



The Eating Disorders Recovery Questionnaire: psychometric properties and validity

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Abstract

Purpose There is no standardized measurement of recovery from an eating disorder (ED). We examined the psychometric properties and construct validity of the “Eating Disorders Recovery Questionnaire” (EDRQ), which defines recovery beyond symptoms to include self-acceptance, social emotional and physical health.

Methods Twenty-eight recovery-related items were administered to 978 people (9.5% men) aged 18–76. 172 participants had a current ED diagnosis (AN, BN or BED), 104 had a past ED diagnosis (AN, BN, BED or > one diagnosis), 105 had another past or present ED, and 579 had no lifetime ED. Participants also completed the Eating Disorders Examination Questionnaire, Dresden Body Image Questionnaire-35, Positive and Negative Affect Schedule—Short Form, Patient Health Questionnaire-9, Satisfaction with Life Scale and Positive Eating Scale.

Results Exploratory and confirmatory factor analyses yielded four factors (CFI = 0.93, RMSEA = 0.07): lack of symptomatic behavior, acceptance of self and body, social and emotional connection, and physical health. Group comparisons showed that currently ill women scored lower on EDRQ and positive indices and higher on negative indices than controls and previously ill women. Previously ill women scored similarly to controls on ED symptomatology, positive body experiences, depression, and positive and negative affect but had lower BMI, life satisfaction and positive eating. The EDRQ–EDEQ correlation was $r = 0.67$, indicating both overlap and distinct variance.

Conclusion The EDRQ is a valid, reliable measure of ED recovery, defined more broadly than symptom remission. We recommend its incorporation into a standardized operationalization of recovery and its use by consumers, carers and service providers to monitor ED recovery status.

Level of evidence Level III, case–control analytic study.

Keywords Eating disorders · Recovery · Eating disorder symptoms · Questionnaire · Measurement

Introduction

The DSM-5 defines illness and, to some extent, remission from psychiatric disorders, including eating disorders (EDs), but proposes no criteria for recovery [1]. The lack of consensus on how recovery from ED should be conceptualized, defined and measured has had negative implications for both

research and clinical practice, leading to contradictory conclusions [2, 3]. A standardized definition of remission and recovery from ED is, therefore, long overdue [4, 5]. Within the medical model, recovery relates to sustained remission and is usually evaluated by symptom reduction and/or improvement in functioning, unlike in the consumer-led mental health “recovery movement” model [6]. This model, which has been applied to EDs [7], draws on narratives of “lived experience” [8] by people recovering from mental illnesses. It defines recovery as “a satisfying, hopeful, and contributing life, even with limitations caused by the illness” [6, p. 527] and stresses meaning and purpose. No standardized definition of recovery has been adopted to date, although in recent years a consensus seems to be emerging within the ED field that a lack of symptomatic and

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functional impairment is insufficient to measure recovery and that broader criteria are called for [3, 9].

Whereas self-report questionnaires assessing ED symptoms, such as the Eating Disorders Examination Questionnaire (EDEQ), are sometimes incorporated into an operationalization of recovery [10], a questionnaire assessing recovery from ED beyond symptomatology is lacking. Recovery has been described as a non-linear process rather than a snapshot in time [11]. Despite fluctuations [12], in the long term, this process tends to progress positively with duration of follow-up [13]. Although it is impossible to capture the nuances of such a complex process in a questionnaire, a valid, psychometrically sound self-report instrument assessing current recovery level could help researchers and clinicians to evaluate the progression of ED patients at different points of illness, treatment and recovery. A continuous measure would offer greater variance than categorical measures such as the “Morgan-Russell” outcome categories for anorexia nervosa (AN; “good,” “intermediate,” “poor,” “died”) [14] or the Psychiatric Status Rating scale, a six-point scale based on symptomatic severity [15].

The alleviation of ED symptoms is necessary but insufficient for recovery from an ED [9]. Since people with EDs tend to gradually sever social and emotional connections [16], recovery should include reconnecting socially and emotionally to others [17]. The physical consequences of the ED need to be reversed, so that recovered individuals can reengage with their life goals [4]. In addition, recovery should include self-acceptance and the correction of the cognitive distortions engendered by the ED [4, 18]. Recovery can, therefore, be viewed as encompassing symptomatic relief, self-acceptance, social and emotional reconnection to others, and a return to physical health.

Measures of recovery from psychiatric disorders in fact exist. In their review of 22 measures of individuals’ recovery, Burgess et al. [19] recommended the use of four specific instruments: (1) The Recovery Assessment Scale [20], assessing personal confidence and hope; willingness to ask for help; goal and success orientation; reliance on others; and no domination by symptoms; (2) the Illness Management and Recovery Scales [21], designed to promote illness management and personal goal setting; (3) the Stages of Recovery Instrument [22], assessing five stages of recovery; and (4) the Recovery Process Inventory [23], intended to measure anguish, connectedness, confidence/purpose, others’ care, living situation and self-care. Whereas these questionnaires adopt a transdiagnostic approach, others, such as the Psychosis Recovery Inventory [24], address more specific psychopathologies. Pinto and her colleagues proposed measuring ED recovery with a measure of self-efficacy [25]. However, to our knowledge, there is no self-report clinical questionnaire that specifically measures recovery from an ED as a multidimensional concept.

Petersen et al. [26] proposed a 17-item “patient-related measure” of recovery from EDs. However, it is a measure of endorsement requiring respondents to rate the importance of each item to recovery in principle, rather than a clinical instrument that asks respondents about their personal recovery. Noordenbos and Seubring [27] similarly asked 41 ex-ED patients and 57 ED therapists to select and rank the relevance of various criteria to recovery from ED. In a previous study, we proposed the “Eating Disorders Recovery Endorsement Questionnaire” (EDREQ) [28], that included slightly amended criteria from Noordenbos and Seubring [27] and used a six-point Likert-like scale instead of a yes/no response format. The EDREQ asks respondents to indicate to what degree they believe the listed criteria are important for recovery from an ED, rather than to report on their clinical state. A clinical version of the EDREQ that asks patients about themselves personally stands to fill a void in the conceptualization and assessment of recovery from an ED.

The aim of the present study was, therefore, to propose the “Eating Disorders Recovery Questionnaire” (EDRQ), adapted from the EDREQ as a clinical, self-report tool, intended to assess progress in clinical practice and accordingly redefine therapeutic goals along the path to recovery. We wished to propose an instrument that could be useful to individual consumers, carers and service providers in monitoring recovery status and change. The EDRQ is intended to be incorporated in a standardized battery of assessment tools to assess ED recovery in research.

We administered the EDRQ to a large sample of young adults with and without a lifetime ED diagnosis. To examine the convergent validity of the questionnaire, we selected variables conceptually related to our concept of ED recovery. We included a measure of ED-related symptomatology, questionnaires assessing depressive symptoms and negative affect, and a body image measure that taps not only the conventional notion of body acceptance, but other positive body experiences related to recovery, such as vitality and enjoyment of sexuality. Since we expected the EDRQ to be related to other indicators of positive mental health and behaviors, we also included measures of satisfaction with life, positive affect and positive eating.

In this study, we aimed to explore and confirm the factor structure of the EDRQ, examine correlations of its total and subscale scores with related variables to confirm convergent validity, and compare EDRQ scores with EDEQ scores to examine to what extent EDRQ scores differ from symptom remission.

We hypothesized that:

1. The construct structure of the EDRQ derived from that of the EDREQ would be validated.
2. The subscales of the EDRQ would correlate significantly with measures of similar constructs.

3. Participants with a current ED would score lower on the EDRQ subscales than participants with a past ED and controls with no ED history.
4. Participants with a current ED would score higher than participants with a past ED and controls with no ED history on measures of ED symptoms, negative affect and depression, and lower on positive affect, positive body experience, life satisfaction and positive eating.

Methods

Participants

Of 1281 initial participants, 978 (76%) completed all questionnaires. Women comprised 90.6% ($n = 885$) of completers. Most study completers ($n = 846$, 77 men) were recruited via social media sites, both online ED communities and sites representative of normative Israeli society. The remainder ($n = 132$, 15 men) were students at the Ruppin Academic Center in Israel, who received class credit for participation in the study. Participants' mean age was 27.8 years ($SD = 7.8$, range 18–76). Most participants (60.1%) described themselves as secular, 14.9% as traditional, 16.7% as religious and 8.3% as very religious. The majority (60.3%) had at least one academic degree. Half (50.8%) were single, 36.4% married, and 1.8% divorced or widowed. Only 12.1% had children; 2.6% had one child, 4.1% had two children, 1.8% had three, and 3.5% had over three.

Participants were asked to report whether they had ever received an ED diagnosis (AN, bulimia nervosa [BN], binge eating disorder [BED] or “other”), and to report on past/present DSM-5 symptoms. Diagnoses were confirmed or rejected via a series of diagnostic questions about the presence or absence of DSM-5 criteria for the reported disorder and determined whether these were valid currently or in the past. One hundred and seventy-two participants (4 men) had a current ED diagnosis of AN ($n = 81$), BN ($n = 43$) or BED ($n = 48$). One hundred and four (0 men) had a past diagnosis of AN ($n = 56$), BN ($n = 19$), BED ($n = 11$), or more than one disorder ($n = 18$). One hundred and five participants who reported a diagnosis of another ED or for whom there was doubt about a lifetime clinical ED diagnosis were excluded from group comparisons because of the heterogeneity and uncertainty that characterized this group. Men were also excluded from these comparisons, since there were too few to examine gender effects.

Instruments

Recovery from an eating disorder was assessed using the 28-item Eating Disorders Recovery Questionnaire (EDRQ).

The items were adapted from the EDREQ [28], with a few changes. The EDREQ item “Does not feel too fat” was reworded “I do not feel fatter than I am” to assess a lack of body distortion. Since more EDREQ items focus on binge/purge symptoms than restriction, the items “Does not use diuretics” and “Does not use slimming pills” were combined (“I do not take diet pills or use diuretics”), and an extra item assessing restriction was added: “I do not restrict my food intake”. Responses were noted on a seven-point Likert scale between 0 (I do not agree at all) and 6 (I completely agree), with higher scores reflecting a higher level of recovery. The alpha Cronbach of the EDRQ was 0.92.

Eating disorder symptoms were quantified via the Eating Disorders Examination Questionnaire [29], a 28-item self-report scale identifying core ED symptoms and associated behaviors and cognitions. Responses to 22 items, for example “Have you had a definite desire to have a totally flat stomach?” are recorded on a seven-point Likert-type scale between 0 (e.g., “no days” during the past 4 weeks) and 6 (“every day”), with higher scores indicating greater symptom severity. The other items are excluded from reliability calculations. Although the EDEQ often has four subscales, the Hebrew version has been shown to have three, Dietary Restraint, Eating Concern and Weight and Shape Concern [30]. The EDEQ has good psychometric properties in English [26] and in Hebrew [30], and in this study the Cronbach's alphas for the subscales were between 0.89 and 0.95.

Positive body experiences were assessed using the Dresden Body Image Questionnaire-35 (DKB-35) [31], a 35-item body image scale, originally published in German. It was chosen for its positive and comprehensive conceptualization of body image. The DKB-35 had good psychometric properties in clinical [32] and non-clinical [33] populations. Respondents rate items between 1 (“not at all true for me”) and 5 (“very true for me”) for five subscales: (1) Vitality, for example “I am physically fit”; (2) Body-Narcissism, or pleasure at being looked at, for example “I find it pleasant and stimulating when somebody looks at me attentively”; (3) Sexual Fulfillment, for example “I feel my body pleasantly and intensely in sexuality”; (4) Physical Contact, or touching and being touched, for example “Physical contact is important for me to express closeness”. We used a Hebrew translation with good psychometric properties [34] and the alpha Cronbach in this study was 0.94.

Life Satisfaction was assessed via the Satisfaction with Life Scale (SWLS) [35] that contains five items inviting a general cognitive appraisal of the respondents' life. The SWLS is a common measure of well-being and has good psychometric properties [35]. Items are scored between 1 (“strongly disagree”) and 7 (“strongly agree”), and high scores indicate greater life satisfaction. A Hebrew version previously used in research was used in this study [36]. The alpha Cronbach in this study was 0.89.

Positive and negative affect was measured using the Positive and Negative Affect Schedule—Short Form (PANAS-SF) [37]. The PANAS-SF is a ten-item questionnaire containing five items about positive affect (PANAS-SF-P) and five about negative affect (PANAS-SF-N). Respondents were asked to rate the extent to which they usually feel various emotions, e.g., excitement and anger on a five-point Likert scale between 1 (“Hardly at all”) to 5 (“Very strongly”). The validity and reliability of the PANAS-SF have been shown in various cultures [36]. In this study, we used a Hebrew translation previously used in research [38]. The alpha Cronbach in this study was 0.79 for positive affect and 0.83 for negative affect.

Depressive symptoms were assessed by the Patient Health Questionnaire-9 (PHQ-9) [39] that includes nine items assessing the severity of DSM-5 criteria for depression. Respondents indicated on a four-point Likert scale from 0 (“not at all”) to 3 (“almost every day”) how often during the past 2 weeks they experienced each criterion, for example ‘little interest or pleasure in doing things’. Higher scores indicate greater symptom severity. The PHQ-9 has good internal reliability and 48-h test–retest reliability [40]. The Hebrew version used in this study was validated in a primary care setting [41] and the alpha Cronbach in this study was 0.91.

Positive eating was assessed using the Positive Eating Scale (PES) [42], an eight-item questionnaire that focuses on normal, non-pathological eating behaviors. Its two subscales assess Satisfaction with Eating, for example “I am relaxed about eating”, and Pleasure when Eating, for example “Eating is fun for me”. Items are scored between 1 (“I strongly disagree”) and 4 (“I strongly agree”). Psychometric properties and six-month test–retest reliability were found to be acceptable for non-clinical samples in Germany, India and the US [42]. It was translated into Hebrew for this study using translation and back-translation by native speakers of the target languages. In this study, the alpha Cronbach was 0.93.

Procedure

This study was conducted after approval was received from the Ruppin Academic Center Ethics Committee. Participants completed questionnaires online via Qualtrics (www.qualtrics.com) and provided informed consent on the first screen after receiving full information about the study. Data were exported into an SPSS file and analyses were conducted using SPSS 23 and AMOS 23.0 for the Confirmatory Factor Analysis (CFA).

EDRQ items were entered into an Exploratory Factor Analysis (EFA) to determine an appropriate factor structure, which was confirmed using CFA. A random split of half the participants with no history of AN, BN or BED ($n = 353$)

was used for the EFA, and the other random half of the sample ($n = 353$) was used for the CFA. An EFA was repeated using only those participants with a confirmed lifetime ED diagnosis of AN, BN and/or BED ($n = 272$). This is because the EDRQ is in fact intended for use with people with a past or present ED, and the control group was included in this study for purposes of comparison and validation. Intercorrelations between the EDRQ subscales and Pearson correlations between the EDRQ (total and subscale scores) and the other study variables were calculated for the entire sample. MANOVAs were conducted to compare scores for the study variables between groups (current ED, past ED and controls without a history of an ED [CN]). To examine the interplay between the EDRQ and the EDEQ, another MANOVA compared other study variables for participants who scored high on ED symptoms (EDEQ) and low on recovery (EDRQ) to participants who scored high on ED symptoms (EDEQ) and low on recovery (EDRQ). Yet another MANOVA compared scores for the study variables between the 10% of participants with a lifetime ED diagnosis with the highest recovery scores (“super-recovered”) and the CN group. Data are available from the authors. The sample size was established with power of the analysis equal to 95%.

Results

EFA of the EDRQ

A random split of half the participants reporting no history of AN, BN or BED ($n = 353$) was used for the first EFA. All 28 items were entered using varimax rotation, although Promax solutions produced the identical factor structure. Item loadings were restricted to > 0.30 . Based on the screen plot and the conceptual clarity of the resultant factor solutions, a four-factor structure seemed most appropriate. The factors (see Table 1) had eigenvalues of 9.66, 3.38, 3.19 and 2.00, and a cumulative explained variance of 65.12%. Alpha Cronbach was 0.92 for the whole scale and ranged between 0.84 and 0.91 for the subscales. The first factor referred to a lack of symptoms and was named Lack of Symptomatic Behavior (LSB). The items that loaded onto the second factor were related to body satisfaction and general self-acceptance, so this subscale was named Acceptance of Self and Body (ASB). The third factor contained items relevant to positive social interaction and emotional experience and was named Social and Emotional Connection (SEC). The fourth factor related to physical aspects of recovery and was named Physical Health (PH). The item “My caloric intake is normal” that we expected to load onto LSB loaded better on ASB (see EFA without EDs, below).

Since the EDRQ is in fact intended for use with people with a present or past ED, we reran the EFA, entering only

Table 1 EFA for the EDRQ (half the participants with no history of AN, BN or BED; $n = 353$)

Item no	Item	Factor			
		LSB	ASB	SEC	PH
4	I do not use laxatives	0.92			
5	I do not take diet pills or use diuretics	0.91			
3	I do not vomit after a meal	0.89			
7	I do not exercise excessively	0.69			
6	I do not restrict my food intake	0.50	0.56		
2	I do not binge	0.44	0.32		
9	I experience my body in a positive way			0.86	
10	I accept my appearance			0.83	
14	My self-esteem is not dependent on my weight			0.71	0.36
12	I am not obsessed by food and weight			0.69	
8	I do not feel fatter than I am			0.68	
13	I have adequate self-esteem			0.66	0.49
11	I feel no need to slim excessively			0.65	
1	My caloric intake is normal			0.42	
26	I am able to handle conflicts				0.84
24	I am able to handle positive emotions				0.80
25	I dare to express a different opinion				0.79
23	I am able to handle negative emotions				0.78
27	I am in touch with my own feelings				0.76
22	I am able to express my emotions in words				0.73
28	I am able to make contact with others				0.72
19	My potassium values are normal				0.89
20	My electrolytes are normal				0.88
18	My heartbeat is normal				0.82
15	My blood pressure is normal				0.81
17	My body temperature is normal				0.78
16	My endocrinological values are normal				0.75
21	My skin is not excessively dry				0.39
	Cronbach's alpha: 0.92 total	0.84	0.89	0.91	0.88

Bold value indicates that the item was allocated to this subscale in the final questionnaire

Only factor loadings of over 0.30 are shown

LSB lack of symptomatic behavior, ASB acceptance of self and body, SEC social and emotional connection, PH physical health

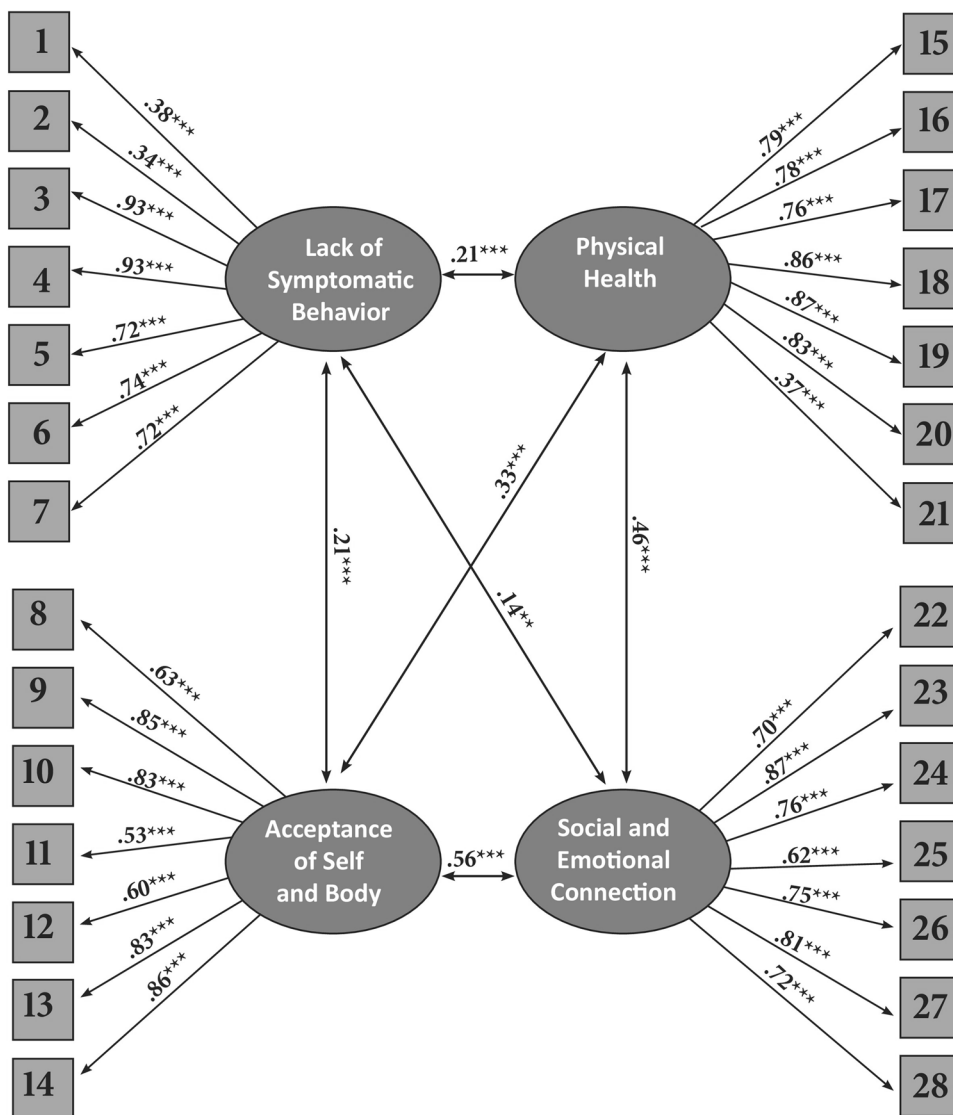
participants with a lifetime history of AN, BN or BED ($n = 272$). Four factors were identified with eigenvalues of 8.38, 3.14, 2.20 and 1.99 and a cumulative explained variance of 56.08%. The identical construct structure was found, with one exception. Item 1 (“My caloric intake is normal”), which loaded onto ASB in the previous EFA, had a higher loading on LSB (0.43) than on ASB (0.37). We decided to include this item in the LSB subscale for the CFA, because conceptually normal caloric intake indicates symptom remission (no under- or overeating) and

because the EDRQ is specifically intended for use with people with a personal history of an ED.

Confirmatory factor analysis of the EDRQ

A CFA was run using the second half of the random split of participants reporting no history of AN, BN or BED ($n = 353$). CFA examines the consistency of constructs theorized to have a specific structure. The hypothesized structure is entered to constrain the analysis, which confirms or rejects the fit of the data to the hypothesized model. The model

Fig. 1 Confirmatory factor analysis for the EDRQ ($n=353$)



is confirmed if model-fit-indices are good and rejected if these are inadequate. The conditions chosen for the acceptance of our model were Chi-square > 0.05 (as Chi-square is highly reliant on the number of participants, other indices are used to better assess the model); CFI (Comparative Fit Index) > 0.90 [43] and RMSEA (root mean square error of approximation) < 0.08 [44]; see Fig. 1. The Chi-square goodness-of-fit index presented a good fit for the data, $\chi^2(330, n=353) = 731.45, p > 0.001$; CFI = 0.93; RMSEA = 0.07.

Intercorrelations, means and standard deviations of the EDRQ subscales are presented in Table 2, for the entire sample. Correlations between each of the EDRQ subscales were positive and of medium strength.

Correlations between the EDRQ and the other study variables are presented in Table 3, for the entire sample. All correlations were in the expected directions and significant

Table 2 Intercorrelations, means and standard deviations of the EDRQ subscale scores in total sample ($n=978$)

	LSB	ASB	PH	SEC
LSB		.45***	0.39***	0.35***
ASB			0.43***	0.56***
PH				0.48***
Mean (SD)	5.68 (1.27)	4.35 (1.73)	6.16 (1.15)	5.73 (1.29)

LSB lack of symptomatic behavior, ASB acceptance of self and body, SEC social and emotional connection, PH physical health

* $p < 0.05$
 ** $p < 0.01$
 *** $p < 0.001$ (two-tailed)

at the $p < 0.001$ level, except for that between positive and

Table 3 Correlations between the EDRQ and the other study variables for total sample ($n=978$)

	EDEQ	DKB-35	PANAS-SF-P	PANAS-SF-N	PHQ-9	SWLS	PES
EDRQ	-0.67***	0.63***	0.37***	-0.49***	-0.63***	0.52***	0.68***
EDEQ		-0.51***	-0.14***	0.49***	0.60***	-0.35***	-0.63***
DKB-35			0.42***	-0.47***	-0.58***	0.51***	0.60***
PANAS-SF-P				-0.08*	-0.33***	0.46***	0.35***
PANAS-SF-N					0.69***	-0.45***	-0.43***
PHQ-9						-0.54***	-0.55***
SWLS							0.49***

EDRQ Eating Disorders Recovery Questionnaire, *EDEQ* Eating Disorders Examination Questionnaire, *DKB-35* Dresden Body Image Questionnaire-35, *PANAS-SF-P* positive and negative affect schedule—short form, negative affect, *PANAS-SF-N* positive and negative affect schedule—short form, positive affect, *PHQ-9* Patient Health Questionnaire-9, *SWLS* Satisfaction With Life Scale, *PES* Positive Eating Scale

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$ (two-tailed)

negative affect. The correlation between EDRQ and EDEQ scores was -0.67 . The magnitude of correlations between positive construct variables and EDRQ scores tended to be somewhat larger than the magnitude of correlations between positive constructs and EDEQ scores.

Comparisons between current ED, past ED and CN women on study variables

Group comparisons were conducted to compare women with a current ED ($n=168$), a past ED ($n=104$) and no ED history (CNs; $n=508$) on all study variables. No significant between-group differences emerged for age, marital status or number of children. However, almost half of the CN (49.2%) and past ED (44.7%), but only 35.2% of the women with current ED held a bachelor's degree ($\chi^2_{(4)}=37.67, p < 0.001$). In addition, more CN women (19.1%) than women with current ED (6.9%) and past ED (4.0%) were Muslim ($\chi^2_{(2)}=24.89, p < 0.001$). Level of education and religion were, therefore, entered as covariates in these analyses.

To assess between-group differences for positive and negative affect, positive body experience, ED recovery and ED symptoms, a 3×7 MANOVA was performed with group as the independent variable and PANAS-SF (two subscales), DKB-35 (five subscales), EDRQ and EDEQ scores as dependent variables. The overall model was statistically significant ($F_{(24,1410)}=23.78, p < 0.001$), with significant between-group differences emerging for all variables (see Table 4). Simple effects post hoc analyses showed that the current ED women differed significantly from both the past ED and CN women for all variables, but that the only significant difference between the past ED and CN groups was for PANAS-SF-N scores, with past ED women reporting more negative affect.

Table 4 Comparison of means and standard deviations of study variables for current ED, past ED and CN groups ($n=978$)

	Current ED Mean (SD)	Past ED Mean (SD)	CN Mean (SD)
PANAS			
Positive affect	2.89 (0.81)	3.25 (0.70)	3.39 (0.73)
Negative affect	3.32 (0.92)	2.60 (0.85)	2.37 (0.84)
DKB-35			
Vitality	2.86 (0.81)	3.39 (0.83)	3.51 (0.79)
Body acceptance	2.01 (0.79)	3.00 (0.98)	3.21 (0.90)
Body narcissism	2.59 (0.79)	2.96 (0.75)	3.03 (0.66)
Physical contact	2.98 (1.06)	3.61 (0.86)	3.75 (0.77)
Sexual fulfillment	2.40 (1.15)	3.20 (1.21)	3.42 (0.98)
PES			
Positive eating	1.78 (0.72)	2.89 (0.70)	3.15 (0.52)
PHQ			
Depression	1.94 (0.70)	1.08 (0.71)	0.83 (0.51)
SWLS			
Well-being	3.60 (1.61)	4.39 (1.66)	4.84 (1.35)
EDRQ			
Recovery	4.36 (0.91)	5.76 (0.81)	5.87 (0.71)
EDEQ			
Symptoms	5.02 (1.30)	2.80 (1.43)	2.61 (1.27)

As hypothesized, participants with current EDs scored highest in negative affect, depression and ED symptoms, and lowest in positive affect, positive body experiences, positive eating, life satisfaction and recovery from ED. Scores of participants with past EDs fell between those of participants with current EDs and those of controls (see Table 4).

We then compared 10% ($n=30$) of participants with an ED history who had the highest EDRQ scores ("super-recovered") with the CN group on all study indices, by conducting

a 2 * 8 MANOVA with group (“super-recovered”, CN) as the independent variable and EDEQ, PANAS-SF (two subscales), DKB-35, PES, PHQ-9, SWLS scores and BMI as the dependent variables. The overall model was statistically significant ($F_{(7,454)} = 3.22, p = 0.002$). Between-group differences were significant for all variables except PANAS-SF-P and BMI, with significantly higher scores observed for the “super-recovered” on the DKB-35 subscales, PES and SWLS and lower scores for the PANAS-SF-N, EDEQ and PHQ.

To examine whether the constructs measured by the EDRQ (recovery) and the EDEQ (symptomatology) differed from one another, we classified the symptomatic women (EDEQ > median, $n = 373$) as low (< median, $n = 271$) versus high (> median, $n = 102$) on recovery (EDRQ scores). These groups were compared for the other study variables: positive and negative affect, positive body experience, depression, satisfaction with life, positive eating and BMI. A 2 * 11 MANOVA analysis was conducted with group as the independent variable and scores of the PANAS-SF (two subscales), DKB-35 (five subscales), PES, PHQ-9, SWLS and BMI as the dependent variables. The overall model was statistically significant ($F_{(5,358)} = 30.16, p < 0.001$). The mean BMI of the high-symptom, high-recovery group (mean = 25.77; SD = 6.70) was significantly higher than that of the high-symptom, low-recovery group (mean = 19.65; SD = 4.93). According to simple effects post hoc analyses, between-group differences were significant for all variables.

Discussion

We propose the EDRQ, a 28-item self-report instrument to assess the level of recovery from an ED in a broad and comprehensive sense, to track progress and monitor change along the ED recovery axis. This instrument proved comprehensible and user-friendly, and demonstrated good psychometric properties and convergent validity with a range of characteristics and experiences associated with EDs and recovery from them. The EDRQ scores for people with current and past EDs differed significantly, and the questionnaire measured a concept that is broader and more holistic than the absence of ED symptoms.

Four EDRQ subscales were determined via EFA using participants with and without a history of ED: lack of symptomatic behavior, physical health, acceptance of self and body, and social and emotional connection. This factor structure was identical for individuals with and without a history of an ED, except for the item “My caloric intake is normal”, intended to indicate an absence of the ED symptoms of restriction and binge eating. For participants with a past or present ED, the EFA indeed placed this item in the LSB subscale. However, for control participants who did

not report an ED history, its loading was higher on the ASB than the LSB subscale, possibly indicating that “normative dieting” or “emotional overeating” differ from the severe restriction and binge eating seen in EDs and reflect a lack of self-acceptance. We recommend including this item on normal caloric intake in the LSB subscale, both because the EDRQ is intended for people who have experienced an ED and because this structure was confirmed via CFA using an independent sample of study participants.

The inclusion of emotional and psychosocial balance extends the concept of recovery beyond symptom remission and the absence of illness. Two EDRQ subscales focus on emotional and psychosocial health: acceptance of self and body, including two items about general self-esteem (e.g., “Has adequate self-esteem”), and Social and Emotional Connection, extending to self-assertion (e.g., “dares to express a different opinion”). These emotional and social factors, further tapped by items like “Is in touch with her own feelings”, reflect elements of recovery shown to be important in qualitative studies [45–47].

It is generally agreed today that a definition of recovery from EDs should extend beyond the medical model to include to psychological [46], emotional [45], and social factors [16, 17]. The EDRQ attempts to evaluate recovery in a comprehensive sense. It includes the concepts of physical health (e.g., normal weight, heart rate and body temperature) and symptom remission (e.g., absence of restriction, bingeing and purging) that are specific to eating disorders and central to the medical model of recovery. Yet, it also includes two emotional and interpersonal aspects of recovery that seem more transdiagnostic than specific: the ability to accept oneself (including one’s body), and the capacity to connect to one’s feelings and to others, including assertiveness (“dares to express a different opinion”). The SEC items and some of the ASB items may reflect universal rather than disorder-specific facets of recovery. Future research should examine whether change in these subscales characterizes recovery from other psychiatric disorders, since general research on recovery in mental health should identify non-specific elements of recovery.

EDRQ scores were clearly different for people with a current versus a past ED. This validates our common-sense understanding of recovery as a process that has presumably occurred in a person now free of a disorder (s)he once had. Significantly, participants with a past ED (i.e., recovered) and participants who reported no ED history scored similarly on ED symptomatology, positive body experiences, depressive symptoms, and positive and negative affect. This finding is in line with the proposal that full recovery should be defined when a person with a past ED has a behavioral, cognitive and psychological profile that is indistinguishable from that of people with no ED history [10, 18]. Bardone-Cone and her colleagues [4] suggest operationalizing

recovery by comparing measures related to eating pathology but not included in the operationalization of recovery for a recovered group, a currently ill group and a control group with no ED history. According to this operationalization, our findings support the validity of the EDRQ because the profile of the recovered group was healthier than that of the currently ill group but did not differ significantly from the controls, “suggesting a return to “normative” levels of these constructs” (p. 2). We also found that the 10% of highest EDRQ scorers, or 30 “super-recovered” participants, had a profile that was significantly healthier than that of control women. These results support the notion that recovery from an ED in a full, comprehensive sense is attainable by some.

It has been argued that the concept of recovery differs from the absence of ED psychopathology [47, 48], and our findings support this claim. The correlation between the EDRQ and the EDEQ scores was -0.67 , so that whereas the concepts measured by these questionnaires have much overlap, they also seem distinct. We compared symptomatic participants (above-median EDEQ scorers) who had above-median EDRQ scores with symptomatic participants who had below-median EDRQ scores. Symptomatic above-median EDRQ scorers scored higher than symptomatic below-median EDRQ scorers on all positive psychological indices: vitality, body acceptance, body narcissism, physical contact, sexual fulfillment, positive eating, positive affect, and satisfaction with life, and lower on negative affect, and depressive symptoms. The EDRQ, therefore, seems to capture dimensions of recovery not assessed by the EDEQ.

We recommend the use of the EDEQ to assess recovery along a continuum, rather than as a dichotomous state opposed to pathology, in setting clinical goals and describing progress. Change in the four domains measured by the EDRQ can help clinicians adapt and individualize treatment strategies, for example affect expression and social skills could be emphasized for a patient with particularly low SEC scores. We also recommend that the EDRQ be included in an operationalization of recovery from ED in outcome studies and research that requires an assessment of level of recovery. Clinical norms should be established, and longitudinal studies should be conducted towards determining a cutoff score above which a person can be considered remitted, or recovered from an ED.

Further research is needed on recovery from eating disorders. The fit of the definition used in constructing the EDRQ presented in this study should be further examined for EDs, generally and specifically. The trajectory of recovery for the four aspects of recovery assessed by the questionnaire should be explored: is there a temporal order to the recovery on these different fronts? While symptomatic remission is a precondition for ED recovery, to what extent are the other three aspects, self and body acceptance, social emotional connection and physical health essential?

This study has several limitations. ED diagnoses were not conducted face-to-face by a qualified clinician, and therefore, perhaps not entirely reliable. There were very few male participants and relatively few participants who reported a history of BED. ARFID, UFED and OSFED were not defined for inclusion in analyses. Future research should, therefore, investigate the validity of the EDRQ for measuring recovery from BED, ARFID and other specific and non-specific EDs in males and females. In addition, this was a cross-sectional study which cannot examine changes attained through the healing process. No measure of socially desirable responding was included in the study, so that the EDRQ may have been vulnerable to biased responding. The EDRQ was not validated with an independent measure of ED or general recovery and should be in future research. Another limitation is the study’s cross-sectional design. While appropriate for examining the reliability, structural validating, and convergent validity of the EDRQ, this design did not allow us to evaluate the sensitivity of the EDRQ to reflect individual recovery trajectories over time. It should also be investigated whether EDRQ total and/or subscale scores or short-term fluctuations can play a role in predicting treatment response, and the EDRQ should be validated in future research with independent measures of recovery, which were not included in this study. The concept and definition of remission should also be thought through and investigated in terms of EDRQ scores. To determine EDRQ thresholds for remission and recovery, longitudinal data are needed to identify cutoff points above which relapse is unlikely. We, therefore, strongly recommend that the EDRQ be adopted in routine clinical work and evaluated in research.

In conclusion, the EDRQ is a self-report instrument in Hebrew, that can be used for the routine assessment of recovery from an ED, over and above levels of symptomatology, in clinical practice and in research. As with many screening instruments, reliability, validity and thresholds may be subject to cultural influences or secular trends and thus require cross-cultural research and re-examination over time. The EDRQ should, therefore, be administered and validated or adapted for use in English and in other languages and cultures.

What is already known on this subject?

There is no consensus definition of recovery from an eating disorder and no reliable and valid instrument intended to assess this construct. A self-report recovery questionnaire would be useful in clinical practice and in research.

What this study adds?

This study validates a 28-item self-report questionnaire assessing recovery from an eating disorder in a broad sense. The Eating Disorder Recovery Questionnaire can be useful to patients, carers, researchers and service providers.

Author contributions RBM conceived and coordinated the study, oversaw recruitment, helped analyze results and wrote the paper. LLA performed and wrote up statistical analyses and contributed to the writing of the manuscript. AHZ helped with analyses and contributed to manuscript preparation. ML conducted the study, helped with analyses and manuscript preparation.

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Data availability Data are available from the corresponding author.

Code availability Not applicable.

Compliance with ethical standards

Conflict of interest On behalf of all the authors, the corresponding author states that there is no conflict of interest.

Ethics approval Approval was received from the Ruppiner Academic Center Ethics Committee.

Consent to participate All the participants provided informed consent.

Consent for publication All the participants understood and approved that the results of the study would be published (without any identifying information).

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