Preliminary Validation of the Eating Disorder Examination Questionnaire-Short Parent Version (EDE-QS-P)

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Author Contributions Statement

The authors confirm contribution to the paper as follows: writing, reviewing, and editing manuscript drafts: all authors; data collection: A. E. Webster, J. Essayli, & S. Lane-Loney; analysis and interpretation of results: A. E. Webster & H. Zickgraf; study methodology: A. E. Webster, H. Zickgraf, S. Lane-Loney, & J. Essayli; measure development: N. Gideon, J. Mond, L. Serpell, S. Lane-Loney, & J. Essayli. All authors reviewed the results and approved the final version of the manuscript.

Abstract

Objective: There is a lack of reliable and valid parent-report measures assessing eating disorder (ED) pathology in children and adolescents. This study aimed to develop and provide preliminary validation of a new parent-report measure, the 12-item Eating Disorder Examination Questionnaire-Short Parent Version (EDE-QS-P). **Method:** The EDE-QS-P was completed by 296 parents seeking treatment for their child at an ED clinic. Children (ages 6-18, $N = 296$) completed the Eating Disorder Examination-Questionnaire (EDE-Q), the seven-item Generalized Anxiety Disorder Questionnaire (GAD-7), and the nine-item Patient Health Questionnaire (PHQ-9). **Results:** After removing item 10, the 11-item version of the EDE-QS-P showed borderline adequate fit to the one factor solution and strong internal consistency ($\alpha = 0.91$). This measure also demonstrated strong convergent validity with child scores on the EDE-Q ($r = .69$), and moderate convergent validity with child scores on the GAD-7 ($r = .37$) and PHQ-9 ($r = .46$). The EDE-QS-P was able to differentiate children with EDs characterized by body image disturbances (e.g., anorexia nervosa) from those with avoidant/restrictive food intake disorder, who do not experience shape or weight concerns. **Discussion:** The 11-item EDE-QS-P may be a promising parent-report measure of ED pathology in children and adolescents.

Key words: EDE-QS-P, parent-report measure, validation, assessment, eating disorders

Clinical Implications

- There exists a dearth of parent-report measures for the assessment of youth eating disorder symptomatology.
- We developed and validated a parent-version of the Eating Disorder Examination Questionnaire – Short (EDE-QS).
- The 11-item version of the EDE-QS parent version demonstrated acceptable preliminary psychometric properties.
- The EDE-QS parent version is a promising parent-report measure for youth eating disorder screening.
- The use of this measure may enable clinicians to better assess youth with eating disorders using a multi-informant approach.

Preliminary validation of the Eating Disorder Examination Questionnaire-Short Parent Version (EDE-QS-P)

Eating disorders (EDs) are mental health conditions that result in serious physical morbidity and psychosocial impairment (Smink et al., 2012). Children and adolescents are especially vulnerable to experiencing physical health complications due to their developmental stage (Gray & Eddy, 2018). Despite the clear need for early intervention, assessing youth for EDs can be challenging. Children may have difficulty identifying internal symptoms and describing their mental state due to their developing cognitive capacities (Mariano et al., 2013). Moreover, many adolescents with EDs are ambivalent about treatment and may deny, distort, and/or downplay their symptoms (Fisher et al., 2001). A multi-informant approach may facilitate a more accurate assessment of ED psychopathology in children and adolescents (Swanson et al., 2014).

To our knowledge, there is one parent version of a clinical interview, the parent version of the Eating Disorder Examination interview (EDE; Couturier et al., 2007; Cooper & Fairburn, 1987). Additionally, there are parent versions of two self-report measures: the Questionnaire on Eating and Weight Patterns (Johnson et al., 1999) and the Development and Well-Being Assessment (Moya et al., 2005). Unfortunately, these measures are lengthy, may be impractical for routine use in clinical settings (Moya et al., 2005), fail to measure the full range of ED symptoms (Johnson et al., 1999), or require specialist training or online assessment (Couturier et al., 2007). Of note, the recently developed Eating Disorder-15 for Parents/Caregivers (ED-15-P) (a parent-report version of the ED-15; Tatham et al., 2015) has demonstrated strong reliability and validity for use with a clinical population (Accurso & Waller, 2021). However, more studies are needed to substantiate its clinical utility. Finally, a parent-version of the Eating Disorder

Examination Questionnaire is currently under development (Drury et al., 2023), but its psychometric properties are yet to be demonstrated.

Given the need for comprehensive, but also parsimonious, parent assessment tools, we chose to adapt the 12-item Eating Disorder Examination Questionnaire-Short (EDE-QS; Gideon et al., 2016). The EDE-QS was selected to adapt because it is brief, has strong psychometric properties, and is easy to complete (Prnjak et al., 2020). Moreover, the EDE-QS differs from the ED-15 in its number of items (12 items in the EDE-QS versus 15 items in the ED-15) and assessment of ED symptoms (assessment of avoidance based on looks in the EDE-QS versus assessment of the fear of weight gain in the EDE-15), differentiating this parent-report measure from the ED-15-P. The aim of the current study is to conduct a preliminary validation of the EDE-QS parent version (EDE-QS-P; Table S1) for use as part of a multi-informant assessment of ED symptomatology in children and adolescents.

We hypothesized that the EDE-QS-P would: (1) exhibit strong internal consistency; (2) demonstrate convergent validity with child responses on the EDE-Q (Johnson et al., 1999), Generalized Anxiety Disorder Questionnaire (GAD-7) (Spitzer et al., 2006) and the Patient Health Questionnaire (PHQ-9) (Arroll et al., 2010); and (3) differentiate between children with avoidant/restrictive food intake disorder (ARFID), who do not experience body image disturbances, from those with a shape/weight ED (SWED), including anorexia nervosa (AN), bulimia nervosa (BN), and binge-eating disorder (BED).

Method

Participants

Participants included 303 patients who completed study questionnaires when presenting to an outpatient adolescent medicine ED service in Pennsylvania, USA. Parents of 296 patients

(97.7%) completed the EDE-QS-P. Patients ranged in age from 6 – 18 years (M = 14.63, SD = 2.32) and were predominantly female (84%) and White (79.9%). ED diagnoses included: ARFID (24.7%; M_{age} = 12.8, SD_{age} = 3.24), AN (21.3%; M_{age} = 14.8, SD_{age} = 1.80), BED (4.7%; M_{age} = 14.5, SD_{age} = 2.27), BN (4.4%; M_{age} = 14.6, SD_{age} = 1.61), other specified feeding or eating disorder (OSFED) (32.4%; M_{age} = 15.5, SD_{age} = 1.75), unspecified feeding or eating disorder (UFED) (6.1%; M_{age} = 15.3, SD_{age} = 1.78), other eating/weight-related problem (patients whose scores indicated a problem with eating/weight, but did not meet criteria for a clinical ED diagnosis) (2.4%; M_{age} = 16.3, SD_{age} = 1.3), and no ED (patients who did not have an eating/weight-related problem) (4.1%; M_{age} = 15.1, SD_{age} = 1.91). Demographic data for parent respondents were not collected.

Complete data on the EDE-QS-P were provided by 233 parent respondents (77.7%). Missing parent data was missing at random. Reasons for non-responding may include arriving late for the appointment, confusion about items, disinterest in the measure, and so on. Following multiple imputation, the final analyses were conducted using data from 296 parents. Child self-report data for convergent validity variables were missing from 42 patients. The sample for convergent validity analyses included 254 (GAD-7) and 256 (PHQ-9) participants. Mean scores on the EDE-QS-P were calculated for all diagnostic groups. Data from 203 participants (those diagnosed with a shape/weight ED including AN, BN, or BED or with ARFID) were used for criterion-related validity analyses. The full dataset of 296 participants was used for factor analysis of the EDE-QS-P and for convergent validity with the child-report EDE-Q.

Measures

EDE-QS-P. The EDE-QS-P is a parent-report adaptation of the EDE-QS (Gideon et al., 2016) that measures ED symptomatology in children and adolescents. The EDE-QS-P includes

the original items from the EDE-QS with altered wording to reflect parent responses about their children (see Table 1). The EDE-QS-P contains twelve items rated on a four-point Likert-type scale. Responses range from zero ("*0 days*") to 3 ("*6-7 days*") with higher scores indicating higher frequency of the child's ED related cognitions and behaviors. Scores of items are summed and result in a possible total score of 0-36.

For reference, the EDE-QS (Gideon et al., 2016) is a revised and brief version of the EDE-Q (see below; Fairburn & Belgin, 1994). This measure has demonstrated high internal consistency ($\alpha = 0.913$) and test-retest reliability (ICC = 0.93, $p < .001$). This measure has strong correlations with the EDE-Q among young adults with ($r = .82$) and without ($r = .91$) ED diagnoses (Gideon et al., 2016), and is suitable for screening purposes (Prnjak et al., 2020).

EDE-Q. The EDE-Q (Fairburn & Beglin, 1994) is a 28-item self-report measure of ED symptoms derived from the EDE clinical interview (Cooper & Fairburn, 1987). Participants indicate frequency of ED-related behaviors and cognitions on a Likert-type scale from zero ("*No days*") to six ("*Every day*"), with higher scores indicating greater ED symptomatology. The EDE-Q has been validated in both clinical and non-clinical samples (Berg et al., 2012).

GAD-7. The GAD-7 is a screening instrument consisting of seven items rated on a four-point Likert-type scale. Responses range from zero ("*Not at all*") to three ("*Nearly every day*"), with higher scores indicating higher levels of anxiety. After summing item scores, the total possible score ranges from 0-28. The GAD-7 has demonstrated excellent internal consistency ($\alpha = 0.92$) and good test-retest reliability (*ICC* = 0.83) (Spitzer et al., 2006).

PHQ-9. The PHQ-9 is a brief questionnaire assessing depressive symptoms that consists of nine items rated on a four-point Likert-type scale. Responses range from zero ("*Not at all*") to three ("*Nearly every day*"). Item scores are summed resulting in a total possible score between 0-

32, with higher scores indicating higher levels of depression. The PHQ-9 has demonstrated construct validity, excellent internal reliability, and test-retest reliability (Arroll et al., 2010; Kroenke et al., 2001).

Procedure

The current study was approved by the Penn State College of Medicine Institutional Review Board. Patients and their parents presented to an outpatient treatment facility affiliated with an academic medical center. Patients were referred for ED concerns and evaluated by a physician or nurse practitioner. Patients and parents were asked to complete a packet of questionnaires prior to seeing the medical provider at their initial appointment. This packet included the PHQ-9, GAD-7, and EDE-Q (completed by children), and the EDE-QS-P (completed by parents).

Initial ED diagnoses were determined by a medical provider with expertise in EDs who used their own semi-structured evaluation template. The template for assessment included evaluation of eating behaviors and weight history, body image, beliefs about weight gain, and history and frequency of eating disorder symptoms (e.g., self-induced vomiting, laxative use, binge eating, skipping meals). Providers combined information from these interviews with participants and, for minors, a parent or legal guardian with data from questionnaires to determine ED diagnoses. A research assistant subsequently confirmed each diagnosis by using notes from the clinical evaluation and following an ED diagnostic flowchart based on criteria from the fifth edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5) (American Psychiatric Association, 2013). Unclear cases were reviewed by a clinical psychologist and either verified or modified. Data were reviewed retrospectively.

Data Analysis

SPSS version 25 was used to conduct descriptive statistics. Multiple imputation using the R "mice" package was conducted to generate five datasets with complete EDE-QS-P data. Missing data were replaced with the average of the five datasets. The final analyses were conducted in a sample of 296 parent responders. Based on a post-hoc power analysis (G*Power 3.1.9.7 [Faul et al., 2007] and standard effect sizes [Cohen, 1988]), 296 participants provided 40.5%, 99.9%, and 100.0% power to detect small, medium, and large effects, respectively. Additionally, since the EDE-QS-P is a brief measure (12 variables, 1 factor), a sample size greater than 250 is adequately powered for confirmatory factor analysis (Brown, 2015; Jackson, 2001).

Confirmatory factor analysis (CFA) was conducted using the R "lavaan" package and was fit using a mean- and variance-adjusted diagonally weighted least squares estimator. Researchers hypothesized a priori a one-factor solution based on the intended use of the measure as a brief global screener. Convergent validity was evaluated using zero-order correlations between the EDE-QS-P and child scores on the EDE-Q Global, GAD-7, and PHQ-9. The mean score of the 11 items that loaded significantly onto a single factor was used for convergent and criterion-related validity analyses. A one-way analysis of covariance (ANCOVA) adjusting for child age and gender was used to compare patients with ARFID to those diagnosed with a shape/weight ED. Those with OSFED/UFED, other eating/weight problem, and no ED were omitted from criterion-related validity analyses.

Results

CFA

For the one factor model, *RMSA* = .077 [.062, .092], *CFI* = .98, *TLI* = .98, and *SRMR* = .08 (*RMSEA* < .08, *CFI* and *TLI* > .90, and *SRMR* < .06, reflecting an adequate model fit (Hu &

Bentler, 1999). The 12-item EDE-QS-P demonstrated "excellent" internal consistency (α = .90; Cortina, 1993).

Item 10 (see Table 1) was found to have a low standardized loading of .22. Thus, the one-factor model was refit omitting item 10. In the 11-item dataset, a one factor model showed improved fit: *RMSEA* = .065 [.048, .082], *CFI* = .99, *TLI* = .99, and *SRMR* = .065. Each remaining item had a standardized loading greater than .40 and internal consistency remained strong (α = 0.91).

Convergent Validity

As hypothesized, parents' scores on the EDE-QS-P exhibited a significant and large correlation with their own children's scores on the EDE-Q (r = .69, p < .01). Medium correlations were found between the EDE-QS-P and the other two child-report measures: the GAD-7 (r = .37, p < .01) and PHQ-9 (r = .46, p < .001).

Criterion-Related Validity

The authors tested for violations of assumptions and found neither normality nor heteroskedasticity assumptions were violated. Although Levene's test for homogeneity of variance was significant, the variance ratio for the EDE-QS-P was found to be 1.79, which is below the rule of thumb (2) for significant heterogeneity of variance (Field, 2016). One-way ANCOVA found significant overall differences in EDE-QS-P scores across diagnoses, $F(7)$ = 22.49, p < .001, η_p^2 = .35 [ARFID$_M$ = 0.44 (0.58), AN$_M$ = 1.46 (0.71), BN$_M$ = 2.07 (0.76), BED$_M$ = 1.16 (0.78), OSFED$_M$ =1.61(0.78), USFED$_M$ = 0.99(0.73), other eating/weight problem$_M$ = 0.68 (0.96), no ED$_M$ = 0.48 (0.72)]. As hypothesized, parents of participants with a shape/weight ED (n = 204) scored significantly higher on the EDE-QS-P than those with a child with ARFID

(n = 72) according to an ANCOVA that adjusted for child age and gender, $F(1) = 74.90$, $p < .001$, $\eta_p^2 = .22$.[1]

Discussion

The aim of this study was to establish a preliminary validation the EDE-QS-P. In the initial 12-item version, item 10 demonstrated poor fit (factor loading = 0.225). This item assesses objective binge eating, which may not be well represented in our sample considering the younger age of participants (Hudson, 2007) and small proportion of individuals with a BN or BED diagnosis (< 10%). Additionally, binge eating behaviors are often secretive and concealed by those engaging in them (Bohon, 2019), and therefore parents may have found it difficult to identify these symptoms in their children. Considering this lack of fit and the presence of only one additional item (Item 9) that assesses binge eating, the EDE-QS-P may not be best suited for evaluation of this symptom. After removing this item, fit was improved and adequate, although the 95% confidence interval for RMSEA included .08 (Hu & Bentler, 1998). This may be due to the positive skew of the data, indicative of higher frequency and severity of ED symptoms, as would be expected in a clinical sample. He and colleagues (2021) found similarly mixed results for the fit of the one-factor model of the EDE-QS and noted that RMSEA may be a biased estimator for skewed data. Comparative fit measures (CFI, TLI) and SRMR all indicated good fit for the 11-item, one-factor model.

The 11-item version of the EDE-QS-P demonstrated strong internal consistency ($\alpha = .91$) and showed moderate convergent validity with child scores on the GAD-7 ($r = .37$) and PHQ-9 ($r = .46$). Consistent with our hypothesis, parent scores on the EDE-QS-P had a strong positive

[1] To account for violation of homogeneity of variance in the EDE-QS-P, sensitivity analyses were conducted using a Welch test (a t-test with no assumption of equal variances for the difference in the EDE-QS-P-11 between ARFID and other ED) using the EDE-QS-P with age and sex regressed out. The results of the sensitivity analysis demonstrated significant overall differences across diagnoses, t(172.39) = 8.99, p<.001, d = 1.06. This is consistent with the results of the one-way ANCOVA.

correlation with child scores on the EDE-Q (r = .69). Additionally, participants with a shape/weight ED scored significantly higher than those with ARFID on the 11-item EDE-QS-P, supporting the measure's criterion validity. Considering this, the EDE-QS-P is recommended as a parent-report measure for ED symptomatology involving shape/weight concerns and should not be used to rule out the possibility of an ARFID diagnosis. Taken together, these results provide preliminary evidence for the 11-item EDE-QS-P as a reliable and valid parent-report measure to assess ED symptomatology in children and adolescents.

Limitations

Several limitations of the current study should be considered. First, no other parent-report measure was used to assess convergent validity. Due to the dearth of brief parent-report measures for ED symptomatology and our limited ability to provide lengthier measures to parents before their child's initial medical appointment, we did not provide another parent-report measure to examine convergent validity. Second, it would have been advantageous to have children complete the EDE-QS to assess convergent validity more accurately with parent scores on the EDE-QS-P. The EDE-Q was ultimately selected for its clinical utility in providing a more comprehensive assessment of ED pathology. Future research should examine convergent validity between the self-report and parent-report versions of the EDE-QS and assess variation in convergence by item. This may provide information about which ED symptoms children and adolescents are most likely to conceal from their parents.

Third, the generalizability of this scale is limited due to the characteristics of our sample, which was recruited form an ED clinic, and included majority White (79.9%), cis-female (84%) children and adolescents, with a small proportion of BN or BED diagnoses (<10%). He and colleagues (2021) reported differential item functioning by gender for item 6 of the EDE-QS,

highlighting a need for further research on the psychometric properties of the EDE-QS-P for different subgroups. Future research should focus on the psychometric evaluation of the EDE-QS-P for those in community samples, males and gender diverse youth, and diverse ethnic/racial groups. Additionally, future studies should add gender inclusive language (they/them/their) to increase the inclusivity of the EDE-QS-P to gender diverse youth.

Fourth, since the EDE-QS-P was only administered at one time point, test-retest reliability was not assessed. Fifth, the EDE-QS-P is limited in its ability to assess binge eating and is not suited for the assessment of ARFID. In relation to this limitation, parents may find commenting on their child's internal states difficult as EDs can be secretive. The parent-report measure should be used as part of a multi-informant assessment in which the child also provides information about their symptoms.

Sixth, some measures used in this study (the GAD-7 and PHQ-9) are not recommended for use with individuals under age 12. These measures were originally selected based on the typical client population at the partial hospitalization program (adolescents and young adults), as well as their brevity, ease of use, and strength of psychometric properties. Only 12.2% of our study sample was under age 12 (ranging from 6.8-11.98 years). Future studies should confirm convergent validity of the EDE-QS-P with measures of depression and anxiety validated in those under age 12.

Finally, as is often the case in clinical settings, ED diagnoses were not confirmed using a fully structured interview such as the EDE. Rather, diagnoses were assigned by an adolescent medicine specialist, and then confirmed via chart review using a DSM-5 checklist created for this study.

Conclusion

To best serve the population of children and adolescents with EDs, it is important that parent measures be included in a multi-informant approach to clinical assessment. Notwithstanding study limitations, our findings indicate that the 11-item version of the EDE-QS-P may be a promising brief, parent-report measure of their child's ED symptomatology.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Disclosure of Interest Statement

The authors report there are no competing interests to declare.

Compliance with Ethical Standards

This study was performed in line with the principles of the Declaration of Helsinki. Approval was given by the Penn State Institutional Review Board (8749).

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Tables

Table 1. Factor loadings of the EDE-QS-P		
Item	12-Item Scale	11-Item Scale (Item 10 Removed)
Item 1 *"Has your child been deliberately trying to limit the amount of food she/he eats to influence her/his weight or shape (whether or not she/he succeeded)?"*	0.828	0.833
Item 2 *"Has your child gone for long periods of time (e.g., 8 or more waking hours) without eating anything at all in order to influence her/his weight or shape?"*	0.573	0.577
Item 3 *"Has thinking about food, eating, or calories made it very difficult for your child to concentrate on things she/he is interested in (such as school, following a conversation, or reading)?"*	0.638	0.638
Item 4 *"Has thinking about weight or shape made it very difficult for your child to concentrate on things she/he is interested in (such as school, following a conversation, or reading)?"*	0.750	0.749
Item 5 *"Has your child had a definite fear that she/he might gain weight?"*	0.872	0.874

Item 6 *"Has your child had a strong desire to lose weight?"*	0.857	0.855
Item 7 *"Has your child tried to control her/his weight or shape by making herself/himself sick (vomit) or taking laxatives?"*	0.426	0.423
Item 8 *"Has your child exercised in a driven or compulsive way as a means of controlling her/his weight, shape, or body fat, or to burn off calories?"*	0.532	0.532
Item 9 *"Has your child had a sense of having lost control over her/his eating (at the time that she/he were eating)?"*	0.450	0.437
Item 10 *"On how many of these days (i.e., days on which your child had a sense of having lost control over her/his eating) did your child eat what other people would regard as an unusually large amount of food in one go?"*	*0.225*	*Removed*
Item 11 *"Has your child's weight or shape influenced how she/he thinks about (judges) herself/himself as a person?"*	0.839	0.840
Item 12 *"How dissatisfied has your child been with her/his weight or shape?"*	0.777	0.776

Supplementary Table 1: EATING DISORDER EXAMINATION QUESTIONNAIRE – SHORT PARENT VERSION (EDE-QS-P)

Child's Name: _____ Parent's Name: _____ Date: _____

To the best of your abilities, answer the following questions about your child by circling the most appropriate response. Please respond to every question, even if you are unsure of the exact answer.

Estimate your child's current: Weight: _____ Height: _____

ON HOW MANY OF THE PAST 7 DAYS . . .	**0 days**	**1-2 days**	**3-5 days**	**6-7 days**
1. Has your child been deliberately trying to limit the amount of food she/he eats to influence her/his weight or shape (whether or not she/he succeeded)?	0	1	2	3
2. Has your child gone for long periods of time (e.g., 8 or more waking hours) without eating anything at all in order to influence her/his weight or shape?	0	1	2	3
3. Has thinking about food, eating, or calories				

made it very difficult for your child to concentrate on things she/he is interested in (such as school, following a conversation, or reading)?	0	1	2	3
4. Has thinking about weight or shape made it very difficult for your child to concentrate on things she/he is interested in (such as school, following a conversation, or reading)?	0	1	2	3
5. Has your child had a definite fear that she/he might gain weight?	0	1	2	3
6. Has your child had a strong desire to lose weight?	0	1	2	3
7. Has your child tried to control her/his weight or shape by making herself/himself sick (vomit) or taking laxatives?	0	1	2	3
8. Has your child exercised in a driven or compulsive way as a means of controlling her/his weight, shape, or body fat, or to burn off calories?	0	1	2	3
9. Has your child had a sense of having lost control				

over her/his eating (at the time that she/he were eating)?	0	1	2	3
10. On how many of these days *(i.e., days on which your child had a sense of having lost control over her/his eating*) did your child eat what other people would regard as an <u>unusually large amount of food in one go</u>?	0	1	2	3

OVER THE PAST 7 DAYS . . .	**Not at all**	**Slightly**	**Moderately**	**Markedly**
11. Has your child's weight or shape influenced how she/he thinks about (judges) herself/himself as a person?	0	1	2	3
12. How dissatisfied has your child been with her/his weight or shape?	0	1	2	3