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Health-Related Quality of Life among Adolescents with Eating Disorders

Running Head: QOL IN EATING DISORDERED ADOLESCENTS

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Abstract

Objective: Health-related quality of life (HRQoL) is an emerging area of research in eating disorders (EDs) that has not been examined in adolescents in detail. The aim of the current study is to investigate HRQoL in an adolescent ED sample, examining **the impact of ED symptoms on HRQoL**. **Methods:** Sixty-seven treatment-seeking adolescents **(57 females)** with anorexia nervosa (AN), bulimia nervosa (BN), or eating disorder not otherwise specified (EDNOS) completed self-report measures of HRQoL and ED symptoms. **Results:** Participants reported poorer HRQoL in mental health domains than in physical health domains. **Disordered attitudes, binge eating, and compensatory behaviours were associated with poorer mental health HRQoL, and body dissatisfaction was associated with poorer physical health HRQoL**. **Conclusion:** The current study assessed HRQoL among adolescents with EDs, finding several consistencies with the literature on adults with EDs. Future research should compare adolescents and adults with EDs on HRQoL.

Keywords: Adolescence; Eating disorders; Quality of life; Anorexia nervosa; Bulimia nervosa

Introduction

Eating disorders (EDs) are costly to treat [1], have high mortality rates [2,3], and are associated with impaired health-related quality of life (HRQoL). Measures of HRQoL assess an individual's subjective evaluation of his or her health and its impact on functioning in various domains, such as performance at work or physical activity. **Compared to measures that focus only on symptomatology,** an assessment of quality of life (QoL) may consider a broader range of factors that influence a person's well-being, such as adequacy of housing or quality of social relationships. Both **QoL and HRQoL** have become increasingly popular areas of mental health research, with such measurement covering areas that might be overlooked by measures that simply assess symptoms (e.g., see [4]). **Assessing HRQoL has important implications for clinical practice as well, as it represents a major goal of treatment in addition to symptom reduction (e.g., [5-7]).**

Several recent studies have found that ED sufferers report poorer HRQoL than healthy comparison groups, recovered ED patients, or those suffering from physical health problems such as angina (see [8], for a review). Quality of life in adults with EDs varies with body mass index (BMI), **showing a curvilinear relationship with QoL generally poorer at extremes of BMI (e.g., [9]). Gender may also moderate this relationship, with poorer QoL seen in obese women compared to obese males [10], and some limited findings also reported in ED samples (e.g., [11]).** Mental health domains have been found to be more affected by the presence of ED symptoms than physical health domains (e.g., [12]). In addition, ED symptoms may be differentially related to HRQoL. In a large community sample of young adult females, for example, Mond, Hay, Rodgers, Owen, and Mitchell [13] found that extreme dietary restriction for purposes of weight control was the best predictor of functional impairment among

disordered eating behaviors. **A similar study by Latner et al. [14] looked at the contribution of ED symptoms to impaired functioning in a sample of females (both clinical and non-clinical). In addition to finding some associations with ED behaviours (such as dietary restriction, laxative use, and binge eating), functional impairment was also affected by extreme levels of concern (often referred to as "overvaluation") with weight and shape. This recent work has highlighted the importance of assessing not only behavioural features of an ED, but also those of a cognitive, or attitudinal, nature.**

The majority of information available on HRQoL among ED patients is based on studies of adults, with younger samples seldom being assessed. In adolescents, the finding that obesity is frequently associated with poorer HRQoL appears well-established (e.g., [15,16]), but less is known about HRQoL and EDs among adolescents. Some studies have found associations between ED behaviors and impaired HRQoL [17,18]. Herpertz-Dahlmann and colleagues [19] provide data on 1,895 individuals aged 11-17 selected from a nationally representative sample of German families. Alongside other self-report measures, participants completed brief measures of ED symptoms (the SCOFF; [20]) and HRQoL (the KINDL-R; [21]). Associations were found between ED symptoms and general psychopathology, as well as poorer HRQoL in adolescents with self-reported disordered eating.

There is also some evidence that adolescents with EDs (including sub-threshold forms) show greater functional impairment than healthy controls (e.g., [22]). Thus it may be the case that ED behaviours **and attitudes** are associated with poorer HRQoL in adolescents, although few studies in this area have been conducted on clinical samples, despite the fact that EDs typically begin during adolescence [23]. Studies on HRQoL among individuals with EDs have typically grouped younger patients and adults together, but there is good reason to study

adolescents as a distinct group [24]. Differences have been found between younger and older

non-ED populations, with young adolescents generally reporting less impaired HRQoL

compared to older adolescents and adults (e.g., [25,26]). In addition, adolescents' perception of

their HRQoL may be different from their adult counterparts, and the effects of an ED during a

time of dramatic change, such as adolescence, may differ from the impact of an ED on adults.

Information obtained on younger samples may also give clues as to the developmental trajectory

of EDs, and what factors are important in an adolescent's perception of his or her HRQoL.

Furthermore, as in the treatment of adult EDs, where assessment of HRQoL is an emerging

area, more information about HRQoL can help to provide an index of how ED symptoms

impact functioning and determine if subjective improvements in quality of life accompany

improvements in symptoms [4,6].

As the presence of any disordered eating has been suggested to negatively impact

HRQoL ([19,27]; see also [28]), the purpose of the present study was to examine the subjective

impact of the presence or absence of various ED behaviours and attitudes on HRQoL among a

clinical sample of eating disordered adolescents. **Based on previous research (e.g., [9]; see**

also [8]), the variables of BMI and gender will be controlled for in these analyses.

Method

Participants and Procedure

Sixty-seven adolescents **(n = 57 female; 85.1%; age range = 11 − 18 years)** seeking

outpatient treatment at multiple sites (University of North Dakota, ND, The Center for Balanced

Living, OH, University of South Florida, FL, and The University of Chicago, IL) between 2000

and 2004 were included in this study. The majority of sites treat **primarily adult patients, but**

all were referred for disordered eating and completed self-report assessment measures at baseline. This study was approved by Institutional Review Boards of the participating institutions. Demographic data for the total sample are shown in Table 1. **Five individuals (7.5%) met criteria for anorexia nervosa (AN), 18 (26.9%) for bulimia nervosa (BN), and the remainder (n = 44; 65.7%) were classified as eating disorder not otherwise specified (EDNOS); that is, individuals with an ED of clinical severity not meeting full criteria for either AN or BN.**

[Insert Table 1 about here]

Measures

SF-36 Health Survey [29]. The SF-36 is a widely-used and well-validated 36-item self-report measure that assesses HRQoL across eight domains**: (a) Physical Functioning assesses the impact of health on a range of physical activities, (b) Role-Physical assesses limitations in daily activities as a result of physical health, (c) Role-Emotional assesses limitations in daily activities as a result of emotional health, (d) Social Functioning measures the impact of physical health on social functioning, (e) Mental Health measures the presence and severity of depression and anxiety, (f) Vitality measures an individual's energy level and level of fatigue, (g) Bodily Pain assesses the presence and degree of pain and the extent to which bodily pain has interfered with daily functioning, and (h) General Health assesses an individual's estimate of his or her overall physical health.** Two summary scores can be computed measuring physical HRQoL (Physical Health Composite Score, PCS) and emotional HRQoL (Mental Health Composite Score, MCS), which were used in the current study. Summary scores on the SF-36 are norm-based (from a US population sample) and transformed to

have a mean of 50 and standard deviation of 10 (range = 0 – 100), with higher scores indicating better functioning. **Adolescent norms for a Swedish population are also available [25], with data from a similar sample that permit some comparison. As the SF-36 summary scores are made up of weighted combinations of the eight subscales, and are therefore closely related, it was decided to only include the MCS and PCS in order to decrease the risk of Type I error. The two summary scores were therefore used to provide broad measures of physical and emotional well-being [30] that have been shown as useful in ED samples [12,31].** For the current sample, Cronbach's α was .90 for the PCS and .93 for the MCS.

Eating Disorder Examination-Questionnaire (EDE-Q) [32]. The EDE-Q is a widely-used 36-item self-report measure that asks respondents to report symptom occurrence in the past 28 days. It consists of four subscales: Restraint; Eating Concern; Shape Concern; and Weight Concern, as well as a Global score. **These are scored on a 0 – 6 scale, with greater scores indicating more frequent experience of those symptoms. The measure also assesses behavioral symptoms including binge eating, and distinguishes between objective binge episodes (OBEs; where a large amount of food is consumed with an associated loss of control), and subjective binge episodes (SBEs; where a 'normal'-sized, or even small, amount of food is consumed with an associated loss of control). The EDE-Q also** provides a measure of compensatory behaviors, namely laxative use, diuretic use, self-induced vomiting, and compulsive exercise. It demonstrates good psychometric properties [33] and has been supported for use with adolescent populations [34,35]. For the current sample, Cronbach's α was as follows: Restraint = .82; Eating Concern = .81; Shape Concern = .92; Weight Concern = .83; and Global score = .95.

In addition, Q2 ("Have you gone for long periods of time [8 waking hours or more] without eating anything at all to influence your shape or weight?") was used as a measure of extreme dietary restriction (e.g., [13]; see also [36]). '**Undue influence of weight and shape' was also included as an eating disorder attitudinal variable. Although there have been different approaches to defining this (e.g., [14,37-40]), the definition used in the current study was a score ≥5 (indicating that weight or shape affected self-worth more than moderately) on either or both of the two questions used to indicate undue influence (cf. [39,40]).** Participants' self-reported height and weight were used to calculate BMI.

In addition to assessing ED symptomatology, the EDE-Q was also used to assign provisional diagnoses. Given the small sample sizes for the AN and BN groups, statistical comparisons between diagnostic groups were not made.

Statistical Analyses

To explore relationships between ED **symptoms** and HRQoL, participants were first categorised according to the presence or absence of ED behaviors in the previous 28 days (i.e., OBEs, SBEs, self-induced vomiting, laxative abuse, diuretic abuse, driven exercise, and extreme dietary restriction), creating "dummy variables," coded 1 for presence of a behavior and 0 for absence. **For ED behaviors, any presence of that behaviour within the last 28 days was coded as present. As dietary restriction is rated on a 0 – 6 scale indicative of frequency, a score ≥1 was taken to indicate presence of that symptom. As noted above, a score ≥5 on either question relating to importance of weight or shape in self-evaluation (also rated on a 0 – 6 scale) was used to provide a measure of overvaluation of weight and shape.** Due to non-normal distribution of some data, Wilcoxon signed rank or Mann Whitney *U* tests were

conducted in order to test for differences between groups, although means and standard deviations are presented for descriptive purposes. Effect sizes (using *r*; see [41]) were also computed. Although it is different from other measures of effect size (e.g., Cohen's *d*), the two can be converted (e.g., see [42]). Generally, a value of *r* of 0.1 is considered a small effect size, 0.3 moderate, and 0.5 large. To further investigate the role of different ED behaviors in predicting HRQoL, linear regressions were carried out, using the dummy-coded variables representing the presence/absence of each ED behavior. **Two regressions were conducted, using measures of quality of life (MCS and PCS) as the dependent variables, and all ED symptoms obtained via self-report as independent variables (i.e., OBEs, SBEs, self-induced vomiting, laxative abuse, diuretic abuse, driven exercise, extreme dietary restriction, and overvaluation of weight and shape).** In the first step, possible confounds (BMI, gender) were entered, followed by the predictor variables in the second step.

Although inspection of the correlation matrix of the predictor variables showed some inter-correlations (i.e, low levels of collinearity were observed), the assumption of no perfect multicollinearity was met for all models; although many of the predictor variables were significantly correlated, none so above an R^2 cutoff of 0.8 [43]. The highest correlation was observed between OBEs and self-induced vomiting ($R^2 = .64$). Similarly, the variance inflation factors (VIFs) were <10 (the average VIF was also close to 1) and tolerance values did not fall below 0.2. The Durbin–Watson test for autocorrelations remained close to 2, confirming that the independent errors assumption was not violated. Inspection of plots suggested that the standardised residuals were acceptable and error terms were normally distributed for analyses involving MCS scores, although there was

some skew in PCS scores. A significance level of 0.05 was employed for all tests, conducted

using SPSS version 18.0.

Results

HRQoL Impairment

Scores were lower across the entire sample for the MCS than the PCS (mean difference =

19.66, $Z = -5.653$, $p < .001$) (see Table 1). Table 2 presents data for SF-36 composite scores

according to the presence and absence of eating disorder behaviours (note: only two individuals

indicated use of diuretics for the purposes of weight / shape control, so this variable is not

reported). **The number of individuals endorsing those behaviors is also shown.**

[Insert Table 2 about here]

Results from these analyses suggest that the presence of all forms of eating disorder

symptoms were associated with lower MCS scores. **Only presence of overvaluation of weight**

and shape was associated with lower PCS scores, **although these remained higher than**

norms from a healthy adolescent population. Effect sizes ranged from 0.26 (OBEs) to 0.**68**

(overvaluation of weight or shape), i.e., moderate-to-large effect sizes. Results of the multiple

regressions are shown in Tables 3 and 4, indicating that presence of extreme dietary restriction

(going without food for 8 or more waking hours) **and overvaluation of weight or shape**

significantly predicted poorer MCS scores. **Similarly, the results for the PCS show that BMI**

emerged as a significant predictor, alongside overvaluation of weight or shape.

[Insert Tables 3 and 4 about here]

Discussion

The purpose of the current study was to examine **the impact of different ED symptoms on quality of life in a clinical sample** of adolescents with EDs, an area that has received limited research attention. The adolescent group as a whole had greater deficits in the mental health component of HRQoL than the physical health component. Similar findings have been reported in the literature on adults [12], suggesting that ED behaviors affect mental health HRQoL more so than physical health HRQoL across the lifespan, although future work might more directly compare adolescent and adult samples. **However, physical impairments may have been less evident in the current study as participants were all recruited from outpatient centers, and may be more likely to occur in samples with extreme BMIs or patients requiring inpatient treatment (e.g., [44,45]).**

The current study also found that the presence of disordered eating symptoms (binge eating, self-induced vomiting, laxative use, compulsive exercise, extreme dietary restriction, **and overvaluation of weight or shape**) was consistently associated with poorer mental health HRQoL but not physical health HRQoL. **Comparison with norms from a healthy adolescent population in Sweden [25] suggests that physical well-being is comparatively high, whereas emotional well-being is impaired in the presence of ED symptoms [8,9].** It is possible that adolescents have not suffered from an ED long enough to experience the negative physical health consequences of these disorders, or may have limited insight into these consequences. However, similar findings among adults suggest that generic measures of HRQoL, such as the SF-36, may not capture the physical health-related consequences of disordered eating **[5,12]**. Future studies may wish to assess ED-specific physical health consequences, particularly those that may be of concern to adolescents (e.g., loss of hair, brittle nails, damage to teeth), **or include measures that are more sensitive to changes in physical well-being**.

In multivariate analyses **when controlling for BMI and gender**, presence of extreme dietary restriction **and the overvaluation of weight or shape were significant predictors** of functional impairment **in the mental health domain**, partially replicating the findings of Mond et al. [13] (see also [39,40,46]), who used comparable measures of ED pathology and HRQoL in a community sample of young adult females **(see also [14]).** The current study used a different cutoff for the presence of extreme dietary restriction (any restriction in the past 28 days) than Mond et al. (*daily* restriction over the past 28 days). A more stringent cutoff (i.e., more frequent ED behaviors) may have yielded different results. However, the finding of a significant association is particularly remarkable given the somewhat lenient threshold used in the current study, and troubling given the prevalence of restrictive eating practices among adolescents [47]. **Similarly, the finding that overvaluation of weight or shape is also associated with poorer QoL supports findings from adult samples, and is particularly similar to the findings of Latner et al [14], who found that this variable was "significantly associated with physical QoL impairment after controlling for the influence of BMI and other ED features" (p. 595). Similarly, it is** worth noting that many of the mental health component HRQoL scores of adolescents who exhibited disordered eating behavior were similar to adults with eating disorders [12,48].

Regarding the findings relating to physical health impairment (PCS scores), both BMI and overvaluation of weight and shape predicted poorer PCS scores, similar to the findings of Latner et al. [14], who also found that laxative use occurring at least weekly emerged as a significant predictor. This finding supports the argument that the presence of 'undue influence' of weight or shape is associated with reduced functional impairment [39], and it may also be the case that the presence of overweight and weight or shape

concerns is particularly detrimental to quality of life in certain samples (e.g., [49]).
However, findings regarding the PCS in particular should be interpreted with caution due
to possible violations of the assumptions of the methods used.

The current findings also partially replicate those of Herpertz-Dahlmann et al. [19], who
reported moderate effect sizes (as were seen in the current study) regarding the influence of
disordered eating on HRQoL in a large non-clinical sample of adolescents. Tobin, Griffing, and
Griffing [50] found that dietary restriction (compared to other compensatory behaviors) was the
most robust predictor of depression in a sample of women with BN, similar to the findings of
Mond et al. [13]. **Further, the impact of extreme dietary restriction on HRQoL in the**
current study highlights the importance of considering non-purging compensatory
behaviors in individuals with EDs, and the need for more research into subtyping purging
vs. non-purging forms of EDs [13; see 51]). Indeed, this has been partly reflected in the
most recent edition of the DSM, which has discarded the distinction between these subtypes
[51,52].

The impact of overvaluation of weight and shape on functional impairment (e.g.,
[49]) emphasizes the importance of addressing cognitive symptoms in treatment programs
for EDs (e.g., [53]). It is possible that this variable affects both physical and emotional well-
being, or it may be related to other features, such as personality, that may be associated
with a negative interpretation of physical impairment [see 14]. Alternatively, presence of
significant weight or shape concerns may exaggerate the impact of behavioral ED
symptoms, or may be associated with more general beliefs about illness, impairment, or the
severity of one's illness.

The current study had several limitations. Information on duration of illness was not available, making it difficult to assess to what extent this variable may have affected HRQoL. It is possible that HRQoL worsens the longer the ED is present **[54] or**, alternatively, it is possible that HRQoL improves or remains the same with illness duration as an individual adapts to the demands of a chronic illness. Future studies should examine this further, **and should include information on comorbid psychopathology (e.g., anxiety, depression) and medical conditions, which were not included in the current study.**

In addition, the modest sample sizes and use of non-parametric analyses in the current study limit the conclusions that can be drawn**, and, while the study controlled for both BMI and gender, the design did not allow for more detailed examination of gender differences or comparison between ED diagnoses**. Furthermore, the use of self-report, rather than interview-based, data may limit the conclusions that can be drawn.

Notwithstanding these limitations, this study is one of the first to examine HRQoL in adolescents with EDs, and offers a useful preliminary look at adolescents' perceptions of their HRQoL, suggesting some significant similarities with adult samples.

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Table 1. Characteristics of the current sample

	N (%) or Mean (SD)
	Total Sample
Age, years	16.5 (2.0)
Gender, female	57 (85.1%)
BMI	19.68 (5.36)
Ethnicity	
Non-Hispanic White	61 (91%)
African-American	2 (3%)
Hispanic	3 (4.5%)
EDE-Q Global	3.49 (1.69)
PCS	69.26 (19.74)
MCS	49.60 (25.18)

Note: BMI = body mass index; EDE-Q Global = Eating Disorder Examination–Questionnaire

Global score; PCS = Physical Health Composite Score; MCS = Mental Health Composite Score.

Note: One participant did not provide information on ethnicity.

Table 2. Means and standard deviations of SF-36 composite scores according to presence or absence of ED behaviours.

Variable		Mean (SD)				
		Present	Absent	*U*	Effect size (*r*)	*p*
OBEs	PCS	68.04 (21.00)	70.19 (19.14)	*508.0*	*-0.05*	.680
	MCS	42.77 (19.48)	55.84 (28.11)	376.5	-0.26	**.035**
n		30 **(45.5%)**	36 **(54.5%)**			
SBEs	PCS	65.19 (18.32)	72.28 (21.22)	*382.0*	*-0.21*	.082
	MCS	39.47 (20.27)	58.39 (26.03)	297.5	-0.36	**.004**
n		33 **(51.6%)**	31 **(48.4%)**			
SIV	PCS	69.31 (18.13)	68.86 (21.86)	*499.0*	*-0.02*	.882
	MCS	39.69 (19.90)	59.25 (25.75)	274.5	-0.40	**.002**
n		30 **(46.9%)**	34 **(53.1%)**			
Laxatives	PCS	65.28 (15.85)	70.35 (20.74)	*228.5*	*-0.13*	.298
	MCS	36.57 (17.18)	53.39 (25.59)	172.5	-0.26	**.040**
n		11 **(17.5%)**	52 **(82.5%)**			
Exercise	PCS	68.17 (17.96)	70.10 (22.43)	*451.5*	*-0.09*	.431
	MCS	43.32 (21.93)	57.74 (26.45)	342.5	-0.28	**.024**
n		34 **(53.1%)**	30 **(46.9%)**			
Extreme dietary restriction	PCS	67.38 (18.58)	73.10 (22.44)	*367.0*	*-0.18*	.142
	MCS	39.73 (21.38)	70.12 (18.04)	136.0	-0.58	**.000**
n		43 **(66.1%)**	22 **(33.9%)**			
Overvaluation of weight or shape	PCS	62.45 (17.62)	78.15 (19.88)	240.0	-0.44	**.000**

MCS	35.35 (17.49)	70.27 (19.03)	99.0	-0.68	**.000**
n	37 **(57.8%)**	27 **(42.2%)**			

Note: OBEs = objective bulimic episodes; SBEs = subjective bulimic episodes; SIV = self-induced vomiting; PCS = Physical Health Composite Score; MCS = Mental Health Composite Score

Table 3. Multiple regression analysis of eating disorder symptoms predicting MCS scores

Variable	B	SE	*B*	t	p
Constant	84.233	15.837	-	5.319	**< .001**
Gender	-2.218	7.034	-.034	-.315	.754
BMI	-.545	.525	-.125	-1.038	.304
Presence of					
OBEs	6.048	7.216	.125	.838	.406
SBEs	-5.276	5.886	-.109	-.896	.375
SIV	-4.063	6.572	-.084	-.618	.539
Laxatives	3.257	7.268	.052	.448	.656
Compulsive exercise	-1.730	5.744	-.036	-.301	.765
Extreme dietary restriction	-16.226	7.497	-.319	-2.164	**.036**
Overvaluation of weight or shape	-21.497	6.740	-.441	-3.189	**.003**

Note: $R^2 = 0.454$, $F(9,46) = 6.072$, $p < .001$. OBEs = objective bulimic episodes; SBEs = subjective bulimic episodes; SIV = self-induced vomiting

Table 4. Multiple regression analysis of eating disorder symptoms predicting PCS scores

Variable	B	SE	*B*	t	p
Constant	99.665	14.647	-	6.805	**< .001**
Gender	-2.274	6.505	-.043	-.350	.728
BMI	-1.580	.485	-.449	-3.256	**.002**
Presence of					
OBEs	10.743	6.673	.277	1.610	.114
SBEs	-4.367	5.444	-.113	-.802	.427
SIV	1.819	6.078	.047	.299	.766
Laxatives	1.249	6.722	.025	.186	.853
Compulsive exercise	2.568	5.312	.066	.483	.631
Extreme dietary restriction	.179	6.933	.004	.026	.980
Overvaluation of weight or shape	-20.011	6.234	-.510	-3.210	**.002**

Note: $R^2 = 0.396$, $F(7,46) = 3.350$, $p < .005$. OBEs = objective bulimic episodes; SBEs = subjective bulimic episodes; SIV = self-induced vomiting