Journal of Affective Disorders 257 (2019) 758–764

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research paper

Comparing severity and qualitative facets of depression between eating disorders and depressive disorders: Analysis of routine data

Ulrich Voderholzer[a,b,*], Johannes Baltasar Hessler-Kaufmann[a], Lukas Lustig[c], Damian Läge[c]

[a] Schoen Clinic Roseneck, Prien, Germany
[b] Department of Psychiatry and Psychotherapy, University Hospital of Freiburg, Germany
[c] Institute of Psychology, University of Zurich, Switzerland

ARTICLE INFO

Keywords:
Anorexia nervosa
Bulimia nervosa
Major depressive disorder
Eating disorders
Depression
Inpatient

ABSTRACT

Background: While it is know that depressive symptoms are common in eating disorders (EDs), it is unclear whether these symptoms differ from those in depressive disorders (DDs) with regard to severity and quality.
Methods: Beck Depression Inventory II (BDI-II) scores at admission to treatment of 4.895 inpatients with a unipolar DD and 3.302 inpatients with an ED were compared by means of independent *t*-tests and Cohen's *d* effect sizes with regard to: (1) overall severity (BDI-II total score), (2) six facets of depression identified by non-metric multidimensional scaling of the German BDI-II validation sample, and (3) individual items.
Results: (1) The two groups did not differ with regard to the BDI-II total score. (2) There was no difference in the facet Depressive Core Symptoms. Patients with DDs had higher scores for Diminished Activation ($d = 0.40$) and patients with EDs had higher scores for Negative View of Self ($d = 0.40$). (3) Patients with DDs showed higher score on the item Loss of Energy ($d = 0.48$), while patients with EDs sored higher on Self-Dislike ($d = 0.48$) and Changes of Appetite ($d = 0.48$).
Conclusions: Depression in EDs seems to be as severe as in DDs and may show similar core aspects (e.g., Sadness, Loss of Pleasure). Qualitative differences suggested that individual additional symptoms of depression need to be differently addressed in therapy. The pronounced Negative View of Self in EDs is in line with the "core low self-esteem", a central component of the prevalent transdiagnostic model of EDs.

1. Introduction

The association between eating disorders (EDs) and depression is complex and defined by intertwined physiological and behavioral factors that affect etiology, symptomatology, response to treatment, and prognosis. Especially in anorexia nervosa (AN), there appears to be a strong physiological association, indicated by a shared genetic risk (Wade et al., 2000; Thornton et al., 2016; The Brainstorm Consortium 2018) and depressive symptoms due to malnutrition (Mattar et al., 2011). Accordingly, depressive disorders (DD) are the second most common psychiatric comorbidity in EDs after anxiety disorders, with rates exceeding 40% (Keski-Rahkonen and Mustelin, 2016; Ulfvebrand et al., 2015).

Longitudinal studies revealed a pattern of mutual influence between depression and EDs. Comorbid DD may predict a diagnosis of AN up to 22 years later (Franko et al., 2018). In a large sample of patients with EDs, one third of the patients with a comorbid diagnosis of major depressive disorder (MDD) developed MDD before the onset of the ED, and two thirds of the sample in the same year or after the onset of the ED (Fernández-Aranda et al., 2007). Treatment studies paint a similarly complex picture. While comorbid DDs were associated with lower remission rates after treatment (Vall and Wade, 2015) and even persisted after the remission of an ED (Holtkamp et al., 2005), other studies found depression to decrease during treatment for bulimia nervosa (BN) despite not being explicitly targeted (Linardon et al., 2017; Valenzuela et al., 2018). Anhedonia might remain after the remission of depression in AN and rather constitute a trait of these patients than a psychiatric comorbidity (Boehm et al., 2018).

On a symptomatic level, depression seems mostly related to body dissatisfaction and self-esteem. In patients with AN, who received

Abbreviations: ED, eating disorder; AN, anorexia nervosa; MDD, major depressive disorder; BN, bulimia nervosa; BDI-II, Beck Depression Inventory II; NMDS, non-metric multidimensional scaling

* Corresponding author at: Schoen Clinic Roseneck, Am Roseneck 6, 83209 Prien am Chiemsee, Germany.
E-mail addresses: uvoderholzer@schoen-klinik.de (U. Voderholzer), johannes.hessler@med.uni-muenchen.de (J.B. Hessler-Kaufmann), lukas.lustig@uzh.ch (L. Lustig), damian.laege@uzh.ch (D. Läge).

https://doi.org/10.1016/j.jad.2019.06.029
Received 9 April 2019; Received in revised form 3 June 2019; Accepted 29 June 2019
Available online 29 June 2019
0165-0327/ © 2019 Elsevier B.V. All rights reserved.

outpatient psychotherapy, a negative body image correlated with depressive symptoms throughout the treatment and a negative body image at treatment start predicted depressive symptoms at follow-up (Junne et al., 2016). The authors hypothesized that these negative core beliefs about the own body, which hardly improved during therapy, may strongly account for the depressive comorbidity. Depressive symptoms also showed stronger correlations with body dissatisfaction than bulimic symptoms in patients with EDs (Joiner et al., 1995; Wiederman and Pryor, 2000). Low self-esteem and self-critical thinking, which are commonly observed in EDs, were attributed to comorbid DD rather than the ED pathology (Smith et al., 2019; Thew et al., 2017).

The close entanglement of EDs and DDs and the persistence of depressive or dysthymic symptoms after ED treatment is contrasted by little evidence on the exact nature of depression in EDs. While previous studies hypothesized that negative core beliefs about the self would be at the core of depression in EDs, this notion has not yet been examined in a large sample of patients with EDs and contrasted with facets of depression in DDs. If found, an ED specific subtype of depression would primarily guide treatment planning and further illuminate the relationship between depression and EDs. Deeper knowledge of how depression manifests in EDs and relates to ED symptoms would allow clinicians to better tailor interventions to address comorbid depression, which would in turn be expected to decrease the risk of relapse of the ED. Based on Beck Depression Inventory II (BDI-II; (Beck et al., 1996)) data from two very large samples of patients with DD and EDs, respectively, we aimed to (1) compare the severity of depressive symptoms between the two groups, as well as (2) investigate differences in the qualitative profiles of depressive symptoms with regard to different facets of depression and (3) on the item level. We hypothesized depression to be more pronounced in DDs on all three levels.

2. Method

2.1. Patients and procedure

The present study is based on a sample of inpatients from the Schoen Clinic Roseneck that were treated between 2012 and 2017. The Schoen Clinic Roseneck is specialized in treating patients from a range of diagnostic groups. We selected all patients with a primary diagnosis of an ED or DD, respectively. EDs included diagnoses of AN, BN, as well as atypical AN and BN. Patients with a primary diagnosis of mania or bipolar disorder were not included in the group with DDs. Upon admission, all patients gave written informed consent for scientific use of the routine data obtained during the inpatient treatment. At admission and discharge, all patients complete a range of psychometric instruments, including the BDI-II (Beck et al., 1996) for the assessment of self-reported symptoms of depression.

The BDI-II is a self-report measure and comprises 21 items that relate to different aspects of depression that were experienced by the respective patient during the last two weeks. All items are scored on a 0–3 Likert scale with higher values indicating more severe symptoms. A total score can be calculated by summing the individual item scores.

2.2. Statistical analysis

In order to compare self-reported depressive symptoms (BDI-II) at admission to inpatient treatment between EDs and DDs, we calculated independent samples *t*-tests on three different levels of integration.

(1) Differences in the overall severity of depression were examined with the BDI-II total score as the dependent variable.
(2) Qualitative differences in depressive symptoms were investigated by comparing the two groups with regard to mean scores in six different symptom facets that are assessed by the BDI-II. The facets emerged from the data of validation sample of the German BDI-II (Bühler et al., 2012; Hautzinger et al., 2006; Kühner et al., 2007) by a method of non-metric multidimensional scaling (NMDS) that was specifically suggested for the analysis of psychiatric data (Läge et al., 2011; Läge et al., 2012). The method permits both the deduction of symptom facets as categorical classifications and the dimensional representation of a symptom space in the sense of an Euclidean space. The latter allows for interpreting the spatial proximity of two symptoms as their covariance. That is, the closer two symptoms lie next to each other, the more often they co-occur within individual patients or are absent together within individual patients in the sample. Further, this method is appropriate to differentiate core symptoms (which affect patients of all subtypes of the relevant disorder) from symptoms of those syndromes characterizing a specific subtype. Core symptoms tend to find their best position in the center of the map, with similar distances to all other clusters, whilst very specific syndromes have their best position at margins (implying very different distances to the other clusters). Hence, NMDS is also useful for showing the specific relations between clusters rendering "neighbor syndromes" (= high co-occurrence in patients) and "opponents" (= low co-occurrence) visible at a glance.
The employed NMDS-structure has been further validated in a factor analysis (Bühler et al., 2012; Bühler et al., 2014) and can be used as a stable multifaceted model of depressive symptoms as measured by the BDI-II. The geometrical collocation suggests the allocation of the BDI-II's items to the following six clusters: (1) Core Depressive Symptoms (Sadness, Loss of Pleasure, Loss of Interest, Indecisiveness, Loss of Energy), (2) Negative Attitude Towards Self (Past Failure, Guilty feelings, Self-Dislike, Self-Criticalness, Worthlessness), (3) Hopelessness (Suicidal Thoughts, Punishment Feelings, Pessimism), (4) Increased Activation (Irritability, Crying, Agitation), (5) Psychovegetative Symptoms (Loss of Interest in Sex, Sleeping, Changes of Appetite), (6) Diminished Activation (Concentration Difficulty, Tiredness). These empirically based facets can be viewed as syndromes in the context of psychopathological diagnostics.
(3) The two groups were compared on the individual item-level. The six facets as described under (2) are a distance-based cluster interpretation of the NMDS structure. In some instances, clusters might be observed in a slightly different composition or the map might be read in a dimensional view. In this case, distances between the individual symptoms (i.e. items) matter. To allow for the consideration of both aspects, we reported the results on item-level as well. As all subjects gave their original statements on the item-level, these statistics can be viewed as the most descriptive and the closest to the patients' symptoms.

Based on the NMDS-solution for the BDI-II (Bühler et al., 2012), the results of the three levels of integration were plotted in symptoms maps by the Klenico AG for patients with DDs and EDs, respectively. These symptom maps display the spatial proximity of the individual items of the BDI-II, their allocation to one of the six facets of depression, and their color-coded mean value in the respective diagnostic groups. This layout renders group differences in overall and symptom severity, as well as diverging patterns within the facets, recognizable at a glance.

Due to the number of comparisons and the large sample size, the interpretation of the results was mainly based on effect sizes. For each dependent variable, we set the one-sided level of significance at $p = 0.05$ and calculated separate tests for each direction of the alternative hypothesis.

As EDs are usually disorders of adolescences or young adulthood and are more common in women (Javaras et al., 2015), we expected the two diagnostic groups to differ with regard to age and gender. While these demographic differences are integral party of the disorders' phenotype, there is a need to perform sensitivity analyses to map the influence of these variables on the outcomes. Hence, we used the SPSS

Table 1
Comparison of severity and qualitative facets of depressive symptoms between eating disorders and depressive disorders. The overall severity and the different facets with their corresponding symptoms below are in boldface.

Depressive symptoms	DD *M* (*SD*)	ED *M* (*SD*)	*t* (*df*)	*p*[a]	Cohen's *d*
BDI-II total: overall severity	1.36 (0.53)	1.37 (0.57)	0.93 (6708)	0.177	
Core symptoms	1.56 (0.63)	1.46 (0.66)	6.64 (6897)	0.000	0.15
Sadness	1.22 (0.78)	1.25 (0.76)	1.57 (8171)	0.059	
Loss of pleasure	1.73 (0.83)	1.72 (0.87)	0.23 (6843)	0.408	
Loss of interest	1.50 (0.93)	1.37 (0.98)	5.88 (6787)	0.000	0.13
Indecisiveness	1.71 (0.96)	1.68 (1.03)	1.31 (6740)	0.095	
Loss of energy	1.64 (0.70)	1.29 (0.77)	20.95 (6566)	0.000	0.48
Negative attitude towards self	1.31 (0.73)	1.61 (0.78)	17.63 (6800)	0.000	0.40
Past failure	1.44 (0.94)	1.66 (0.97)	10.29 (8175)	0.000	0.23
Guilty feelings	1.11 (0.88)	1.40 (0.95)	13.68 (6734)	0.000	0.31
Self-dislike	1.29 (0.89)	1.74 (0.95)	21.22 (6729)	0.000	0.48
Self-criticalness	1.45 (0.90)	1.70 (0.91)	12.22 (6991)	0.000	0.28
Worthlessness	1.27 (0.95)	1.58 (1.00)	13.83 (6782)	0.000	0.31
Hopelessness	0.90 (0.66)	0.81 (0.67)	5.61 (8193)	0.000	0.13
Suicidal thoughts or wishes	0.55 (0.62)	0.58 (0.63)	1.61 (8179)	0.054	
Punishment feelings	0.86 (1.10)	0.87 (1.05)	0.51 (8127)	0.307	
Pessimism	1.28 (0.86)	0.99 (0.90)	14.31 (6855)	0.000	0.32
Increased activation	1.34 (0.67)	1.30 (0.69)	2.47 (6895)	0.007	0.06
Irritability	1.34 (0.91)	1.27 (0.90)	3.53 (7122)	0.000	0.08
Crying	1.42 (1.04)	1.42 (0.99)	0.12 (7314)	0.452	
Agitation	1.26 (0.85)	1.22 (0.96)	1.95 (6476)	0.026	0.04
Psychovegetative symptoms	1.38 (0.71)	1.44 (0.77)	3.25 (6651)	0.001	0.07
Loss of interest in sex	1.29 (1.10)	1.09 (1.18)	7.68 (6595)	0.000	0.18
Changes in sleeping pattern	1.79 (0.94)	1.44 (1.02)	15.50 (6649)	0.000	0.35
Changes in appetite	1.07 (1.00)	1.77 (1.11)	29.42 (6433)	0.000	0.67
Diminished activation	1.68 (0.66)	1.39 (0.74)	17.61 (6507)	0.000	0.40
Concentration difficulty	1.68 (0.77)	1.44 (0.89)	12.70 (6350)	0.000	0.29
Tiredness or fatigue	1.68 (0.77)	1.35 (0.82)	17.83 (6743)	0.000	0.40

Note. Cohen's *d* effect sizes only reported for statistically significant comparisons. BDI-II = Beck Depression Inventory II, DD = depressive disorder, ED = eating disorder, *M* = mean, *SD* = standard deviation, *df* = degrees of freedom.
[a] one-sided.

case control command to create pairs with one patient from each diagnostic group based on age and gender. In this subsample, we conducted the same *t*-tests as described above.

3. Results

Of the 11,018 inpatients treated between 2012 and 2017, 4895 had a primary diagnosis of a unipolar form DD and 3302 had an ED. Patients with DDs had a mean age of 45.6 years (*SD* = 15.37, range 14 – 84) and 58.3% were female. Of these patients, 59.7% had a recurrent depressive episode (F33), 40.2% a depressive episode (F32), and 0.1% a persistent mood disorder (F34). Patients with an ED had a mean age of 24.1 (*SD* = 10.37, range 13 – 74) and 96.2% were female. Of these patients, 66.0% had AN (F50.0/F50.1), 25.3% BN (F50.1/F50.3), and 8.7% other EDs (F50.4 – F50.9).

Table 1 displays the results of all independent *t*-tests that were calculated for the three levels of integration. Fig. 1 visualizes the comparisons with regard to overall severity and the six facets of depression.

(1) Patients with DDs and EDs did not statistically significantly differ in the overall severity of depressive symptoms.
(2) The two groups statistically significantly differed in all six facets of depression. The respective effect sizes, however, suggested only small differences. Patients with DDs had higher scores with regard to Depressive Core Symptoms ($d = 0.15$), Diminished Activation ($d = 0.40$), Hopelessness (0.13), and Increased Activation (0.06). Patients with EDs had higher scores with regard to Negative View Towards Self ($d = 0.40$) and Psychovegetative Symptoms ($d = 0.07$).
(3) Notable differences on the item-level emerged within five of the six facets and confirmed the results found for the six facets. We report all differences with an effect size larger than 0.20. The detailed results can be found in Table 1. Among the Core Depressive Symptoms, Loss of Energy was more pronounced in patients with DDs ($d = 0.48$). Among the symptoms pertaining to Negative Attitude Towards Self, Past Failure ($d = 0.23$), guilt ($d = 0.31$), Self Dislike ($d = 0.48$), Self-Criticalness ($d = 0.28$), and Worthlessness ($d = 0.31$) were all stronger in patients with EDs. Pessimism was the only symptom pertaining to Hopelessness that differed between the groups with a higher value in patients with DDs ($d = 0.32$). There were no notable differences pertaining to the facet Increased Activation. With regard to Psychovegetative Symptoms, Sleeping ($d = 0.35$) was more pronounced in patients with DDs and, unsurprisingly, Changes in Appetite ($d = 0.67$) was stronger in patients with EDs. With this effect size being the only one in this study to exceed the conventional margin for moderate effects, Changes in Appetite represented the strongest difference between patients with DDs and EDs in our sample. Among the symptoms relating to Diminished Activation, both Concentration Difficulty ($d = 0.29$) and Tiredness ($d = 0.40$) were stronger in patients with DDs.

The visualization of the NMDS in Fig. 2 reflects the results of all levels of integration. Importantly, the NMDS solution is based on BDI-II data from the validation sample and was, therefore, applied top-down to the data of our study. Hence, there are no different distributions of the symptoms across the map for patients with DDs and EDs. The color-coding of symptoms with green representing low and red high mean values suggests a similar overall severity in the two diagnostic groups. Comparing the symptom colors within the facets of Negative Attitude Towards Self and Diminished Activation, respectively, we see more pronounced symptoms in patients with EDs in the former and stronger symptoms for patients with DDs in the latter. Also, differences on the item level emerged. For example, the symptom Changes in Appetite

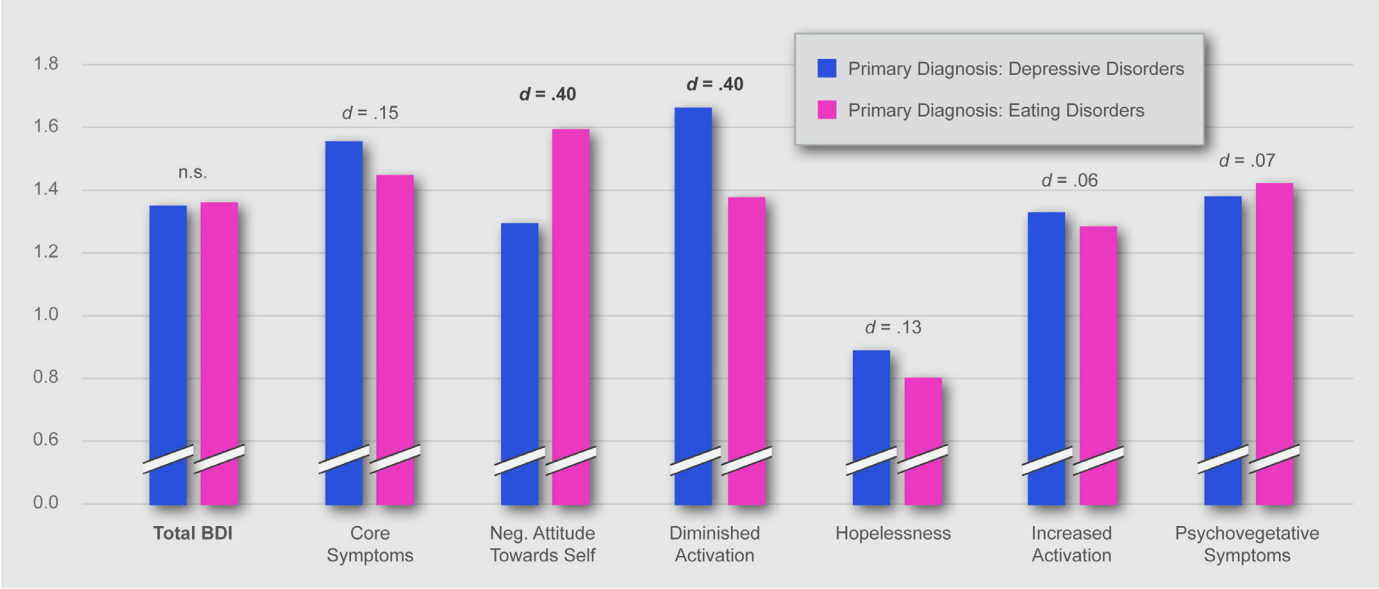

Fig. 1. Comparison of mean values for BDI-II total score and six facets of depressive symptoms between patients with eating disorders (N = 3302) and depressive disorders (N = 4895).
Note. d = Cohen's d.

appears red for patients with EDs and orange for patients with DDs, suggesting higher values in the former group, and larger circles indicate statistical significant differences found in the t-tests. Further, the spatial proximity of the symptoms in Fig. 2 sheds light on their interrelations. For example, the symptom Loss of Energy is close to the facet of Diminished Activation, though belonging to the Core Depressive Symptoms and Guilty Feelings are on the border to the facet of Hopelessness, though belonging to Negative Attitude Towards Self. These proximities are meaningful both on a nosological and semantic level.

Notably, we found a replication of the effects in the facets with all respective symptoms of the facets Negative Attitude Towards Self (5x higher scores with ED) and Diminished Activation (3x higher scores with DD). This homogeneous result is contrasted by the plausible differences within the facet of the three Psychovegetative Symptoms. These findings emphasize the necessity to look at the results on the item level and not on the facet level alone.

The sensitivity analyses in a sample of 1295 patients in each diagnostic group largely confirmed the above findings, while effect sizes decreased. One difference concerning the facet of Negative View Towards Self emerged, however, with patients with DDs and EDs showing similar values.

4. Discussion

We investigated differences in the severity and quality of depression in a large sample of inpatients with either a DD or an ED as primary diagnosis. With regard to our study aims, some patterns emerged. (1) There is no difference in the overall severity of depressive symptoms between patients with DDs and patients with EDs. (2) Depression in EDs is rather characterized by a Negative Attitude Towards Self while patients with a DDs tend to suffer from Diminished Activation. There was no notable difference in the Core Symptoms of Depression. (3) Patients with EDs scored higher on the items Changes in Appetite and Self-Dislike, while patients with DDs scored higher on Loss of Energy and Pessimism, which confirms the qualitative differences reported above. Our findings, hence, emphasize the close association between EDs and depression and add the notion of qualitative differences compared to a DD as a primary diagnosis.

As depression most often occurs with or after the onset of the ED (Fernández-Aranda et al., 2007), the pathogenesis of the two disorders is likely not independent. As patients with EDs and DDs did not differ with regard to the overall severity of depression and the facet of Core Symptoms of Depression, however, depression in EDs seems not to be only a byproduct of the ED, but clinically as relevant as a primary diagnosis of a DD. The assumed emotion regulation functionality of disordered eating (Fairburn et al., 2003) would predict a decrease in depressive symptoms with the successful treatment of the ED if the depressive symptoms were completely dependent on the ED symptoms. While this in part may hold true (Linardon et al., 2017), the fact that depression or anhedonia often remain after ED treatment (Vall and Wade, 2015; Holtkamp et al., 2005; Boehm et al., 2018) suggests that some variance of depression in EDs cannot be explained by the ED.

The analysis of facets of depression may further illuminate how depression and EDs relate. As suggested above, there might be a part in the depression in EDs that is inherently “depressive”. Our findings suggest that this “depressive” part may consist of the Core Depressive Symptoms that informed nosology and diagnostics of DDs, including Sadness, Loss of Energy, Indecisiveness, Loss of Pleasure, and Loss of Interest. The other part was characteristic of patients with EDs in our sample and was described as Negative Attitude Towards Self, including Past Failure, Self-Criticalness, Guilty Feelings, Worthlessness, and Self-Dislike. These attributes closely relate to what is called “core low self-esteem” in the transdiagnostic model of EDs (Fairburn et al., 2003), which has a trait-like character and hardly responds to specialized treatment (Linardon et al., 2019). Accordingly, a sequence leading from body dissatisfaction via low self-esteem and depression to ED symptoms has been repeatedly reported in community samples (Cruz-Sáez et al., 2018; Olivardia et al., 2004; Brechan and Kvalem, 2014) and low self-esteem was also found to predict the onset of EDs (Cervera et al., 2003; Fairburn et al., 1987). Our results expand these findings with suggesting an ED specific depressive syndrome revolving around self-esteem that rather might be a part of the ED than primarily “depressive”. This notion is in line with the transdiagnostic model of EDs and contradicts the proposition that low self-esteem in EDs is attributable to comorbid depression (Smith et al., 2019; Thew et al., 2017). Based on the transdiagnostic model of EDs and findings from community samples, future studies should investigate the detailed relationship within the triad of self-esteem, depression, and ED symptoms in clinical populations. Also, the construct of the ED-specific depressive syndrome needs to be validated in independent samples and compared between

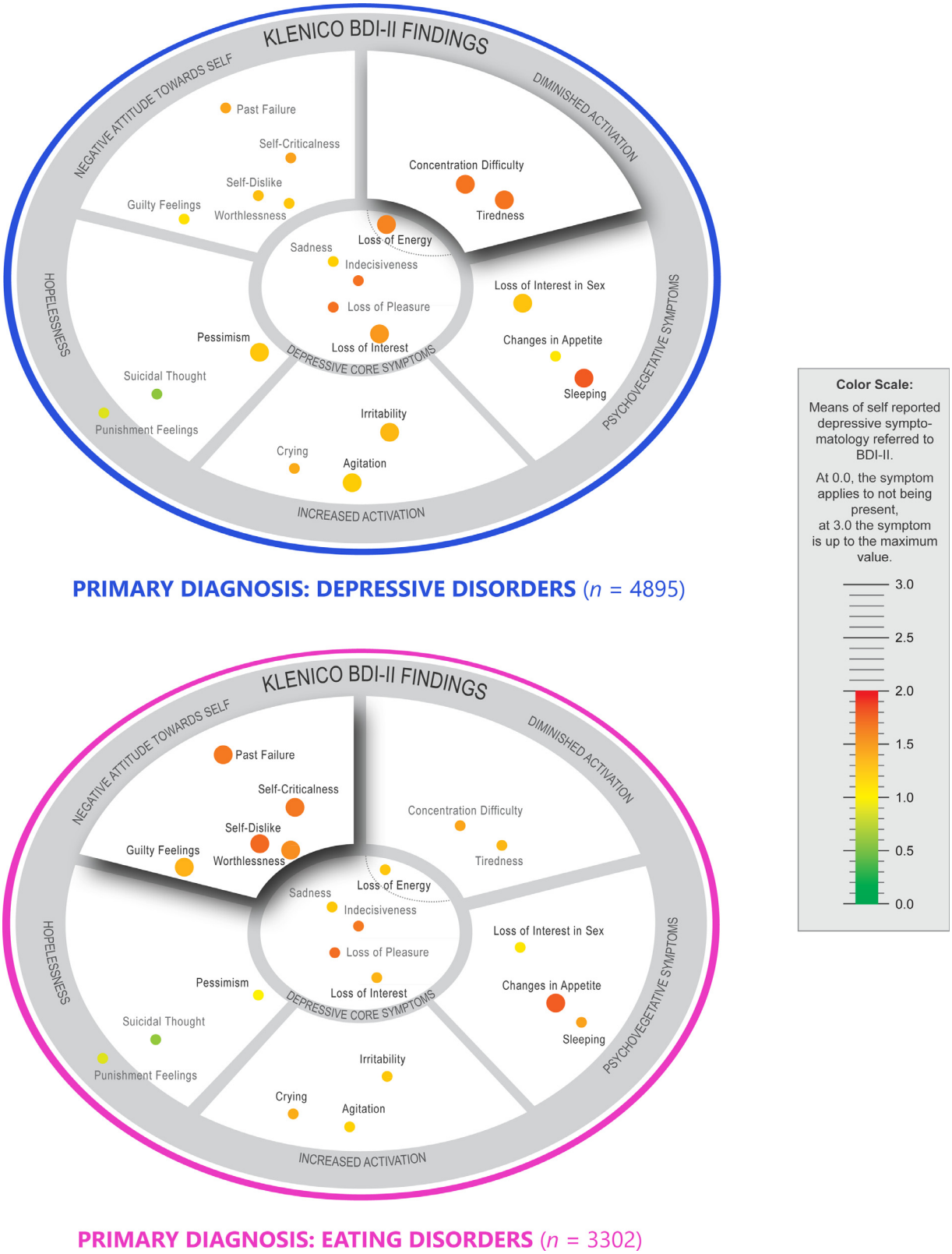

Fig. 2. Symptom maps for BDI-II symptoms and facets. Larger circles indicate statistically significantly higher mean values in comparison to the other diagnostic group. Facets with higher overall severity (Cohen's $d > 0.2$) are accentuated.

different EDs, as our sample largely consisted of patients with AN, who might be especially prone to depression (The Brainstorm Consortium 2018).

Our finding that the facet of Diminished Activation was more characteristic of patients with DDs than with EDs is in line with the often observed urge for movement and excessive exercising in EDs (Rizk et al., 2012). Inactivity, in turn, is a common symptom of DDs and behavioral activation is among the most effective interventions in the

treatment of DDs (Cuijpers et al., 2007). The fact that patients with EDs showed lower scores on this facet validates the applied NMDS-structure of the BDI-II.

The analyses on the item level revealed several noteworthy aspects. Both Pessimism and Sleeping were more pronounced in patients with DDs. While the former support the propositions outlined above, the latter might be a result of the higher age in this group. Patients with EDs reported stronger Changes in Appetite, which is a rather trivial finding but serves as sort of manipulation check and, thereby, further validates the NMDS- structure and our findings. The extent of Loss of Interest in Sex was similar in both groups, however, might be attributable to different causes. While little sexual interest in depression might reflect side-effects of antidepressive medication that was prescribed before the admission to inpatient treatment or relate to Diminished Activation (as suggested by the spatial proximity to this facet in the symptom maps), weight-related hormonal changes might account for these changes in EDs.

The fact that the group difference with regard to the Negative View Towards Self vanished in a demographically matched subsample, does not nullify the above results. Rather, it confirms that EDs are disorders that predominately occur in young women (Javaras et al., 2015). Statistically removing this information from the analyses means neglecting important characteristics of the disorder. Or, the other way round, selecting a subsample from the DD group to match the younger and more female ED group may misrepresent the former group. Still, there is something to be learned from these results. Given the shared genetic vulnerability (The Brainstorm Consortium 2018), the strong comorbidity (Keski-Rahkonen and Mustelin, 2016; Ulfvebrand et al., 2015), and the fact that DDs usually succeed EDs (Fernández-Aranda et al., 2007), it seems plausible that the two disorders have common vulnerabilities. It is possible that these biological forces manifest differently across the life-span, with some of the EDs crossing over to DDs as time progresses. During this process, the Negative View Towards Self, which is a main driving force of EDs (Fairburn et al., 2003), may attenuate together with the ED symptoms and depressive symptoms remain. Also, the similarity in this facet between the groups in the matched sample suggests that low self-worth might also be a problem of younger people struggling to find their place in life.

4.1. Implications

While the total score of the BDI-II did not suggest differences between patients with DDs and EDs in the overall severity of depression and both groups seem equally affected by Core Depressive Symptoms, the more detailed analyses of facets on individual items revealed meaningful differences. This finding strongly suggests that breaking down the patients test scores and inspecting facets and individual items of the BDI-II could improve diagnostics in patients with EDs and comorbid depression. The results of this procedure are likely to be indicative for treatment. This notion applies not only to the patient groups examined in the present study.

Given that patients with EDs show facets of depression that are typically “depressive” and closely linked to ED pathology, respectively, suggests a two-track approach to treatment. On the one hand, patients with EDs might benefit from making depression a priority in the treatment next to the ED symptoms. That is, treating the Core Depressive Symptoms like a primary diagnosis of MDD, if not contraindicated by urgent ED-related factors like very low weight or refusal to gain weight. On the other hand, treatment needs to be improved with regard to core low self-esteem and the Negative Attitude Towards Self, which are decisive for the development and maintenance of the ED. Patients who do not improve in these aspects are likely to retain significant symptoms after treatment and are at higher risk for relapse. In turn, improvement in these areas would suggest substantial change for the better (Fairburn et al., 2003).

4.2. Strength and limitations

Strengths of our study include the large data set, which increases the representativeness of the findings, as well as the flexible and meaningful data analyses. Limitations include the overrepresentation of patients with AN and women in our sample, which might restrict the generalizability of our findings for other populations. Secondary diagnoses were not recorded, hence, we are not able to state, how many patients with EDs had a DD as comorbid diagnosis and vice versa. Future studies should investigate different EDs separately.

5. Conclusion

Inpatients with DDs and EDs are similar with regard to Core Depressive Symptoms and overall severity of depression, yet, differ with regard to qualitative facets. While DDs were associated with Diminished Activation, EDs related to a Negative Attitude Towards Self. These findings should inform the diagnostics and treatment of both EDs and DDs.

Conflict of interest

None.

Author statement

Availability of data and materials

The dataset supporting the conclusion of this article are held by the authors and will not be made available as they contain sensitive patient information.

Funding

No funding sources.

Authors' contributions

U.V. designed the study, coordinated the data collection, and interpreted the data. J.B.H.-K. interpreted the data and drafted the manuscript. L.L. analyzed the data and drafted the manuscript. D.L. designed the study, advised in the data analysis, and interpreted the data. All authors read and approved the final draft of the manuscript.

Declarations

Ethics approval and consent to participate

Upon admission to the Schoen Clinic, all patients were asked to sign informed consent that their routine data may be used for scientific studies and publications. There was no formal approval of an ethics committee.

Consent for publication

Not applicable.

CRediT authorship contribution statement

Ulrich Voderholzer: Data curation, Validation. **Johannes Baltasar Hessler-Kaufmann:** Data curation, Writing - original draft, Validation. **Lukas Lustig:** Formal analysis, Writing - original draft, Validation. **Damian Läge:** Formal analysis, Data curation, Validation.

Acknowledgment

The authors would like to acknowledge the staff of the Schoen Clinic Roseneck for conducting the data collection.

References

Beck, A.T., Steer, R.A., Brown, G., 1996. Beck Depression Inventory-2. Psychological Corporation, San Antonio, TX.

Boehm, I., Flohr, L., Steding, J., Holzapfel, L., Seitz, J., Roessner, V., Ehrlich, S., 2018. The Trajectory of anhedonic and depressive symptoms in anorexia nervosa: a longitudinal and cross-sectional approach. Eur. Eat. Disord. Rev. 26, 69–74. https://doi.org/10.1002/erv.2565.

Brechan, I., Kvalem, I.L., 2014. Relationship between body dissatisfaction and disordered eating: mediating role of self-esteem and depression. Eat. Behav. 17, 49–58. https://doi.org/10.1016/j.eatbeh.2014.12.008.

Bühler, J., Keller, F., Läge, D., 2012. Die Symptomstruktur des BDI-II: Kernsymptome und qualitative Facetten. Z. Klin. Psychol. Psychother. 41, 231–242. https://doi.org/10.1026/1616-3443/a000170.

Bühler, J., Seemüller, F., Läge, D., 2014. The predictive power of subgroups : An empirical approach to identify depressive symptom patterns that predict response to treatment. J. Affect. Disord. 163, 81–87. https://doi.org/10.1016/j.jad.2014.03.053.

Cervera, S., Lahortiga, F., Martínez-González, M.A., Gual, P., de Irala-Estévez, J., Alonso, Y., 2003. Neuroticism and low self-esteem as risk factors for incident aating disorders in a prospective cohort study. Int. J. Eat. Disord. 33, 271–280. https://doi.org/10.1002/eat.10147.

Cruz-Sáez, S., Pascual, A., Wlodarczyk, A., Echeburúa, E., 2018. The effect of body dissatisfaction on disordered eating: the mediating role of self-esteem and negative affect in male and female adolescents. J. Health Psychol. 1–11. https://doi.org/10.1177/1359105317748734.

Cuijpers, P., van Straten, A., Warmerdam, L., 2007. Behavioral activation treatments of depression: a meta-analysis. Clin. Psychol. Rev. 27, 318–326. https://doi.org/10.1016/j.cpr.2006.11.001.

Fairburn, C.G., Cooper, Z., Shafran, R., 2003. Cognitive behaviour therapy for eating disorders: a “transdiagnostic” theory and treatment. Behav. Res. Ther. 41, 509–528. https://doi.org/10.1016/S0005-7967(02)00088-8.

Fairburn, C.G., Kirk, J., O'Connor, M., Anastasiades, P., Cooper, P.J., 1987. Prognostic factors in bulimia nervosa. Br. J. Clin. Psychol. 26, 223–224.

Fernández-Aranda, F., Pinheiro, A.P., Tozzi, F., Thornton, L.M., Fichter, M.M., Halmi, K.A., Kaplan, A.S., Klump, K.L., Strober, M., Woodside, D.B., Crow, S., Mitchell, J., Rotondo, A., Keel, P., Plotnico, K.H., Berrettini, W.H., Kaye, W.H., Crawford, F., Johnson, C., Brandt, H., Via, M.La, Bulik, C.M., 2007. Symptom profile of major depressive disorder in women with eating disorders. Aust. N. Z. J. Psychiatry 41, 24–31.

Franko, D.L., Tabri, N., Keshaviah, A., Murray, H.B., Herzog, D.B., Thomas, J.J., Coniglio, K., Keel, P.K., Eddy, K.T., 2018. Predictors of long-term recovery in anorexia nervosa and bulimia nervosa: Data from a 22-year longitudinal study. J. Psychiatr. Res. 96, 183–188. https://doi.org/10.1016/j.jpsychires.2017.10.008.

Hautzinger, M., Keller, F., Kühner, C., 2006. Beck Depressions-Inventar (BDI-II). Harcourt Test Services, Frankfurt.

Holtkamp, K., Müller, B., Heussen, N., Remschmidt, H., Herpertz-Dahlmann, B., 2005. Depression, anxiety, and obsessionality in long-term recovered patients with adolescent-onset anorexia nervosa. Eur. Child Adolesc. Psychiatry 14, 106–110. https://doi.org/10.1007/s00787-005-0431-5.

Javaras, K.N., Runfola, C.D., Thornton, L.M., Agerbo, E., Birgegård, A., Norring, C., Yao, S., Råstam, M., Larsson, H., Lichtenstein, P., Bulik, C.M., 2015. Sex- and age-specific incidence of healthcare-register-recorded eating disorders in the complete swedish 1979-2001 birth cohort. Int. J. Eat. Disord. 48, 1070–1081. https://doi.org/10.1002/eat.22467.

Joiner, T.E., Wonderlich, S.A., Metalsky, G.I., Schmidt, N.B., 1995. Body dissatisfaction: a feature of bulimia, depression, or both? J. Soc. Clin. Psychol. 14, 339–355.

Junne, F., Zipfel, S., Wild, B., Martus, P., Giel, K., Resmark, G., Friederich, H.C., Teufel, M., de Zwaan, M., Dinkel, A., Herpertz, S., Burgmer, M., Tagay, S., Rothermund, E., Zeeck, A., Ziser, K., Herzog, W., Löwe, B., 2016. The relationship of body image with symptoms of depression and anxiety in patients with anorexia nervosa during outpatient psychotherapy: Results of the ANTOP study. Psychotherapy (Chic) 53, 141–151. https://doi.org/10.1037/pst0000064.

Keski-Rahkonen, A., Mustelin, L., 2016. Epidemiology of eating disorders in Europe: Prevalence, incidence, comorbidity, course, consequences, and risk factors. Curr. Opin. Psychiatry 29, 340–345. https://doi.org/10.1097/YCO.0000000000000278.

Kühner, C., Bürger, C., Keller, F., Hautzinger, M., 2007. Reliabilität und Validität des revidierten Beck-Depressionsinventars (BDI-II). Befunde aus deutschsprachigen Stichproben. Nervenarzt 78, 651–656. https://doi.org/10.1007/s00115-006-2098-7.

Läge, D., Egli, S., Riedel, M., Möller, H.-J., 2012. Exploring the structure of psychopathological symptoms: a re-analysis of AMDP data by robust nonmetric multidimensional scaling. Eur. Arch. Psychiatry Clin. Neurosci. 262, 227–238. https://doi.org/10.1007/s00406-011-0271-x.

Läge, D., Egli, S., Riedel, M., Strauss, A., Möller, H.-J., 2011. Combining the categorical and the dimensional perspective in a diagnostic map of psychotic disorders. Eur. Arch. Psychiatry Clin. Neurosci. 261, 3–10. https://doi.org/10.1007/s00406-010-0125-y.

Linardon, J., Kothe, E.J., Fuller-Tyszkiewicz, M., 2019. Efficacy of psychotherapy for bulimia nervosa and binge-eating disorder on self-esteem improvement: meta-analysis. Eur. Eat. Disord. Rev. 27, 109–123. https://doi.org/10.1002/erv.2662.

Linardon, J., Wade, T., de la Piedad Garcia, X., Brennan, L., 2017. Psychotherapy for bulimia nervosa on symptoms of depression: a meta-analysis of randomized controlled trials. Int. J. Eat. Disord. 50, 1124–1136. https://doi.org/10.1002/eat.22763.

Mattar, L., Huas, C., Duclos, J., Apfel, A., Godart, N., 2011. Relationship between malnutrition and depression or anxiety in Anorexia Nervosa: A critical review of the literature. J. Affect. Disord. 132, 311–318. https://doi.org/10.1016/j.jad.2010.09.014.

Olivardia, R., Pope, H.G.J., Borowiecki, J.J., Cohane, G.H., 2004. Biceps and body image: the relationship between muscularity and self-esteem, depression, and eating disorder symptoms. Psychol. Men Masc. 5, 112–120. https://doi.org/10.1037/1524-9220.5.2.112.

Rizk, M., Lalanne, C., Berthoz, S., Kern, L., Group, EVHAN, Godart, N., 2012. Problematic exercise in anorexia nervosa: testing potential risk factors against different definitions. PLoS One 10, e0143352. https://doi.org/10.1371/journal.pone.0143352.

Smith, K.E., Mason, T.B., Crosby, R.D., Cao, L., Leonard, R.C., Wetterneck, C.T., Smith, B.E.R., Farrell, N.R., Riemann, B.C., Wonderlich, S.A., Moessner, M., 2019. A comparative network analysis of eating disorder psychopathology and co-occurring depression and anxiety symptoms before and after treatment. Psychol. Med. 49, 314–324. https://doi.org/10.1017/S0033291718000867.

The Brainstorm Consortium, 2018. Analysis of shared heritability in common disorders of the brain. Science (80-.). 360, eaap8757. https://doi.org/10.1126/science.aap8757.

Thew, G.R., Gregory, J.D., Roberts, K., Rimes, K.A., 2017. Self-critical thinking and overgeneralization in depression and eating disorders: an experimental study. Behav. Cogn. Psychother. 45, 510–523. https://doi.org/10.1017/S1352465817000327.

Thornton, L.M., Welch, E., Munn-Chernoff, M.A., Lichtenstein, P., Bulik, C.M., 2016. Anorexia nervosa, major depression, and suicide attempts: shared genetic factors. Suicide Life-Threatening Behav 46, 525–534. https://doi.org/10.1111/sltb.12235.

Ulfvebrand, S., Birgegård, A., Norring, C., Högdahl, L., von Hausswolff-Juhlin, Y., 2015. Psychiatric comorbidity in women and men with eating disorders results from a large clinical database. Psychiatry Res. 230, 294–299. https://doi.org/10.1016/j.psychres.2015.09.008.

Valenzuela, F., Lock, J., Le Grange, D., Bohon, C., 2018. Comorbid depressive symptoms and self-esteem improve after either cognitive-behavioural therapy or family-based treatment for adolescent bulimia nervosa. Eur. Eat. Disord. Rev. 26, 253–258. https://doi.org/10.1002/erv.2582.

Vall, E., Wade, T.D., 2015. Predictors of treatment outcome in individuals with eating disorders: a systematic review and meta-analysis. Int. J. Eat. Disord. 48, 946–971. https://doi.org/10.1002/eat.22411.

Wade, T.D., Bulik, C.M., Neale, M., Kendler, K.S., 2000. Anorexia nervosa and major depression: shared genetic and environmental risk factors. Am. J. Psychiatry 157, 469–471. https://doi.org/10.1176/appi.ajp.157.3.469.

Wiederman, M.W., Pryor, T.L., 2000. Body dissatisfaction, bulimia, and depression among women: The mediating role of drive for thinness. Int. J. Eat. Disord. 27, 90–95. https://doi.org/10.1002/(SICI)1098-108X(200001)27:1<90::AID-EAT10>3.0.CO;2-0.