliminary analyses, the ED group presented with demographic differences compared to the OCD and GD groups. Specifically, ED patients were younger, more likely to be women and have no mainstream religion. In general, this demographic profile is similar to clinical samples of ED patients (Keuthen et al., 2010; Siddiqui et al., 2012; Calikusu et al., 2012; Leibovici et al., 2014; Keuthen et al., 2000; Tucker et al., 2011), suggesting that the ED participants in our sample are likely representative of ED treatment-seeking sample in general.

Concerning the diagnostic overlap, the results suggest that OCD and ED were more likely to co-occur compared to ED and GD. In fact, no patient with ED met co-occurring GD. The frequent overlap between ED and OCD was based on ED being a secondary comorbidity to OCD, rather than OCD being a secondary comorbidity to ED. A potential reason for this finding could be that ED may represent a partial syndrome of OCD, similar to the relationship between binge eating disorder and bulimia nervosa. In other words, OCD may constitute a more restrictive diagnosis compared to ED, specifically due to the presence of obsessions, whereas the compulsion to pick one's own skin can occur without the presence or obsessions or preoccupations. Moreover, it is plausible that OCD may represent a more severe form of ED, similar to Kraepelin's view of kleptomania constituting a more severe form of compulsive buying (Baltacioglu et al., 2015). Future research assessing the temporal sequencing of ED and OCD would be highly informative.

Table 2
Psychiatric comorbidities of excoriation disorder, obsessive–compulsive disorder and gambling disorder, multinomial logistic regressions.

Characteristics	ED (n = 40)		OCD (n = 41)		GD (n = 40)		Test	P*
	n	%	n	%	n	%		
Lifetime major depressive disorder	28	70.0	33	80.5	21	52.5	$\chi^2(2) = 0.57$	0.753
Any anxiety disorder:	33	82.5	37	90.2	21	52.5	$\chi^2(2) = 3.91$	0.141
-Lifetime panic disorder	8	20.0	12	29.3	3	7.5	$\chi^2(2) = 2.67$	0.264
-Agoraphobia	17	42.5	15	36.6	7	17.5	$\chi^2(2) = 0.77$	0.681
-Social phobia	6	15.0	15	36.6	6	15.0	$\chi^2(2) = 0.82$	0.663
-Post-traumatic stress disorder	0	0	1	2.4	5	12.5	$\chi^2(1) = 2.84$[a]	0.092
-Generalized anxiety disorder	24	60.0	21	51.2	13	32.5	$\chi^2(2) = 6.98$	0.030[b]
Any grooming behavior:	22	55.0	19	47.5	9	23.1	$\chi^2(2) = 4.00$	0.135
-Lip and cheek biting	18	45.0	11	27.5	2	5.1	$\chi^2(2) = 8.07$	0.018[c]
-Nail biting	11	27.5	11	26.8	5	12.5	$\chi^2(2) = 3.63$	0.163
-Hair pulling	2	5.0	4	9.8	2	5.0	$\chi^2(2) = 0.30$	0.862
Any addictive behavior:	13	32.5	6	14.6	22	55.0	$\chi^2(2) = 8.66$	0.013[d]
-Alcohol abuse/addiction	3	7.5	0	0	9	22.5	$\chi^2(1) = 0.04$[e]	0.848
-Tobacco smoking	10	25.0	3	7.3	21	53.8	$\chi^2(2) = 8.25$	0.016[f]
-Drug abuse/addiction	2	5.0	0	0	2	5.0	$\chi^2(1) = 0.05$[e]	0.816
-Binge eating	6	15.0	7	17.1	8	20.0	$\chi^2(2) = 5.63$	0.060[g]
-Compulsive buying disorder	3	7.5	4	9.8	3	7.5	$\chi^2(2) = 3.19$	0.203
-Hypersexuality disorder	0	0	2	4.9	1	2.5	$\chi^2(1) = 0.001$[a]	0.982
-Internet use disorder	2	5.0	2	4.9	3	7.5	$\chi^2(2) = 1.86$	0.394
-Videogame use disorder	0	0	2	4.9	2	5.0	$\chi^2(2) = 0.10$[a]	0.754
Any impulse control disorder:	2	5.0	4	9.8	6	15.0	$\chi^2(2) = 1.25$	0.534
-Intermittent explosive disorder	1	2.5	2	4.9	5	12.5	$\chi^2(2) = 0.52$	0.772
-Non-suicidal self-injury disorder	1	2.5	2	4.9	1	2.5	$\chi^2(2) = 1.77$	0.413
-Kleptomania	0	0	3	7.3	0	0	–[h]	–
Suicide risk							$\chi^2(2) = 11.08$	0.004[i]
-Absent or mild	35	87.5	40	97.6	28	70.0		
-Moderate to severe	5	12.5	1	2.4	12	30.0		

* Onset of disorder added to the models as co-variate; gender, religion, use of SSRI and antipsychotic medication added as cofactors.
[a] Comparison conducted only for OCD x GD.
[b] ED > OCD (OR = 5.10, 95% CI: 1.05–24.86, p = 0.044); ED > GD (OR = 5.23, 95% CI: 1.12–24.47, p = 0.036).
[c] ED > GD (OR = 19.67, 95% CI: 1.73–224.1, p = 0.016).
[d] ED > OCD (OR = 11.83, 95% CI: 1.38–101.3, p = 0.024).
[e] Comparison conducted only for ED x GD.
[f] ED > OCD (OR = 12.53, 95% CI: 1.18–132.9, p = 0.036).
[g] ED < GD (OR = 0.11, 95% CI: 0.01–0.81, p = 0.030).
[h] Regression not performed due to absence of cases in two groups.
[i] GD > OCD (OR = 139.2, 95% CI: 3.84–5055, p = 0.007).

The single factor models and the unified final model point to a unique comorbidity profile for ED. Specifically, GAD, BFRB (lip and cheek biting) and addictive disorders were more likely to occur with ED. This comorbidity pattern seen in ED was more closely related to the comorbidity profile of OCD than GD, in particular the high rates of GAD. However, addictive disorders in general and tobacco use specifically were more likely to co-occur with ED than OCD. Interestingly, ED did not differ from GD regarding addictive behaviors, which suggests an addiction like component to ED. In contrast, ED differentiated from GD by the higher frequency of other BFRBs, specifically, lip and cheek biting, which is more similar to the comorbidity profile of OCD. Regarding suicide risk, GD had the higher risk, followed by ED than OCD.

Taken together, these results suggest that ED is closer to OCD, at least in comparison to GD, reinforcing ED's compulsive nature. However, the data also point to the possibility of an impulsive/addictive nature of ED, which may differentiate ED from OCD. Indeed, a previous study suggested that there might be a subgroup of more impulsive patients with specific features, such as greater urges to pick, higher level of anxiety and depressive symptoms (Oliveira et al., 2015). Thus, ED, along with BFRBs, might represent a unique cluster of disorders as have been proposed (Grant and Stein, 2014; Grant et al., 2010), sharing features with both OCRDs and BAs. Having said that, comorbidity profiles is only one important element in classifying disorders. As such, future research may wish to examine other important features such as epidemiology, neurological characteristics, genetics, treatment response, as well as psychopathologic features in a complementary dimensional approach, which would further help in the classification of ED.

4.1. Limitations and strengths

Several limitations are worth noting in the present research. First, the present research lacked a control group (i.e., base rate data). As such, it is difficult to ascertain whether the differences could be partly due to differences in background population prevalence. Second, we only used categorical variables to examine the overlap between ED, GD, and OCD. Thus, future research should examine the overlap between with ED, OCD and GD using dimensional measures. Specifically, assessing similarities and differences between the three groups in impulsivity and compulsivity would be highly informative and provide further data into the classification of ED. Third, neither the MINI nor the SCID-ICD provided a diagnosis of body dimorphic disorder and tic disorders, which frequently co-occur with ED and OCD. Thus, we are not able to assess the overlap between ED, OCD, body dimorphic disorder and tic disorders. Relatedly, although the diagnoses of ICDs were made using a structured clinical interview modeled after the SCID, the SCID-ICD, has yet to be validated. Fourth, the sample consisted of people seeking treatment for the respective disorders, which may limit the generalization to non-treatment seeking individuals, although our results may have great clinical utility. Lastly, the relatively modest sample size warrants some caution to the interpretation of our findings. Strengths of the present research include the use of semi-structured clinical interviews by registered psychiatrists, which provides

confidence in the diagnosis of ED, OCD and GD, as well as other psychiatric comorbidities.

5. Conclusion

Although ED was first identified during the 19th century, it has only recently been recognized as a psychiatric disorder. Today, despite the increasing recognition of ED as a psychiatric disorder, its classification remains a large point of contention. The present research aimed to add to the growing understanding of ED by examining whether it best resembles an OCRD or BA. The results generally support the classification of ED as an OCRD. However, it should be noted that ED shared impulsive traits commonly seen in BAs, ultimately suggesting that additional research is warranted to better understand and classify this psychiatric disorder.

Declaration of Competing Interest

Funding source

Data access

The data underlying this present research will be made available upon request. To request data, please email Faculty of Medicine at University of Sao Paulo's Ethics Board (email: cappesq@hcnet.usp.br). We have decided not to upload the data onto a repository, as this was not communicated to the participants prior to data collection.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.112518.

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