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Health-Related Quality of Life in College Undergraduates with Learning Disabilities: The Mediational Roles of Anxiety and Sadness

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Abstract Little research has examined health-related quality of life (HRQoL) in adults with learning disabilities in post-secondary settings and the potential relationship between a learning disability and anxiety or sadness. This study examined HRQoL in 68 undergraduate students: 34 students who reported having been diagnosed with a "learning disability" were compared to 34 students who indicated they had not been diagnosed with a learning disability. Participants completed an online survey of anxiety, sadness, and HRQoL, including the SF-36. ANCOVAs on the Emotional Well-Being and Role Limitations Due to Emotional Problems scales from the SF-36 revealed that students reporting a diagnosis of a learning disability were significantly more impaired in Emotional Well-Being. Regression analyses suggested that impairment in Emotional Well-Being was mediated by separate ratings of both anxiety and sadness. Results indicated that those undergraduates reporting learning disabilities suffered from an impaired sense of well-being associated with anxious and sad feelings.

Keywords Quality of life · Anxiety · Sadness · Learning disability

The use of quality of life (QoL) measures has become an integral part of mental health evaluations in recent years (Mendlowicz and Stein 2000; Mogotsi et al. 2000; Quilty et al. 2003; Wells et al. 1989). "Quality of life" typically includes the concepts of well-being, functioning, life-satisfaction, health, and disability and refers to "aspects of life that make life particularly fulfilling and worthwhile" (Quilty et al. 2003, p.406). In contrast to clinical ratings of impairment, QoL assessments are based on the subjective global views of the individual. In addition, QoL assessments can be further refined to specifically reflect the individual's impression of his or her functioning (i.e., health-related quality of life; HRQoL) as opposed to the more global indicators or other specific measures (e.g., life-satisfaction). As a result, QoL measures, and in particular HRQoL instruments, provide valuable, complementary information for the clinical profile (Katsching 1997; Mogotsi et al. 2000).

Research examining typically achieving adults has uncovered rather pervasive and debilitating effects upon HRQoL among individuals diagnosed with a variety of psychopathologies. Reporting on 11,000 patients with depression, Wells et al. (1989) found that patients with depression experienced worse physical functioning, social functioning, role functioning, perceived current health, and somatic complaints than patients with no chronic conditions. Schonfeld et al. (1997) examined the HRQoL in individuals with untreated major depressive disorder or anxiety disorders. Their results suggested that HRQoL was impacted the most by major depressive disorder, followed by post-traumatic stress disorder (PTSD) and panic disorder (PD). Additionally, the impact of untreated anxiety disor-

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ders on HRQoL was found to be equivalent to, or greater than, several medical conditions (e.g., heart disease, arthritis, and diabetes). Similarly, Olfson et al. (1997) compared the relative impairment imposed by several psychiatric disorders, finding that impairment increased along with increasing comorbidity. After adjusting for demographic variables, comorbidity issues, and perceived health, the results also suggested that only bipolar disorder, major depressive disorder, phobias, and substance use had significant negative impacts on work, family, and social functioning.

While investigations like these have demonstrated significant HRQoL impairment associated with psychopathologies in individuals, comparably little is known about QoL, and HRQoL in particular, in those with learning disabilities (Gillberg and Soderstrom 2003). This oversight is especially important given the difficulties with anxiety and depression frequently observed in adolescents and young adults with learning disabilities (Huntington and Bender 1993). While previous research has not specifically examined QoL or HRQoL in young adults with learning disabilities per se, extant literature does suggest a significant risk for emotional distress in adolescents with learning disabilities which would presumably have an impact. Svetaz et al. (2000) reported adolescents with learning disabilities were at twice the risk of emotional distress, including increased risk for suicide attempts and violence. Adolescents with multiple learning disabilities have also been found to have higher clinical maladjustment, emotional symptoms, and school maladjustment compared to normally achieving peers (Martinez and Semrud-Clikeman 2004). Additionally, adolescents with learning disabilities have been reported to be less socially adept than peers without learning disabilities (Jackson et al. 1987). Researchers have also suggested that adolescents with learning disabilities often experience severe symptoms of depression (Maag and Behrens 1989), though likely not clinical levels of depression (Maag and Reid 2006). One study, which broadly conceptualized disability as including learning disabilities, medical/physical disabilities, and emotional/behavioral problems, found that adolescents with disabilities reported significantly lower HRQoL than adolescents without disabilities (Edwards et al. 2003).

Results also indicate the impact from having a learning disability extends developmentally beyond adolescence into adulthood. Although a substantial number of adolescents and young adults with learning disabilities have enrolled in post-secondary education, many do not successfully navigate its demands. While Sitlington and Frank (1990) found that 50% of a sample of 911 high school graduates with learning disabilities enrolled in undergraduate institutions, only 7% were still enrolled 1 year later. These findings are interesting to consider when researchers have also found that post-secondary students with learning disabilities have significantly poorer stress management and adaptability compared to normal achieving peers (Reiff et al. 2001). Moreover, college students with learning disabilities also report more nervousness, frustration, and uncertainty during examinations (Heiman and Precel 2003). Longer-term outcomes for young adults are not encouraging, with many reporting that learning disabilities impact work (Madaus et al. 2002) and self-esteem (McNulty 2003).

In sum, little research has directly examined the concept of HRQoL in young adults with learning disabilities, especially higher-functioning adults faced with the demands of post-secondary education. The primary purpose of this study was to examine differences in emotional aspects of HRQoL among young adults with and with-out self-reported learning disabilities. Secondary to this purpose and given the impact of anxious and depressive symptoms on individuals with learning disabilities and also the literature indicating the impact of anxious and depressive symptoms on HRQoL, this study examined the extent to which separate ratings of anxiety and sadness mediated any differences in HRQoL in individuals reporting learning disabilities. As a result, it was hypothesized that learning disabilities would be associated with increased emotional difficulties and subsequent disability in a challenging academic setting. The Emotional Well-Being and Role Limitations Due to Emotional Problems scales from the SF-36 (see below; Ware and Sherbourne 1992) were examined. Other scales were not examined as learning disabilities were not hypothesized to disable one physically in this higher functioning population and a conservative approach to the number of tests conducted was desired given the sample size. In addition, it was hypothesized that learning disabled participants' ratings of anxiety and sadness would mediate these hypothesized differences.

Methods

Participants

Participants were identified and selected from a larger online screening and data collection process for a related HRQoL study that included 1,108 respondents. Sixty-eight college undergraduate students enrolled in Psychology courses at a large, state university served as participants for the current study (17 men, 51 women; age range = 18–29 years; M=20.00 years; SD=2.05). The sample was 82.4% Caucasian, 4.4% African American, 4.4% Asian, and 8.8% other. Participants were divided into two groups: 1) a learning disabled group (n=34) was comprised of those individuals reporting a previous diagnosis of a "learning disability", and 2) a non-learning disabled group (n=34)

chosen at random from the remaining participants and including those individuals indicating they had not been diagnosed with a "learning disability". Based upon demographic questioning, participants were excluded if they reported current substance use based on their "yes" (current usage) or "no" (no current usage) answers to an item in the demographic questionnaire below. All participants were eligible to receive extra credit in their respective Psychology courses for their participation.

Measures (Measures Completed by All Participants Online)

Demographic Questionnaire This questionnaire was developed by the first author as a demographic and screening tool. The questionnaire probed typical demographic areas (e.g., name, age, race, gender, SES) and included 25 additional questions designed to provide a broad overview of functioning. This instrument was based upon a client information form and the Anxiety Disorders Interview Schedule-IV (ADIS-IV; Brown et al. 1994). For group designation, participants were asked if they had "ever been diagnosed with a learning disability".

Anxiety and Sadness Ratings For the self-reported (and separate) ratings of anxiety and sadness, participants were asked in two individual items to rate how anxious they "feel during an average 2-week period", from 0 (No Anxiety) to 8 (Very Anxious) and how "sad/depressed/hopeless" they "feel during an average 2-week period", from 0 (No Sadness) to 8 (Very Sad). The initial properties of these two questions were examined in a separate study (Munson et al. 2008) and participants' ratings of being "anxious" and "sad/depressed/hopeless" were found to significantly predict respective scores on the Anxiety and Depression scales of the Depression, Anxiety, and Stress Scales (DASS; Lovibond and Lovibond 1995).

RAND 36-Item Health Survey 1.0 (SF-36; a.k.a. Medical Outcomes Study 36-Item Short-Form Health Survey; SF-36; Ware and Sherbourne 1992) The SF-36 is a 36-item, generic, HRQoL instrument and arguably the most widely used measure of HRQoL in the extant literature. This self-report assesses functioning in eight domains: physical functioning, role limitations because of physical health problems, bodily pain, social functioning, general mental health, role limitations because of emotional problems, vitality (energy/fatigue), and general health perceptions. Internal consistency and test–retest reliability have been cited in the adequate range (Mendlowicz and Stein 2000). The SF-36 has been validated in several normal and clinical populations (McHorney et al. 1994; McHorney et al. 1993; Mendlowicz and Stein 2000). Scores are transformed into a scale ranging from 0 to 100 with 100 indicating "the most favorable health state" and 0 "the least favorable" (McHorney et al. 1994, p. 44). For the current study, low scores on the Emotional Well-Being scale (a.k.a., "General mental health", Ware and Sherbourne 1992) indicate "feelings of nervousness and depression all the time" while high scores indicate feeling "peaceful, happy, and calm all the time" (p. 475). Low scores on the Role Limitations Due to Emotional Problems scale indicate problems with work or activities due to emotional problems with high scores indicating "no problems with work or other daily activities as a result of emotional problems" (p. 475).

Procedures

Participants completed a two-hour survey online which included questionnaires on fear, anxiety, and QoL, including HRQoL. Students provided informed consent electronically and procedures were carried out according to current ethical guidelines and received approval from the Institutional Review Board. A debriefing page followed the survey with additional contact information for local mental health services. Individuals indicating on the demographic questionnaire that they had been "diagnosed with a learning disability" were selected from the data and a control group was selected at random from the remaining participants. These two groups of people were then compared in the analyses which follow on a measure of HRQoL and self-reported ratings of anxiety and sadness.

Analytic Plan

A three-stage analytic plan was utilized: preliminary analyses, examination of group differences, and subsequent mediational analyses. Following preliminary analyses to determine differences due to demographic characteristics, analyses proceeded by conducting two analyses of covariance (ANCOVAs) on the Emotional Well-Being and Limitations Due to Emotional Problems scales using significant findings from the preliminary analyses as a covariate and using a Bonferroni corrected alpha level to control for additional type I error. Subsequently, effect sizes were calculated using Cohen's *d*. Finally, potential mediators (i.e., reported levels of anxiety and sadness/depression/hopelessness during an average 2 week period) of significant effects were investigated (Baron and Kenny 1986; Holmbeck 1997). The grouping variable was dummy-coded: learning disability = 1 and no learning disability = 2. Subsequently, analyses proceeded by regressing the hypothesized mediator (either anxiety or sadness ratings) onto the learning disability/no learning disability group. Then, well-being scores were regressed onto the hypothesized mediator. Next, well-being scores were regressed onto

the learning disability/no learning disability group. Finally, if these analyses were all significant, well-being scores were regressed onto both the grouping variable and mediator entered into the same step.

Results

Preliminary Analyses

Results from preliminary analyses suggested significant differences between men and women for both Emotional Well-Being and Role Limitations Due to Emotional Problems: t (64)=−2.66, p=.01 (two-tailed) and t (64)=−2.12, p=.04 (two-tailed) respectively with men having significantly higher HRQoL scores (i.e., men reported significantly more favorable health than women; cf. Hanmer et al. 2006). Additionally, women were found to report significantly more anxiety and sadness/depression/hopelessness than men: t (66)=2.30, p=.02 (two-tailed) and t (66)=2.17, p=.03 (two-tailed) respectively. Further analysis did not suggest a significant interaction between sex and the presence of a self-reported learning disability. As a result, sex was entered in as a covariate in the ANCOVAs which follow and as the first step of the regressions for the mediation analyses.

Examination of Group Differences

Consistent with hypotheses, results of the ANCOVA examining Emotional Well-Being suggested a significant effect for the reported presence of a learning disability, even after taking a conservative approach of controlling for sex and conducting a Bonferroni correction: F(1, 65)=5.48, p=.02 (see Table 1).

Individuals reportedly having been diagnosed with a learning disability had significantly poorer emotional well-being. Cohen's d indicated a medium effect size, or according to Cohen (1992) an effect which would be "visible to the naked eye" (p. 156). No effect was found for Role Limitations Due to an Emotional Problem: F(1, 65)=1.63, n.s. and only a small effect size was observed (see Table 1).

Table 1 Results from ANCOVAs examining the effects of learning disability on quality of life

Quality of life scale	Learning disability		No learning disability		F	d
	M	SD	M	SD		
Emotional well-being	66.97	16.37	75.53	14.16	5.48*	0.56
Role limitations due to emotional problems	61.62	44.19	74.75	39.11	1.63	0.31

*p<.05

Mediational Analyses

Consistent with the procedures suggested by Baron and Kenny (1986) and Holmbeck (1997), two sets of mediational analyses were conducted. The first series of tests examined the mediating role of self-reported anxiety. Results of the three regression analyses and the fourth mediational test indicated anxiety ratings mediated impairment in well-being in those with learning disabilities (R^2=.132, see Fig. 1). The second series of mediational analyses examined the effects of self-reported ratings of sadness. Following the series of four regression equations, sadness was found to mediate the effects of having a learning disability on emotional well-being (R^2=.305, see Fig. 2).

Discussion

This study examined the HRQoL of those with self-reported learning disabilities. Results indicated that individuals having a learning disability experienced significantly poorer Emotional Well-Being than those who did not report having such a disability. Also, no impairment in role functioning was found for those having a learning disability. This finding is inconsistent with the hypothesis advanced, but could also be interpreted as support for the assertion that a learning disability may impair an individual emotionally more than in one's day to day role and completion of daily living activities. This interpretation is consistent with findings in the extant literature suggesting negative emotional effects associated with learning disability (Heiman and Precel 2003; Maag and Behrens 1989; Martinez and Semrud-Clikeman 2004; McNulty 2003; Reiff et al. 2001). Further, the present study was able to advance these previous findings by examining the mediating effects of anxiety and sadness. Ratings of anxiety and sadness/depression/hopelessness were found to mediate the effects of having a learning disability on well-being. This finding suggests a significant portion of the effect of having a learning disability on well-being is associated with anxiety (13.2%) and sadness (30.5%).

The current study did, however, have several limitations which should be addressed in subsequent studies. Future investigations should use standardized measures of anxiety and sadness/depression/hopelessness or even structured diagnostic interviews to obtain levels of psychopathology to be used in mediational testing. As a result, no conclusion can be made as to whether the participants with learning disabilities in this investigation experienced clinically

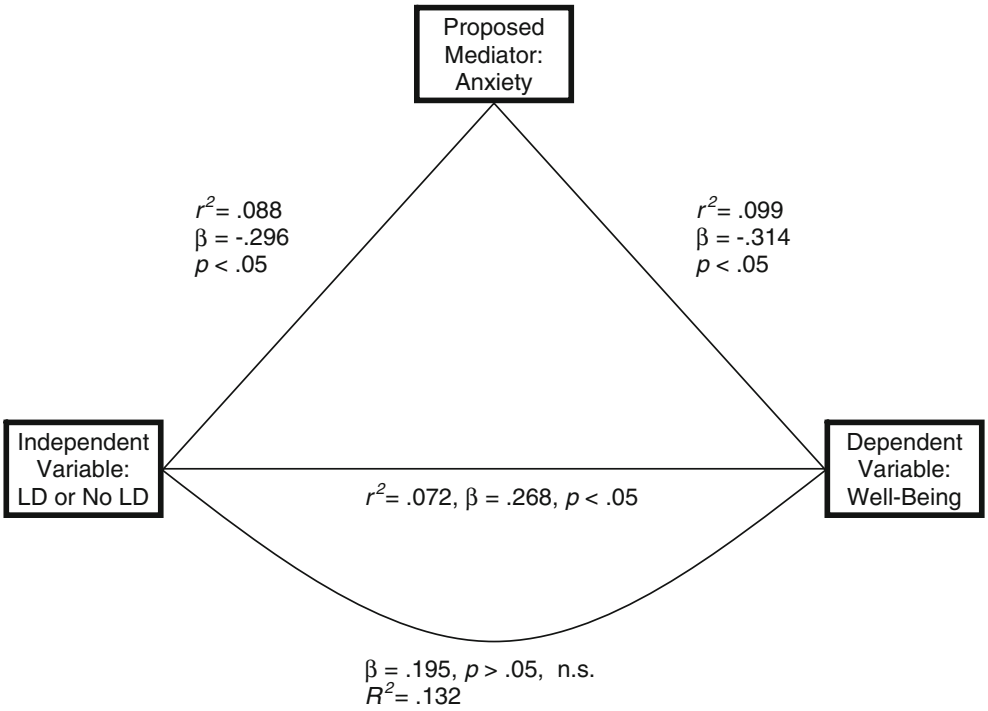

Fig. 1 Results of mediational analyses suggesting ratings of anxiety mediate impairment in well-being in those reporting a learning disability

severe levels of anxiety or sadness/depression/hopelessness. Likely, the associated symptoms and impairment are significant, but not considered pathological (cf. Maag and Reid 2006). However, it may be that the combined effects of anxiety, sadness, learning disability, and stress from increased academic rigors contribute to the increased rates of drop-out (Sitlington and Frank 1990) and psychological impairment (McNulty 2003) observed in the literature.

The presence or absence of a learning disability should also be verified through appropriate testing instead of participant self-report. While it is argued there is little reason to believe that high functioning young adults attending college would purposely lie about having a learning disability for a Psychology survey, it is possible that students may have misunderstood the question or miscategorized themselves. For example, those participants

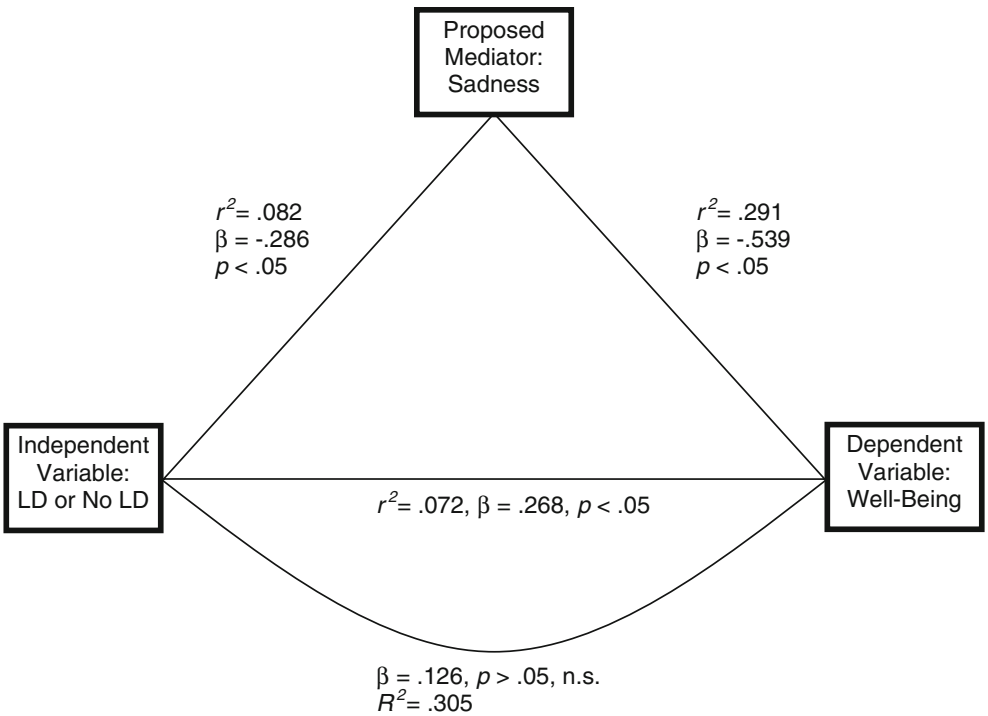

Fig. 2 Results of mediational analyses suggesting ratings of sadness/depression/hopelessness mediate impairment in well-being in those reporting a learning disability

having difficulties with or dislike of a subject may have indicated they had a "learning disability". As a result, the possibility of error in group assignment exists. However, the demographic question was carefully worded to inquire if participants had "ever been diagnosed with a learning disability" in an attempt to minimize error from misinterpretation of the question while also implying a need for professional validation of their assertion. Even with these limitations, the conservative statistical approach used in the current investigation supported the findings of this initial step toward considering how learning disabilities might affect the HRQoL of college students.

Also, the impact of comorbid psychopathology and physical illness should be addressed in future research. Given the self-report methodology of the study and the frequent comorbidity associated with learning disabilities, the extent to which participants may have had other psychological or medical concerns that might have impacted their HRQoL remains to be explored. Along these lines, even though sex was covaried out of the dependent variables in the analyses, the different prevalence rates for the constructs being examined (i.e., learning disability, anxiety, sadness/depression/hopelessness) may have affected the results. Future studies should include comprehensive diagnostic interviews to determine the participants' psychological profiles and perhaps even medical evaluations to determine any physical ailments which may influence HRQoL ratings.

The implications of the findings are that university services directed toward those with learning disabilities should regularly include assessments of and treatment for emotional difficulties as well as prevention services. Findings highlight the possibility that traditional accommodations may not sufficiently provide for a student's psychological needs. Even more disturbing, it may be that for a proportion of students with learning disabilities accommodations may work, but academic success may be supplanted by other psychological variables. Student and faculty attitudes toward learning disabilities at the undergraduate level should also be explored. For example, even with support in place, future research should investigate the extent to which negative attitudes by faculty or other students regarding learning disabilities or accommodations impact a learning disabled student's self-efficacy, which in turn impacts anxiety and sadness and HRQoL. Programs directed at improving social skills, reducing anxiety (e.g., relaxation, time management, cognitive-behavioral therapy), and inoculating students from stress may also be effective and improve HRQoL. Alternatively, it may be that students may be unaware of services currently available to them to assist with stress, anxiety, and sadness. Although it may be that little impairment in role functioning is observed in this high functioning population, the emotional toll and impaired sense of well-being should not be discounted.

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