



# Quality of life of adolescent males with Attention-Deficit Hyperactivity Disorder

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Most psychosocial research on attention-deficit/hyperactivity disorder (ADHD) has focused on deficits in school, family, or behavioral functioning without incorporating perceived quality of life (QoL) or the adolescents' perspective. The Youth Quality of Life Instrument—Research Version (YQOL-R), was used to assess self-perceived QoL in a community sample of adolescents aged 11–18 years.

Fifty-five adolescent males with a clinical diagnosis of ADHD were compared to a group of 107 adolescents with no chronic conditions (NCC) and a group of 52 adolescents with mobility impairments (MI). The adolescents with ADHD reported significantly lower perceived QoL scores, particularly in the Self and Relationship domains, than the NCC group. Their scores were similar to those from the group with MI, a group previously shown to have a substandard QoL. Interventions to improve self-esteem and social interactions might use QoL outcomes in evaluating effectiveness.

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In the United States, attention-deficit/hyperactivity disorder (ADHD) is one of the most common disorders for which children are referred to family practice, pediatrics, neurology, and child psychiatry (NIH Consensus Statement, 2000). It has been established that approximately 31% of these children will continue to qualify for the diagnosis into adolescence (Barkley, DuPaul, & McMurray, 1990). For youth with ADHD, negotiating the challenges presented during this developmental period is complicated by medication regimens and being unable to focus their attention (Varley, 1999), hindering their development of a healthy sense of self and self-reliance. In some cases, these adolescents describe themselves in terms of their condition and incorporate the negative cumulative effects of ADHD into their development of their sense of self (Krueger & Kendall, 2001). Recognizing that a child's total well being is affected by their illness, and treating the "whole child," therefore, is important (Harding, 2001).

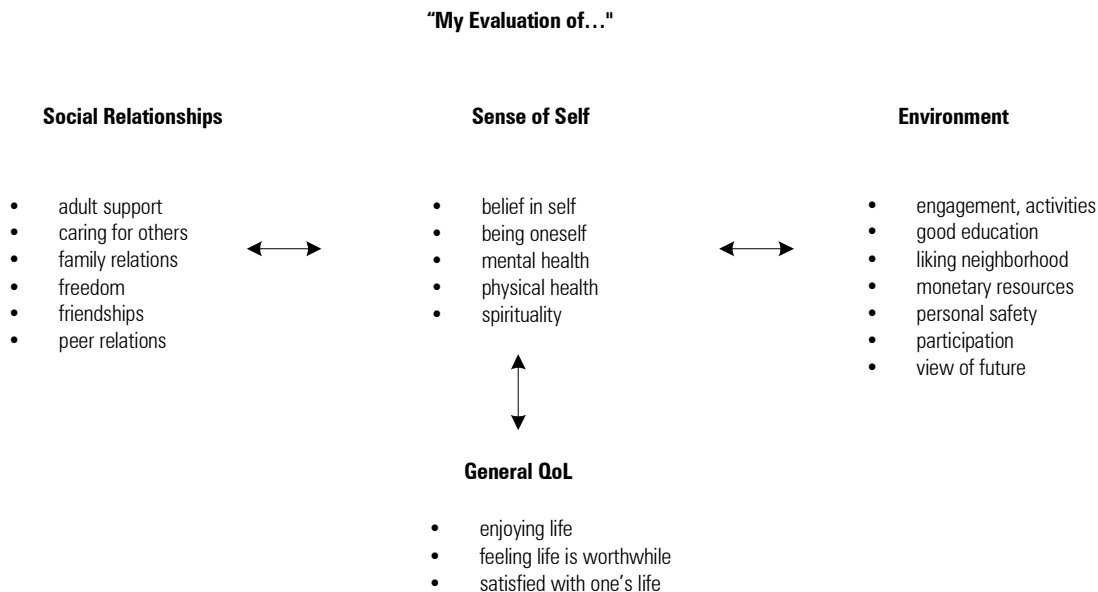
One approach to measuring the impact of treating the "whole child" is multidimensional QoL assessment. QoL is a concept that encompasses all aspects of a person's well-being including physical, psychological, and social, as well as aspects of the environment and their standard of living (Harding, 2001). QoL measures can augment the traditional focus on diagnosis and symptom management by providing information regarding both positive and negative aspects of life from the youth's own perspective. The need for patient perspective on the impact of disease and medical

treatment was recently noted by the American Academy of Pediatrics (American Academy of Pediatrics, 2001).

Perceived QoL can be used to determine the subjective experience of living with a health condition, affect planning for the future, and potentially affect acceptance and adherence to treatment. In 1997, the Youth Quality of Life Group at the University of Washington designed a generic instrument to assess adolescent self-reported QoL (Edwards, Huebner, Connell & Patrick, 2002) based on an adaptation of the World Health Organization Quality of Life Group's definition of QoL as "an individual's perception of their position in life in the context of the culture and value systems in which they live, in relation to their goals, expectations, standards, and concerns" (Bonomi, Patrick, Bushnell & Martin, 2000; WHOQoL Group, 1994). The instrument was developed using a "grounded-theory" approach (Glaser & Strauss, 1967) to specify the development of a conceptually-rich, integrated model of QoL derived from adolescent interviews and focus groups with parents and adolescent-health professionals. The conceptual model developed from this process is presented in Figure 1.

The YQOL-R is divided into two types of items: the "perceptual," which are things known only to the adolescent him/herself (e.g., "I feel that life is worthwhile"), and the "contextual," which are things potentially verifiable (e.g., "During the past month, how often did you spend time with a friend having a good time outside of school?").

**Figure 1. YQOL-R Conceptual Model**



The 41 perceptual items form the heart of the YQOL-R and are used to create 4 domain scores: Self, Relationships, Environment, and General QoL that correspond to the conceptual model and a total score. The Self domain provides a perspective on the adolescent's sense of who they are, and is comprised of items such as "I feel good about myself." The Relationship domain assesses both family relationships (including items such as "I feel I am getting along with my parents or guardians") and peer relationships (e.g., "I am satisfied with my social life"). The Environment domain includes items such as "I feel my life is full of interesting things to do."

The 15 contextual items are used as individual indicators. These are important for assessing objective factors that may impact the youth's perception of their QoL. Contextual items can be used as surrogates to assess the impact of potential interventions (i.e., if we could equate the amount of time that adolescents with ADHD spend having a good time with friends, with that of their non-ADHD peers, would this improve their QoL?). In the initial validation of the instrument, the YQOL-R displayed good psychometric properties (see Patrick, Edwards, & Topolski, 2002) with the ability to discriminate between known groups. The psychometric characteristics of this instrument are comparable with those of other health-related QoL instruments currently in use in medical settings, including The Child Health and Illness Profile-Adolescent Edition (Starfield et al., 1995), The Child Health Questionnaire (Landgraf, Abetz & Ware, 1996), the Pediatric Asthma

Quality of Life Questionnaire (Juniper, et al., 1996), the Pediatric Oncology Quality of Life Scale (Goodwin, Boggs, & Graham-Pole, 1994), the Quality of Life Profile-Adolescent Version (Raphael, D., Rukholm, Brown, Hill-Bailey, & Donato, 1996), the Quality of Well Being Scale (Bradlyn, Harris, Warner, Ritchey, & Zaboy, 1993), and was validated against the generic KINDL (Munich Quality of Life Questionnaire for Children; Ravens-Sieberer & Bullinger, 1998).

Previously published studies of the global concept of QoL and ADHD have not been noted. Rather, previous studies focused mainly on the behavioral adjustment patterns of adolescents with ADHD, noting that adolescents with ADHD showed more behavioral, emotional, academic, and social deficits (Barkley, Anastopoulos, Guevremont, & Fletcher, 1991; Barkley et al., 1990; Biederman, Mick, & Faraone, 1998; Weiss & Hechtman, 1993; Wilson & Marcotte, 1996) and generally reported greater depressive symptomatology (Treuting & Hinshaw, 2001) and more antisocial acts than community control groups (Barkley, et al., 1991).

It was also noted that children diagnosed with ADHD plus comorbid anxiety or depression experience higher levels of coexisting life stresses and family risk factors (i.e., parental psychopathology) than children with a diagnosis of ADHD alone (Jensen, Shervette, Xenakis, & Richters, 1993). Greene and colleagues (1996) suggested that the expression of symptoms of ADHD may result in "social disability" as expressed by a

deviation in social skills from what would be expected from youth based upon intelligence scores. These studies suggest that adolescents with ADHD may experience a substandard QoL.

Defining a “good” QoL in pediatric populations is difficult because of two significant hindrances: (a) no consensus as to what constitutes “health” in children currently exists, and (b) children’s QoL is a moving target as they are constantly developing and changing (Marra, Levine, McKerrow, & Carleton, 1996). To put the QoL of adolescents with ADHD into context, we chose to compare their QoL scores to adolescents without a diagnosed condition to obtain a comparison with a “standard” group, and to a group of adolescents with mobility impairments who have previously been shown to have a “substandard” QoL. A “no chronic condition” group was a logical control group for assessing departure from a “good” QoL. This, however, does not provide a reference for how far from “good” their QoL might be. A review of the literature revealed that among adults, those with mobility limitations generally reported the poorest QoL when compared with “well” adults, adults with other chronic conditions, adults with terminal cancer, stroke survivors, nursing home residents, and adults with HIV/AIDS (Patrick, Kinne, Engelberg & Pearlman, 2000). In a study with adolescents, Edwards, Patrick, & Topolski (2003) observed that adolescents with self-reported physical and emotional/behavioral disabilities reported lower QoL scores than their peers without disabilities. Although mobility impairment per se was not ascertained, an analysis of a subsample of these youth with self-reported physical disabilities resulting in activity limitations revealed that these youth reported the lowest QoL scores compared with those with reported emotional/behavioral disabilities or no disability (unpublished data). Thus, to provide a context for a substandard or “poor” quality of life, adolescents with mobility impairments were also used as a comparison group in this study.

Epidemiological studies suggest that the ratio of males to females with ADHD is approximately 3:1 (Gaub & Carlson, 1997), the ratio of males to females seen in clinics, however, is approximately 10:1 (Arnold, 1996). Because of the relatively low prevalence of females seen in clinical settings and funding restraints, the data presented in this study are based on only male adolescents with ADHD. The objectives of this study were to (a) investigate the relationship between QoL and attention-deficit hyperactivity/disorder (ADHD) in 11 to 18-year-old males who were being treated by a clinician for ADHD by comparing these youth with a group of adolescents without a diagnosed chronic condition and a group of adolescents with mobility impairments, and (b) investigate the relationship between QoL and severity of

self-reported ADHD symptoms among the ADHD adolescents.

## Methods

### Participants

Sixty-eight male adolescents ages 11–18 were recruited from ADHD specialty clinics in the greater Seattle area. Adolescents in these clinics were diagnosed using DSM-IV criteria based on information obtained from parents, teachers, and adolescents using standardized instruments such as the Child Behavior Checklist (Achenbach & Edelbrock, 1983) and the Attention Deficit Disorder Evaluation Scale (McCarney, 1989). Diagnoses were made by either child psychiatrists or pediatricians with training in adolescent medicine and mental health, or who specialize in the treatment of ADHD.

Both parents/guardians and adolescents completed consent/assent forms. Parents gave formal written consent for the adolescents’ physicians to release diagnostic and treatment information. Adolescents received a \$20 reimbursement for participation in the study. In the clinic setting, adolescents and their parents were given a brief description of the study including purpose and procedures by clinic personnel, and were asked for their permission for the study recruiter to call them with more detailed information. They were informed that their medical care would be unaffected whether they participated in the study or not. Most gave permission to be contacted, and approximately one-third of those referred were enrolled in the study, with the remainder being either ineligible or uninterested. The study recruiter conducted a telephone screen with the parents to solicit age, reading level, as well as a brief health history for the adolescent (see parent telephone screen in Screening Instruments and Measures section for details). The Conners’ ADHD/DSM-IV Adolescent Instrument–Parent Version (CADS–P, Conners, 1997) was administered as part of this screen. Adolescents meeting the age and reading criteria were then assigned to the appropriate study group based on the information received from the parent. In cases where there were coexisting chronic conditions, the parent’s report of the condition with the greatest impact was used to assign to the study group. The ADHD group was all male by design of the study, due to funding restraints and the relatively low prevalence of females in treatment.

Adolescents in the comparison groups were recruited in the Seattle, Washington area from specialty clinics for treating mobility impairments, adolescent health clinics at the University of Washington and other health care organizations, and through ads in local newspapers. Clinic

recruitment, procedures for consent/assent, formal written consent for the adolescents' physicians to release diagnostic and treatment information, and adolescent reimbursements for participation were the same as for the ADHD group. Some adolescents in the NCC group saw the ad in the newspaper and called in. For those adolescents, the recruiter asked to speak with their parent and obtained permission to provide additional information about the study. This study was conducted with approval from the institutional review boards at the University of Washington and Children's Hospital and Regional Medical Center in Seattle.

## Screening Instruments and Measures

**Parent Telephone Screen.** Prior to enrollment, the study recruiter conducted a telephone screening interview with a parent or guardian. Data collected in this interview included the adolescent's (a) age; (b) grade in school; (c) ability to read English at the 6th grade level (yes/no); (d) attendance in special classes at school (remedial or advanced); (e) history of diagnoses of ADHD, depression, or other mental health conditions; (f) past and current treatment for ADHD or depression (medication, counseling); (g) presence/absence of a mobility-impairing disability; and (h) if more than one clinical condition present, which in the parent's estimation had the greatest current impact upon the adolescents's life.

**Verification and Severity Rating Form (VSR).** The VSR was developed for this study to confirm the assignment of participants to design cells. The form was sent to clinicians identified by the parent or guardian as either the primary care physician or the clinician who referred the adolescent to the study. Clinicians were instructed to indicate the presence or absence of (a) attention-deficit/hyperactivity disorder, (b) clinical depression, (c) mobility impairing physical disabilities or chronic conditions, and (d) other physical or mental health diagnoses. Clinicians were instructed to provide a rating of severity from 1 (normal, not ill) to 7 (very severely ill) on the Clinician Global Impression of Severity (CGI-S; Guy, 1976), and to indicate the type of treatment for each condition mentioned.

**Youth Quality of Life Instrument-Research Version (YQOL-R).** This instrument assesses important areas of young people's lives as previously defined by adolescents themselves, their parents, their teachers, and health care providers (Edwards et al., 2002). The YQOL-R is a self-report paper-and-pencil instrument. A research assistant who was available to answer questions and to ensure the instrument was completed appropriately administered it individually with supervision. The instrument took an average of 15 minutes for the respondents to complete. The YQOL-R

is readable at the U.S. 4<sup>th</sup> grade reading level, and an inclusion criterion for enrollment was the ability to read at least at the 6<sup>th</sup> grade level, as reported by parent or guardian during a telephone screen interview. The YQOL-R consists of 41 perceptual and 15 contextual items. Perceptual items are those known only to the adolescents themselves, and cannot be observed by others, while contextual items are those that are potentially verifiable by others. In the validation of this instrument, item and factor analyses confirmed the hypothesized conceptual model derived from previous qualitative research. The scales of the YQOL-R showed acceptable internal consistency (Cronbach's alpha = 0.77 to 0.96), reproducibility (ICCs = 0.74 to 0.85), expected associations with other constructs (depression, another QoL measure), and ability to distinguish between known groups.

**Conners' ADHD/DSM-IV Scale (CADS; Conners, 1997).** The CADS is a self- and proxy-rated (parent, teacher) symptom oriented scale. The scale discriminates youth with the psychiatric diagnoses of ADHD predominantly inattentive, ADHD predominantly hyperactive-impulsive, and combined attention-deficit/hyperactivity disorder, as opposed to those with other psychiatric conditions or "normals." The CADS has been extensively validated, and is an acceptable index of the severity of ADHD. It is designed for youth ages 12-17. Both parent (CADS-P) and self-report (CADS-A) versions were employed in this study. The parent report was administered via telephone as part of the screening interview if the parent reported that a clinician had diagnosed the adolescent with ADHD.

**Children's Depression Inventory (CDI; Kovacs, 1992).** The CDI is a self-rated symptom oriented instrument. The instrument discriminates children and adolescents with the psychiatric diagnosis of major depressive or dysthymic disorder, as opposed to those with other psychiatric conditions or "normals." It is sensitive to changes in depression over time and is an acceptable index of the severity of the depressive disorder. The CDI has been extensively validated and is designed for children and adolescents ages 7-17.

**Demographics.** Demographic data collected were gender, ethnicity, age, last grade completed in school, parental education level, and family configuration (with whom the adolescent lives).

## Results

### Descriptive Statistics

Data regarding the entire sample are shown in Table 1. The ethnic mix of the sample was representative of the Puget Sound region of Washington (U.S. Census Bureau,

2000). The mean age for the sample was 14.8 years. The mean age for all three groups differed significantly,  $F(2,225) = 15.69, p = .000$  with the ADHD group being the youngest and the MI group being the oldest. Sixty-eight percent of the sample lived with both biological parents. In 76% of the families, the parents had some college or were college graduates.

VSR forms were completed by clinicians for 100% of the ADHD group and 92% of the NCC and the MI groups, with a 94% overall average. VSR forms for the ADHD group showed that in addition to the primary diagnosis of ADHD, 17 adolescents had coexisting conditions (11 had depression, 4 had anxiety, 1 had substance abuse, and 1 had disruptive behavior disorder). Among the MI group their clinicians noted the following coexisting conditions: ADHD (2 adolescents), substance abuse disorder (1 adolescent), and disruptive behavior disorder (1 adolescent). The parents of these four adolescents indicated that the MI was the condition with the strongest current impact on the adolescent's life. Although in the telephone interview parents for the adolescents in the NCC group indicated no chronic illnesses or mental health conditions, VSR forms completed by their primary care clinician revealed conditions for 9 individuals who were then excluded from the analyses. The conditions included Tourette's Syndrome, pregnancy, neurofibromatosis, scoliosis ( $n = 2$ ), hypothyroidism, seizure disorder, bulimia, and ADHD (one individual, recently diagnosed).

Clinicians and parents were asked about drug therapy and psychotherapy. There was 100% agreement between parent and clinician regarding current medications, but only 41% agreement regarding counseling or psychotherapy. Data reported here are based on parent reports. All but five of the ADHD-diagnosed adolescents were currently taking medication for their condition. Additionally, 14 of the adolescents were receiving both medication and counseling

or psychotherapy. Among the adolescents taking medication, methylphenidate (Ritalin) and amphetamine-based agents (e.g., Adderall) were the most commonly prescribed drugs.

### Initial Analyses

The data from the CADS-P for the ADHD group were reviewed to assure that the youth had scores in the atypical range on the scale. Scores for 13 adolescents did not meet this criterion and data from these youth were excluded from further analyses. Because our control groups had male and female participants, we reviewed our outcome data on the YQOL-R for gender differences. No significant differences were found between males and females on any of the YQOL-R domain scores or total scores. Analyses were then conducted using only male participants. No differences in the results were found for the ADHD group. For the MI group, the differences with the NCC group remained in the same direction, but did not reach significance because of the reduction in power due to the limited sample size. Thus, data presented here are from 55 adolescent males in the ADHD group, 107 adolescents (64 males and 43 females) in the no chronic condition group (NCC) and 52 adolescents (29 males and 23 females) with a physician-confirmed diagnosis of a mobility impairment (MI).

### Symptom Severity

Clinicians were asked to provide severity ratings (CGI) for each disorder mentioned. This information was obtained for 50 of 55 adolescents in the ADHD group. The CGI score for the ADHD group was 2.89. CGI scores for adolescents with ADHD plus a coexisting condition were significantly higher ( $M = 3.44, SD = .96; F(1,50) = 7.85, p = .01$ ) than for adolescents without a co-existing condition ( $M = 2.59, SD = 1.08$ ). The coexisting condition accounted for 13% of the observed variation between the means. The mean CGI Severity score for the MI group was 3.87 ( $SD = 1.44$ ).

**Table 1. Sample Demographics**

	Total Sample ( $n = 214$ )	NCC ( $n = 116$ )	ADHD ( $n = 55$ )	Mi ( $n = 52$ )
Mean Age ( $SD$ )	14.8 (1.67)	14.8 (1.64)	13.9 (1.6)	15.5 (1.38)
% Ethnicity				
White	80.5	74.1	89.1	84.6
Hispanic				3.80
African American	4.7	4.6	5.5	3.8
Asian/Pacific Islander	7.4	13.0	—	3.8
Other	6.5	8.3	5.6	3.8
% Family Configuration				
Both Biological Parents	69.3	75.0	69.1	57.7
Biological Mother only	18.6	17.6	16.4	23.1
Biological Mother & Stepfather	4.2	3.7	5.5	3.8
Other	7.9	3.7	9.1	15.4

Fourteen adolescents in the ADHD group self-reported CADS-A scores of 16 or higher, indicating that they were currently experiencing a sufficient number of symptoms/behaviors to be classified in the moderately to severely atypical range. Of these adolescents, 10 were receiving drug therapy.

### Quality of Life and ADHD

Adolescent scores on the YQOL-R perceptual domains and total perceptual score as well as fifteen contextual items (see appendix A) were reviewed for mean differences. Adjustment was made for three covariates: age, gender, and depressive symptomatology. Depressive symptomatology (CDI) and age were used as covariates because they have been previously shown to be significantly associated with YQOL-R scores (Patrick et al., 2002). Although no gender differences were found between the groups, gender was included as a covariate because of the differences in sample composition. It was thought that adolescents with ADHD would score more similar to the group of adolescents with MI, who have been shown to report lower YQOL-R scores than a no-condition peer group. Pairwise comparisons were conducted on the estimated marginal means using the General Linear Model function in SPSS (1999).

When looking at the simple contrasts, the NCC group scored higher than either the MI or the ADHD group on all the YQOL-R variables. When the Bonferroni correction was applied, however, the differences between the NCC group and the ADHD group on the General QoL domain, and the difference between the NCC group and the MI group on the Self domain, were no longer significant. Table 2 shows

the estimated marginal mean difference scores between the NCC and the condition groups along with 95% confidence intervals for the YQOL-R domain scores and the total perceptual scores on which the contrast and pairwise analyses were based. When the data were analyzed using only male participants, no changes were found in the results for the ADHD group. For the MI group, although the means were still lower than the NCC group for all the variables, the sample size ( $n = 29$ ) did not provide sufficient power to find a significant difference for any of the scores except the environment domain.

The ADHD and MI groups reported significantly lower means than the NCC group on the contextual item "How often does your parent or guardian let you decide what time to go to bed?" and the ADHD group reported significantly lower grades in school during the most recent grading period. The MI group reported having a good time with friends outside of school and being made to feel unwelcome because of how they looked significantly more often than the NCC group, but did not differ from the ADHD group, whose scores were intermediate to the other two groups. Additionally, the MI group reported missing out on an activity that they wanted to do significantly more often than either the NCC group or the ADHD group.

**QoL and Self-Reported ADHD Symptom Severity.** Self-reported severity of ADHD symptomatology was assessed using the CADS-A. Contrasts were computed for those in the ADHD group who scored in the moderately to severely atypical range (above 16,  $n = 14$ ,  $M = 20.0$ ,  $SD = 3.11$ ) and those who scored in the typical range (below 16,  $n = 41$ ,  $M = 8.61$ ,  $SD = 3.44$ ). The estimated YQOL-R

**Table 2. Contrast Analysis for YQOL-R Scores Condition Groups vs. NCC Group**

		Mean	Difference	P	P	Bonferroni Correction	
						Lower <sup>a</sup>	Upper <sup>a</sup>
Self Domain	NCC <sup>a</sup>	78.29					
	ADHD <sup>b</sup>	71.56	-6.72	0.005	0.014	-12.39	-1.06
	MI <sup>c</sup>	73.29	-5.00	0.028	0.084	-10.45	0.454
Relationship Domain	NCC <sup>a</sup>	80.14					
	ADHD <sup>b</sup>	71.27	-9.10	0.001	0.002	-15.44	-2.75
	MI <sup>c</sup>	73.94	-6.42	0.012	0.035	-12.53	-0.32
Environment Domain	NCC <sup>ad</sup>	87.14					
	ADHD <sup>b</sup>	79.65	-7.49	0.000	0.001	-12.44	-2.55
	MI <sup>c</sup>	78.65	-8.49	0.000	0.000	-13.25	-3.73
General QoL	NCC <sup>a</sup>	86.18					
	ADHD <sup>b</sup>	78.64	-7.53	0.009	0.028	-14.45	-0.619
	MI <sup>c</sup>	77.45	-8.72	0.002	0.005	-15.38	-2.07
Total Perceptual Score	NCC <sup>a</sup>	81.74					
	ADHD <sup>b</sup>	73.95	-7.79	0.000	0.001	-12.80	-2.77
	MI <sup>c</sup>	75.12	-6.61	0.001	0.003	-11.44	-1.79

<sup>a</sup> $n = 107$ . <sup>b</sup> $n = 55$ . <sup>c</sup> $n = 51$ . <sup>d</sup>NCC = reference group. <sup>e</sup>95% Confidence Interval bounds.

marginal means, standard errors, and 95% confidence intervals are shown in Table 3. The results revealed that adolescents who self-reported Conner's ADHD index scores in the atypical range also reported lower scores on the Self domain,  $F(1,51)=4.15, p < .05$ , and the General QoL domain  $F(1,51)=3.94, p < .05$ .

In an attempt to understand the differences between the adolescents with and without current symptomatology (typical vs. atypical), demographic data, medication use, depression scores, and comorbidities were reviewed. There were no demographic differences between the typical and atypical scorers. Adolescents in the atypical group, however, scored significantly higher on the CDI. As noted previously, 5 adolescents were not currently using prescribed medication. Four of these adolescents scored in the atypical range on the CADS-A, and medication use accounted for 8% of the variation in QoL scores between the typical and atypical groups. Having a coexisting condition was not significantly associated with scoring in the atypical range.

The contextual variables were also reviewed for differences between typical and atypical adolescents in the ADHD group. A MANCOVA, with the covariates age and CDI score was conducted to assess mean differences on 15 contextual items. The multivariate results showed that there were significant differences between the typical and atypical groups on the set of predictors based on Wilks Lambda,  $\lambda = .566, F(15,37)=3.15, p = .002$  with group membership accounting for 56% of the observed variation in this set of means.

The univariate results showed that atypical adolescents reported serious emotional or mental health problems that they felt they needed help with significantly more often,  $F(1,51)=13.77, p = .000; \eta^2 = .21$ , they were in a good mood significantly less often,  $F(1,51)=4.10, p = .04; \eta^2 = .07$ , had a conversation with an adult significantly more often  $F(1,51)=4.09, p = .04; \eta^2 = .07$ , and were home without an adult for 3 hours or more significantly more often  $F(1,51)=6.11, p = .01; \eta^2 = .10$ . Reports on their behavior causing problems in the family approached significance,  $F(1,51)=3.53, p = .066; \eta^2 = .065$ .

Although it is tempting to do so, a comparison of the means in Tables 2 and 3 cannot be done because the means are based on different values of the covariates. The review of the data for differences based on study group and current symptomatology showed that the typical group's mean scores more closely matched those of the MI group than the NCC group.

## Discussion

Perceived QoL was used to determine the experience of living with a ADHD. Despite the fact that the adolescents with ADHD in this cross-sectional study were currently receiving treatment, they tended to report lower Total QoL scores as well as deficits in the Self and the Relationship domains. The sense of self is intimately tied to the parent-child relationship and to relationships with peers. Given the makeup of ADHD, it is not surprising that lower scores for both the Self and Relationship domains were observed. The ability to process information in social settings is necessary for social problem solving. The adolescent needs to be able to encode social cues, form mental

**Table 3. Adjusted Mean Perceptual YQOL-R Domain Scores and Total QoL Score by Typically and Atypically Scoring ADHD Males on the CADS-A**

	CADS-A status	EMM <sup>a</sup>	Standard Error	Bonferroni 95% Confidence Interval	
				Lower	Upper
Self Domain	Typical	77.25	1.67	73.89	80.61
	Atypical	69.73 <sup>c</sup>	3.08	63.54	75.91
Relationship Domain	Typical	75.98	2.1	71.78	80.19
	Atypical	70.64	3.86	62.89	78.38
Environmental Domain	Typical	81.72	1.83	78.04	85.4
	Atypical	80.11	3.38	73.34	86.89
General QoL	Typical	84.84	1.89	81.04	88.62
	Atypical	76.55 <sup>c</sup>	3.48	69.57	83.54
Total Perceptual Score	Typical	78.46	1.51	75.43	81.49
	Atypical	73.07	2.78	67.5	78.64

<sup>a</sup>Estimated marginal means evaluated at covariates appearing in the model: Mean Age = 14.04, Mean Total CDI = 9.20.

<sup>b</sup>Typical Group n=41; A typical Group n=14.

<sup>c</sup>Typical Group mean is significantly higher at  $p < .05$ .

representations, interpret the cues, decide on a particular response, and then act on that response (Dodge, 1986). Adolescents with ADHD are inefficient in their problem solving strategies (Wenar, 1994), which may, in part, explain these lower domain scores. These findings build on the clinical literature, which indicates that adolescents with ADHD have deficits in social functioning (Mannuzza & Klein, 2000) and experience greater family stress. Parents of ADHD children also tend to report less favorable parenting practices, such as being more directive (Johnston, 1996), which may be reflected in the finding that adolescents with ADHD were allowed to participate in the decision on "bedtime" significantly less often. The negative actions and reactions in both parent and child may act in a reciprocal fashion to affect the development of the sense of self in the child as well as confidence and ability in parenting for the caregiver; thus, the QoL of both the adolescent and the parent is impacted. This is in contrast to the MI group who reported scores slightly higher than the NCC group on the Self domain. Although their scores on the Relationship domain are not significantly different from the NCC group, a review of the items comprising this domain showed that the items regarding family are slightly higher, whereas peer relationships more closely resemble those of their ADHD peers. This suggests that on the Relationship domain, family ties offset some of the negative impact observed in peer relationships. This difference between the condition groups highlights the disruptive nature of ADHD on the family system.

The lower scores on the Environment domain may also be reflective of a poor sense of self and of an inability to attend to social and environmental cues. The Environment domain contains items such as "I feel that my life is full of interesting things to do" and "I like trying new things" which they may not endorse often because of their inability to focus on tasks. The domain also includes items such as "I feel that I am getting a good education" and "I know how to get the information that I need," which again would be items that could be affected by a poor sense of self and an inability to focus on tasks. Youth with ADHD often have comorbid learning disabilities, which may be the source of the lower Environment domain score reported here rather than their ADHD.

The General QoL domain showed no significant differences between adolescents in the NCC group and adolescents with ADHD. Given the items that comprise this domain, such as "I enjoy life," "I am satisfied with the way my life is now," and "I feel life is worthwhile," it is not unreasonable to assume that adolescents with ADHD would feel that life is worthwhile and that they enjoy life. When compared to the NCC group and the mobility group at the same levels of

the covariates, the ADHD adolescents are intermediate to the NCC and the MI group. Adolescents with ADHD who also self-report CADS-A scores in the atypical range, however, score significantly lower on this domain than their ADHD peers reporting typical CADS-A scores. This suggests that in samples with greater current symptomatology, there is an observed difference in mean General QoL domain scores.

Adolescents who self-report moderate to severe ADHD symptomatology reported lower QoL scores than their peers who self-reported ADHD symptomatology in the typical range, even after adjusting for differences in depressive symptomatology. These adolescents also reported having greater emotional problems with which they felt they needed help.

These data support previous qualitative research, that suggested that adolescents with ADHD incorporate their disorder into their sense of who they are (Kreuger & Kendall, 2001). Moreover, the data presented here support the idea that QoL is a potentially important outcome measure in ADHD research.

### **Limitations and Future Directions**

This ADHD sample is reflective of a treated population of male adolescents with ADHD, but may not represent a nontreated ADHD population or females with ADHD. Treatment status of the sample is, most likely, reflected in the CGI scores (mild range) and the limited number of adolescents reported to have comorbid conduct problems. Another limitation of this study is lack of information on duration of the disorder and therapy. Additionally, the method of ascertainment of comorbidities based only on doctors' reports may limit the findings reported here. Further study of QoL with a group that is untreated, and a group for which information on duration of both the disorder and therapy are obtained may provide additional insight on the relationship of ADHD to QoL.

The findings presented here may also be limited in that the socioeconomic status of the youth was not ascertained. All adolescents in the study groups reported here were recruited through a local regional medical center or specialty clinics in the greater Seattle area and generally were from middle- to upper-class families. A study looking at ADHD, QoL, and socioeconomic status could significantly add to the literature. Moreover, many of the adolescent reports obtained for this study were completed during the summer months when the youth were not in school, which may have influenced the results reported here.



These data highlight the need to treat the “whole” child, as ADHD affects total well being. As noted above, the development of the sense of self is intimately tied to the parent-child relationship, which is strained in ADHD families. The low scores in the Self and Relationship domains highlight the need for a comprehensive family approach to treating adolescents with ADHD. Additionally, it suggests that research on how living with an adolescent with ADHD impacts the family may prove to be beneficial. The family experience of ADHD should include family stress, family resources, and sibling relationships. It will be interesting to see whether these family life variables are associated with QoL scores.

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## References

Achenbach, T. M., & Edelbrock, C. (1983). *Manual for the child behavior checklist and revised child behavior profile*. Burlington, VT: Queen City Printers.

American Academy of Pediatrics. Subcommittee on Attention-Deficit/Hyperactivity Disorder & Committee on Quality Improvement. (2001). Clinical practice guidelines: Treatment of the school-aged child with attention-deficit/hyperactivity disorder. *Pediatrics*, *108*, 1033–1043.

Arnold, L. E. (1996). Sex differences in ADHD: Conference summary. *Journal of Abnormal Child Psychology*, *24*, 555–569.

Barkley, R. A., Anastopoulous, A. D., Guevremont, D. C., & Fletcher, K. E. (1991). Adolescents with ADHD: patterns of behavioral adjustment, academic functioning, and treatment utilization. *Journal of the American Academy of Child and Adolescent Psychiatry*, *30*, 752–761.

Barkley, R. A., DuPaul, G. J., & McMurray, M. B. (1990). Comprehensive evaluation of attention deficit disorder with and without hyperactivity as defined by research criteria. *Journal of Consulting and Clinical Psychology*, *58*, 775–789.

Biederman, J., Mick, E., & Faraone, S. V. (1998). Normalized functioning in youths with persistent attention-deficit/hyperactivity disorder. *Journal of Pediatrics*, *133*, 544–551.

Bonomi, A. E., Patrick, D. L., Bushnell, D. M., & Martin, M. (2000). Validation of the United States’ version of the World Health Organization Quality of Life (WHOQOL) instrument. *Journal of Clinical Epidemiology*, *53*, 19–23.

Bradlyn, A. S., Harris, C. V., Warner, J. E., Ritchey, A. K., & Zaboy, K. (1993). An investigation of the validity of the quality of Well Being Scale with pediatric oncology patients. *Health Psychology*, *12*, 246–250.

Conners, C. K. (1997). *Conner’s ADHD/DSM-IV Adolescent Scale (CADS)*. Toronto, Ontario, Canada: Multi-Health Systems.

Dodge, K. A. (1986). A social information process model of social competence in children. In M. Permuter (Ed.), *Eighteenth annual Minnesota Symposium on Child Psychology* (pp.77–125). Hillsdale, NJ: Erlbaum.

Edwards, T. C., Huebner, C. E., Connell, F. A., & Patrick, D. L. (2002). Adolescent quality of life, part I: conceptual and measurement model. *Journal of Adolescence*, *25*, 275–286.

Edwards, T. C., Patrick, D. L., & Topolski, T. D. (2003). Quality of life of adolescent with perceived disabilities. *Journal of Pediatric Psychology*, *28*, 233–241.

Gaub, M., & Carlson, C. L. (1997). Gender differences in ADHD: A meta-analysis and critical review. *Journal of the American Academy of Child and Adolescent Psychiatry*, *36*, 1036–1045.

Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory*. New York: Aldine De Gruyter.

Goodwin, D. A. J., Boggs, S. R., & Graham-Pole, J. (1994). Development and validation of the Pediatric Oncology Quality of Life Scale. *Psychological Assessment*, *6*, 321–328.

Greene, R. W., Biederman, J., Faraone, S. V., Ouellette, C. A., Penn, C., & Griffith, S. (1996). Toward a new psychometric definition of social disability in children with attention-deficit hyperactivity disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, *35*, 571–578.

Guy, W. (1976). *ECDEU Assessment Manual for Psychopharmacology, Revised*. (DHHS Publication ADM 91–338). Rockville, MD: U.S. Department of Health and Human Services.

- Harding, L. (2001). Children's quality of life assessments: A review of generic and health related quality of life measures completed by children and adolescents. *Clinical Psychology and Psychotherapy*, 8, 79–96.
- Jensen, P. S., Shervette, R. E., Xenakis, S. N., & Richters, J. (1993). Anxiety and depressive disorders in attention deficit disorder with hyperactivity: New findings. *American Journal of Psychiatry*, 150, 1203–1209.
- Johnston, C. (1996). Parent characteristics and parent-child interactions in families of nonproblem children and ADHD children with higher and lower levels of oppositional-defiant behavior. *Journal of Abnormal Child Psychology*, 24, 85–104.
- Juniper, E. F., Guyatt, G. H., Feeny, D. H., Ferrie, P. J., Griffith, L. E., & Townsend, M. (1996). Measuring quality of life in children with asthma. *Quality of Life Research*, 5, 35–46.
- Kovacs, M. (1992). *Children's Depression Inventory (CDI)*. Toronto, Ontario, Canada: Multi-Health Systems.
- Kreuger, M., & Kendall, J. (2001). Descriptions of self: An exploratory study of adolescents with ADHD. *Journal of Child and Adolescent Psychiatric Nursing*, 14, 61–72.
- Landgraf, J. M., Abetz, L., & Ware, J. E. (1996). *The CHQ user's manual*. Boston, MA: The Health Institute, New England Medical Center.
- Mannuzza, S., & Klein, R. G. (2000). Long-term prognosis in attention-deficit/hyperactivity disorder. *Child and Adolescent Psychiatric Clinics of North America*, 9, 711–726.
- Marra, C. A., Levine, M., McKerrow, R., & Carleton, B. C. (1996). Overview of health-related quality-of-life measures for pediatric patients: Application in the assessment of pharmacotherapeutic and pharmacoeconomic outcomes. *Pharmacotherapy*, 16, 879–888.
- McCarney, S. B. (1989). *Attention Deficit Disorders Evaluation Scale-Home Version*. Columbia, MO: Hawthorne Educational Services.
- NIH Consensus Statement. (2000). National Institute of Health Consensus Development Conference Statement: Diagnosis and treatment of attention deficit hyperactivity disorder (ADHD). *Journal of the American Academy of Child and Adolescent Psychiatry*, 39, 182–193.
- Patrick, D. L., Edwards, T. C., & Topolski, T. D. (2002). Adolescent quality of life, part II: Initial validation of a new instrument. *Journal of Adolescence*, 25, 287–300.
- Patrick, D. L., Kinne, S., Engelberg, R. A., & Pearlman, R. A. (2000). Functional status and perceived quality of life in adults with and without chronic conditions. *Journal of Clinical Epidemiology*, 53, 779–785.
- Raphael, D., Rukholm, E., Brown, I., Hill-Bailey, P., & Donato, E. (1996). The Quality Of Life Profile-Adolescent Version: Background, description, and initial validation. *Journal of Adolescent Health*, 19, 366–375.
- Ravens-Sieberer, U., & Bullinger, M. (1998). Assessing health-related quality of life in chronically ill children with the German KINDL: First psychometric and content analytical results. *Quality of Life Research*, 7, 399–407.
- SPSS Inc. (1999). *SPSS Reference Guide*. Chicago, IL: Author.
- Starfield, B., Ensminger, M., Green, B. F., Riley, A. W., Ryan, S., Kim-Harris, S., et al. (1995). *Manual for the Child Health and Illness Profile: Adolescent Edition (CHIP-AE)*. Baltimore, MD: The Johns Hopkins University.
- Treuting, J. J., & Hinshaw, S. P. (2001). Depression and self-esteem in boys with attention-deficit/hyperactivity disorder: Associations with comorbid aggression and explanatory attribution mechanisms. *Journal of Abnormal Child Psychology*, 29, 23–39.
- U.S. Census Bureau (2000). *United States Census, 2000 Washington State* [Data File]. Available from United States Census Bureau Website, <http://www.census.gov>.
- Varley, P. (1999). ADHD in adolescents. *Advance for Nurse Practitioners*, 7, 59–60.
- Weiss, G., & Hechtman, L. T. (1993). *Hyperactive children grown up: ADHD in children, adolescents, and adults*. New York: Guilford Press.
- Wenar, C. (1994). *Developmental psychopathology: From infancy through adolescence* (3<sup>rd</sup> ed.). New York: McGraw-Hill.
- Wilson, J. M., & Marcotte, A. C. (1996). Psychosocial adjustment and educational outcome in adolescents with a childhood diagnosis of attention deficit disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 35, 579–587.
- World Health Organization Quality of Life Group. (1994). The development of the World Health Organization Quality of Life Assessment Instrument (WHOQOL). In J. Orley & W. Kuyken (Eds.), *Quality of life assessment: International perspectives* (pp. 41–57). Berlin: Springer-Verlag.

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## **Appendix A: Contextual Items Used in the Analyses**

1. During the past month, how often did you have a conversation with an adult about something that is important to you?
2. During the past month, how often have your parents or guardians let you make your own decisions about what time you go to bed?
3. During the past month, how often has your behavior caused problems with your family?
4. During the past month, how often did you spend time with a friend having a good time outside of school?
5. During the past month, how often have you had serious emotional or mental health problems that you felt you needed help with?
6. During the past month, how often did you feel that you could not shake off the blues, even with help from your family & friends?
7. During the past month, how often have any of your family members had serious arguments with one another?
8. During the past month, how often did you miss out on an activity that you wanted to do because of any physical or emotional problems you have?
9. During the past month, how often have people your age made you feel unwelcome because of how you look?
10. During the past month, how often have you been in a good mood?
11. During the past week, how often did you have dinner with a parent, guardian or other adult in your family?

12. During the past week, how many days were you at home without an adult for at least 3 hours?
13. During the past week, how many days did you spend time on an activity that you enjoy, such as sports, hobbies, or reading (DO Not include time spent watching TV).
14. During the past month, how often have you talked to anyone about your future?
15. At the most recent grading period, what were your grades in school?