1-1-2006

Coping and Quality of Life of Adolescents with Idiopathic Scoliosis

Elizabeth Shannon Kuhl

Coping and Quality of Life of Adolescents with Idiopathic Scoliosis

by

Elizabeth Shannon Kuhl

Thesis

Submitted to the Department of Psychology

Eastern Michigan University

in partial fulfillment of the requirements

for the degree of

MASTER OF SCIENCE

in

Clinical Behavioral Psychology

Thesis Committee:

Flora Hoodin, Ph.D., Chair

Karen Saules, Ph.D.

Michelle Byrd, Ph.D.

August 21, 2006

Eastern Michigan University

Acknowledgements

There are many people I would like to thank for their guidance and support throughout the duration of my thesis project. I would like to thank my mentor, Dr. Flora Hoodin. Without your guidance I would not have been able to successfully conduct a thesis of this caliber. In addition, I would like to thank you for showing me that the red pen is not something to fear but rather is a tool that has allowed me to become a better scientific writer. I would also like to thank Dr. Michael Mendelow for inviting our lab to conduct research with his patients; without this invitation and your continual support, my thesis project with would not have been possible. To my additional thesis committee members, Dr. Karen Saules and Dr. Michelle Byrd, thank you for reading the multiple, long drafts of my thesis. Your knowledge and feedback about statistics, research design, and child development was essential to the development and analysis of this project. I would also like to thank Heather Nix, Elizabeth Nelson, Lisa Manthey, Teresa Lynch, Maraya McCarroll, Kevin Alschuler, Michelle McCourt, and Lance Kuebler for all of their assistance with data collection and data entry. Finally, to my family, Chris, and my friends--thank you for all of your support. The plethora of phone calls and emails provided me with the fuel I needed to see this project through to the end.

This study was funded by grant support from the Graduate School and the Department of Psychology at Eastern Michigan University and the Margaret M. Smith Fund for the Advancement of Women.

Abstract

How adolescents cope with the stress of bracing or spinal fusion surgery for idiopathic scoliosis (AIS) and how coping might impact quality of life (QOL) for this population is unknown. The primary aim of this study was thus to examine these relationships.

Forty-eight adolescents participated in this cross-sectional study and completed the *SRS-22r*, the *PedsQL*, and the *A-COPE* during regularly scheduled orthopedic appointments. Treatment groups did not differ significantly on either dimension of coping (approach or avoidant) or on either measure of quality of life. In addition, neither dimension of coping moderated QOL. However, higher use of avoidant coping predicted lower QOL. In addition, QOL was comparable to healthy samples.

These findings suggest that, in general, AIS treatment does not significantly impair QOL, but use of avoidant coping does. Therefore, coping should be assessed to ascertain whether coping skills intervention is warranted in order to improve disease-specific QOL.

Table of Contents

List of Tables

Coping and Quality of Life for Adolescents with Idiopathic Scoliosis

Introduction and Background

Health-related quality of life is a construct that describes an individual's perception of how his or her health status impacts social, physical, and psychological functioning. Adolescents diagnosed with chronic health conditions such as Type 1 diabetes, asthma, and cancer report a decreased quality of life when compared to their healthy peers (Sawyer, Reynolds, Couper, French, Kennedy, et al., 2004). This negative relationship not only compromises the effectiveness of a particular treatment, but it more importantly places the physical and psychological health of the adolescent in jeopardy. Thus, factors that may predict, moderate, or mediate health-related quality of life for adolescents with chronic health conditions are of great interest.

Recent research with adolescents who have Type 1 diabetes indicates that coping is related to quality of life within this population. Specifically, adolescents who manage disease-specific stress with avoidant coping behaviors report lower quality of life, and adolescents who manage disease-specific stress with approach coping behaviors report higher quality of life (Graue, Wentzel-Larsen, Bru, Hanestad, & Søvik, 2004; Grey, Boland, Davidson, Li, & Tamborlane, 2000; Grey, Boland, Davidson, Yu, Sullivan-Bolyai , et al., 1998; Grey, Boland, Yu, Sullivan-Bolyai, & Tamborlane 1998). Identification of this relationship has been important to developing interventions that teach diabetic youth coping skills to manage disease-related stressors within the context of stressors related to adolescent developmental issues. The outcome of these interventions is often a higher quality of life, increased adherence, and decreased psychological distress (Grey, Boland, Davidson, Li, & Tamborlane, 2000; Grey et al., 1998).

Adolescents diagnosed with idiopathic scoliosis also experience stress due to characteristics associated with the treatment of their chronic health condition. However, few studies have been performed that directly measure how adolescents cope with these stressors. In addition, no studies have examined whether coping is related to quality of life for this population and whether coping may moderate or mediate the relationship between coping and quality of life. The following cross-sectional study is thus proposed to address these voids in hopes of increasing the knowledge on coping and quality of life for adolescents treated for idiopathic scoliosis.

Adolescent Idiopathic Scoliosis and Its Treatment

Idiopathic scoliosis is a chronic health condition often diagnosed in late childhood and early adolescence. This condition is distinguished by two features: lateral growth of the spine (at least ten degrees) and rotation of its vertebrae (Lyons, Boachie-Adjei, Podzius, & Podzius, 1999; Neuwirth & Osborn, 2001; Roach, 1999). While many theories have been postulated, there is no known cause for adolescent idiopathic scoliosis. Adolescent idiopathic scoliosis is suspected to be present in 2 to 4 percent of children and adolescents ages 10-16 (Reamy & Slakey, 2001). It is diagnosed equally in males and females but because the curve progression for females is more rapid, females are eight times more likely to be treated for this chronic health condition (Neuwirth & Osborn, 2001; Reamy & Slakey, 2001; Lyons et al., 1999). No information is available regarding prevalence rates by ethnicity (Mina, 2001).

Short-term complications associate of AIS are impeded growth and occasional discomfort and pain. If AIS is not treated and growth of the curve exceeds 45 degrees, then the individual is at high risk for respiratory and heart problems due to compacting of the lungs and subsequent stress on the heart. Long-term effects of untreated AIS have not been

extensively evaluated and thus are poorly understood. However, studies by Fowles, Drummond, Ecuyer, Roy, and Kassab (1978) and Weinstein, Dolan, Spratt, Peterson, Spoonamore, et al. (2003) provide evidence that some individuals with untreated scoliosis report shortness of breath during physical activities, chronic back pain, cosmetic concerns, and being self-conscious about appearance. While these reports do not indicate severe disability or decreased daily functioning, they do suggest that untreated idiopathic scoliosis has the potential to negatively affect quality of life.

Adolescent idiopathic scoliosis is most often detected by observation that one's shoulder is elevated or that a shoulder blade or section of the ribcage is protruding (Neuwirth & Osborn, 2001; Lyons et al, 1999; Pashman, 2005). In severe cases these features are physically apparent; when less severe, they may be detected when an adolescent is asked to bend and touch his or her toes. If scoliosis is suspected, the adolescent is referred to an orthopedic surgeon who will take a series of x-rays and conduct a series of walking and bending tests to determine the presence, severity, and degree of the spinal curvature. If the curve is less than 20º, then the orthopedic surgeon will usually recommend that the adolescent be watched, having additional evaluations every four to six months to determine if the curve has progressed and treatment is needed (Neuwirth & Osborn, 2001; Lyons et al, 1999). If the curve exceeds 20º, then the orthopedic surgeon will evaluate the severity of the curve and recommend either bracing or surgical treatment.

Bracing is prescribed for adolescents whose curves are between 20-45º. Additional factors that contribute to this selection of this treatment rather than spinal fusion surgery are pubertal stage and, for females, whether they have had their first menstrual period. Bracing is only prescribed for adolescents who are still experiencing physical growth. Those who have

ceased physical growth but who still fall in this category for degree of curve, will be

monitored to see if the curve worsens. Bracing treatment does not totally correct the curve.

Rather, pads on the brace push the spine straighter, providing some correction and forcing

vertical spinal growth instead of the lateral, twisting growth that is highly likely to occur if

the brace is not worn (Lyons et al., 1999; Neuwirth & Osborn, 2001; Pashman, 2005). Those

who are braced will still have a minor physical deformity when treatment is completed.

Adolescents are prescribed either a full-time bracing schedule (23 hours per day) or a

part-time bracing schedule (16-18 hours per day). Two types of braces are frequently

prescribed for these schedules. First, the Thoracolumbosacral orthosis (TLSO) braces are

low-profile and are prescribed for curves mid-back and below (Lyons et al, 1999; Neuwirth

& Osborn, 2001). While they must be worn 23 hours each day, they can be removed for

participation in sports or other physical activities. The Boston brace, one type of TLSO

brace, fits from below the breast-line to the top of the pelvic region, forcing the abdomen

inward and causing the spine to flex (Lyons et al, 1999; Neuwirth & Osborn, 2001). A

second type of brace that may be prescribed is the Charleston brace. It is the least restricting

type of brace and is only worn at night (Neuwirth & Osborn, 2001; Lyons et al, 1999). All

braces are tailor-made for each adolescent. A third type of brace that is prescribed much less

frequently due to advances in brace technology is the Milwaukee brace, which fits the

adolescent from underneath the chin to the end of the spine (Lyons et al, 1999; Neuwirth &

Osborn, 2001).

Bracing often successfully retards curve growth. However, in some cases the spine

may continue to curve due to either biological causes or deficient treatment adherence. If the

curve progresses beyond 45º, then an orthopedic surgeon is likely to recommend spinal

fusion surgery. The outcome of surgery will be a straighter spine with the exact number of degrees of the curve that will be corrected varying by individual (Lyons et al, 1999; Neuwirth & Osborn, 2001; Ullrich, 2001).

The adolescent is fully anesthetized during this surgical procedure. The orthopedic surgeon either makes an incision in the patient's back or chest cavity. Specific adjustments made to the spine will vary depending upon the degree and location of the curve. Most procedures involve attaching screws into the vertebrae above and below the portion of the spine that is curving. Next, rods (Harrington rods or Cotrel-Dubousset Instrumentation) are attached to the screws, which function to straighten the curved vertebrae. This process may take several hours, depending upon factors such as flexibility of the adolescent's spine and the surgeon's opinion of how much curve correction is possible. The installation of the corrective hardware is permanent unless it breaks or causes infection. Sometimes ribs may have to be removed in order for the best surgical outcome to be achieved. Finally, the straightened vertebrae are fused to prevent further growth of the corrected section of the spine. Surgery is only recommended in older adolescents and severe cases of AIS because the procedure impedes physical growth. Surgical complications are rare but may include extreme blood loss, infection, breaking of the installed hardware, spinal cord fluid leaks, and paralysis. Long-term complications can include failure of the spine to fuse or continuation of growth of the curve despite installation of the spinal hardware (Lyons et al, 1999; Neuwirth & Osborn, 2001; Ullrich, 2001).

Adolescents remain in the hospital approximately 4 to 9 days post-surgery. They are told to expect pain and discomfort after the surgery and are provided with morphine intravenously during their hospital stay. The adolescent is encouraged to roll and move in

bed (called "logrolling") in order to prevent stiffness while at the hospital and also once he or she has returned home (Lyons et al, 1999; Neuwirth & Osborn, 2001; Ullrich, 2001). Assistance with basic life skills such as dressing and bathing is often necessary until flexibility is regained. The adolescent is encouraged to walk about within the first two weeks post-surgery, and after approximately four weeks he or she is expected to be almost fully mobile. Strenuous activity is not permitted until at least a year after the surgery (Lyons et al, 1999; Neuwirth & Osborn, 2001).

The patient's school is notified about the surgical procedure and parents often request a tutor so that the adolescent does not fall behind academically. Orthopedic surgeons often also contact the employer of the primary care-giver, explaining the need for approximately a two to four week leave of absence to assist the adolescent with post-surgery recovery. Parents are often able to take a medical leave of absence and utilize sick and vacation days, but such efforts may not provide salary payment for the duration of the adolescent's recovery period (Mendelow, 2003). Surgery is costly, averaging from a low end of $50,000 up to $300,000 for more complicated cases. Percentages covered by insurance companies will differ.

From this brief introduction, it is possible to hypothesize that the characteristics of treatment for idiopathic scoliosis can be stressful and that these stressors may negatively impact physical, psychological, and social functioning and, subsequently, quality of life. It is important to evaluate how an adolescent copes with these changes, as coping may moderate quality of life. Examination of this relationship is still in its infancy.

The following topics will be presented in order to help understand why it is important to examine coping, quality of life, and the moderating role coping may play to quality of life

for adolescents with idiopathic scoliosis. First, an introduction to coping

theory/conceptualization and a brief review of adolescent coping literature will be provided;

this review will include the coping research for adolescents with Type 1 diabetes, which

serves as a foundation for an argument for the importance of investigating this topic for those

with idiopathic scoliosis. Second, the inferences drawn about coping and chronic illness will

be woven with an overview of the disease-specific stressors for adolescents with idiopathic

scoliosis. Third, health-related quality of life research for adolescents with Type 1 diabetes

and adolescent idiopathic scoliosis will be presented. Finally, the relationship between

coping and quality of life for adolescents with Type 1 diabetes will be reviewed, which will

highlight why similar research with adolescents with idiopathic scoliosis is so imperative.

Review of the Related Literature

Coping

Lazarus (1998) stated, "What makes the difference in adaptational outcome is coping,

and so we should give special attention to it in our research on human functioning," (p. 202).

Research has shown this to be particularly true for those transitioning to life with a chronic

health condition. In order for health care professionals to assist patients with their

adaptation, it is helpful to know how an individual copes with disease-specific stress and

what might be the positive or negative health and social consequences of using these coping

behaviors.

Coping refers to "constantly changing cognitive and behavioral efforts to manage

specific external and/or internal demands that are appraised as taxing or exceeding the

resources of the person," (Lazarus and Folkman, 1984, p. 141). In 1984, Lazarus and

Folkman published one of the most well known theories on stress and coping, which

discriminated two distinct functions, problem-focused coping and emotion-focused coping, within the larger construct of coping. Problem-focused coping includes behaviors performed to change a concrete stressor such as a person or environmental variable; emotion-focused coping includes behaviors used to change or manage negative emotions associated with the stressor.

This theory pioneered the field of coping but received much criticism because researchers were not certain that classification of coping behaviors by function was the best approach. Lazarus (1996) and others ultimately agreed and discouraged researchers from conceptualizing coping behaviors by function because "Ways of coping are *not* functions. They are actions that *have* functions" (Skinner, Edge, Altman, & Sherwood, 2003, p. 227).

A second methodology for conceptualizing coping is to use a dimensional approach. One commonly used dimensional structure is the classification of coping into the categories of approach and avoidant coping. This conceptualization of coping was selected for use in this exploratory study for two reasons. First, there is no gold-standard for how coping should be conceptualized and subsequently studied. The dimensions of approach and avoidant coping were selected for use in this study because of their higher use than other conceptualizations of coping within the adolescent coping literature (Griffith, Dubow, & Ippolito, 2000; Herman-Stahl, Stemmler, & Petersen, 1995; Renk & Creasey, 2003; Seiffge-Krenke, 2000; Seiffge-Krenke & Sklessinger, 2000). Second, the dimensions of approach and avoidant coping were selected for use in this study because the dimensional approach describes actual coping behaviors, as opposed to other conceptual approaches that describe functions of coping behaviors (Compas, Conner-Smith, Saltzman, & Wadsworth, 2001;

Skinner et al., 2003). Knowledge of the actual behaviors performed is preferred because it is behaviors that are often targeted for change during coping skills interventions.

The dimension of approach coping includes behaviors such as actively seeking support, taking actions to solve a problem, and/or reflecting on possible solutions to a problem; all are behaviors manifested in efforts to manage a problem (Seiffge-Krenke & Klessinger, 2000; Herman-Stahl et al., 1995). There are benefits and costs to using approach coping (Roth & Cohen, 1986). By using approach coping behaviors, an individual is learning that active problem-solving is often an effective manner of resolving stressful situations. Nevertheless, this coping style could immediately lead to increased stress and "nonproductive worry" as an individual must decide how best to solve a particular problem (Roth & Cohen, 1986, p. 817). In addition, the use of approach coping can be harmful when there is no solution to a particular problem (i.e. elimination of scoliosis), creating frustration for an individual as he or she ineffectively tries time and again to problem-solve how to alleviate the stress.

The dimension of avoidant coping includes behaviors such as denying that a problem exists, withdrawing from a problem situation, avoiding seeking support, and attempting to regulate emotions instead of dealing directly with a particular problem (Seiffge-Krenke & Klessinger, 2000; Herman-Stahl et al., 1995). Roth and Cohen (1986) describe the benefits of avoidant coping as reduction in immediate stress and an increased hope that the stressor will disappear on its own. In addition, avoiding a stressor provides an individual with a sense of mastery over the stressful situation as avoidance becomes a gratifying short-term coping mechanism. The costs for approach coping include disappointment (stressor is only temporarily suppressed), the possibility of emotional numbness, the tendency to avoid

information that a situation is actually dangerous, and avoidance of particular geographic locations, events, and other stimuli associated with the stressor because of worry associated with the stressor.

Coping, age, and gender. The predictive properties of age and gender have been examined in relation to use of approach and avoidant coping. Griffith et al. (2000) found that significantly more adolescents in the twelfth grade applied an approach coping style to manage stress than ninth or seventh graders who endorsed higher use of avoidant coping. Compas, Melcarne, and Fondacaro (1988) also found that younger adolescents (seventh and eighth grade) endorsed higher use of avoidant coping to mange stress. Similarly, Blanchard-Fields and Irion (1987) found that adolescents ages 14-16 use higher levels of avoidant coping.

Gender has also been examined as a predictor of coping style; however, a definite relationship is not clear. Plancherel and Bolognini (1995) found females self-reported significantly higher use of social relationships, ventilating feelings, self-reliance, and distraction coping behaviors; boys, significantly more humor and leisure activities. Piko (2001) found similar coping patterns for female adolescent participants. Although not specifically classified as avoidant coping by Piko (2001) and Plancherel and Bolognini (1995), the coping behaviors reported by females and males in these studies are similar to those described as avoidant coping by Seiffge-Krenke and Klessinger (2000) and Herman-Stahl et al. (1995).

The aforementioned studies review the predictive value of age and gender to use of approach and avoidant coping; more consistent evidence exists to support age as a predictor rather than gender. It is important to note, however, that between-studies comparisons with

respect to age and gender as predictors of adolescent use of approach and avoidant coping

may be confounded for four reasons. First, age grouping of adolescent participants across

studies differed: some were grouped by academic grade and others were grouped by

biological age. Second, different measures for coping were utilized in each study. Third, the

particular stressors referenced were not consistent across studies. Fourth, studies differed

with respect to their use of the approach and avoidant coping dimensions and, for those who

did use this dimensional approach, they differed in the coping behaviors that were placed in

the approach and avoidant coping categories.

Coping and psychological distress. When Lazarus and Folkman published Stress,

Appraisal, and Coping (1984), there was little research to confirm the speculation that coping

style predicted psychological distress. However, since 1984, researchers have made a

concerted effort to examine this potential link between use of approach or avoidant coping

and self-reports of depressive and anxious symptoms.

Prospective examination indicates a relationship between coping style and

psychological distress. Compas et al. (1988) found that adolescents who used less approach

coping reported greater difficulty adjusting to problems. In addition, those adolescents who

endorsed higher use of avoidant coping styles also reported more emotional and behavioral

problems. Wilkinson, Walford, and Espnes (2000) similarly found that adolescents who self-

reported increased use of avoidant coping endorsed higher levels of distress, negativity, and

more unpleasant events.

The relationship between approach and avoidant coping and psychological distress

has also been examined longitudinally in recognition that the development of psychological

distress may not be immediate. Herman-Stahl et al. (1995) measured coping for adolescents

over a two-year time period and found that use of approach coping behaviors predicted the

presence of fewer depressive symptoms; the opposite relationship was reported for avoidant

coping. These findings were supported by Seiffge-Krenke & Klessinger (2000). In addition

to noting a relationship between specific coping behaviors and presence of psychological

distress, Plancherel and Bolognini (1995) noticed this relationship also differed by gender.

For boys, ventilating coping (i.e., getting angry and yelling at others or blaming others for

what is going wrong) was positively correlated with anxiety and relaxation coping was

positively correlated with depression; for girls, positive correlations were found between

forming social relationships and anxiety, ventilation coping and anxiety, and ventilation

coping and depression. Negative correlations for females were found between depression and

use of humor, on the one hand, and using schoolwork as a distraction, on the other. Although

Plancherel and Bolognini did not categorize individual coping behaviors, the coping

behaviors of ventilating, relaxing, humor, and use of schoolwork as distraction are consistent

with behaviors comprising the avoidant coping dimension, and forming social relationships is

consistent with behaviors comprising the approach coping dimension.

In summary, some trends are evident with respect to adolescents' use of approach and

avoidant coping. Specifically, age and increased used of approach coping behaviors are

positively correlated, and age and use of avoidant coping behaviors are negatively correlated

(Compas et al., 1988; Griffith et al., 2000; Piko, 2001; Plancherel and Bolognini, 1995). In

addition, use of avoidant coping behaviors is positively correlated with psychological

distress, depressive symptoms in particular (Compas et al., 1998; Herman-Stahl et al., 1995;

Seiffge-Krenke & Klessinger, 2000; Wilkinson et al., 2000). What is not as clear is how

gender may predict adolescent coping. Between-studies comparisons may be confounded

because few studies used the same measures to assess coping. Thus, the specific coping

behaviors comprising the approach and avoidant coping dimensions differed between studies.

An additional confounding factor is that three studies (Herman-Stahl et al., 1995; Piko, 2001;

Plancherel & Bolognini, 1995) included samples of adolescents from countries other than the

United States. Thus, there may be cultural differences in expression and conceptualization of

coping.

Coping and Chronic Health Conditions

"The way in which children and adolescents cope with chronic health conditions is

considered as an increasingly important predictor of health in clinical and psychosocial

research," (Petersen, Schmidt, Bullinger, and the DISABKIDS Group, 2004, p. 635). The

literature reviewed thus far has examined adolescent coping in response to general stressors

in common domains such as school, family, and peers. Adolescents with a chronic health

condition must manage all of these common hassles at the same time as managing all of the

challenging stressors posed by their illness and its treatment. This task is not easy; thus,

considerable effort has been made to evaluate whether coping moderates or mediates quality

of life for those diagnosed with chronic health conditions. One population that has already

profited from the benefits of this research is adolescents diagnosed with Type 1 diabetes. The

adolescent idiopathic scoliosis literature is almost mute on this issue. Thus, the Type 1

diabetes literature will be used as a prototype for the current study.

Stress and management of type 1 diabetes. Diagnosis of Type 1 diabetes requires

several changes in one's daily routine. Performance of daily self-management behaviors such

as blood glucose monitoring, administering insulin injections, and counting carbohydrates are

stressful for adolescents (Delamater, 1992; Delamater, Kurtz, Bubb, White, & Santiago,

1987; Fisher, Delamater, Bertleson, & Kirkley, 1982; Kovacs, Brent, Steinberg, Paulauskas, & Reid, 1986). These behaviors must be performed to prevent short and long-term physical complications of Type 1 diabetes such as hyper-/hypoglycemia, kidney failure, limb amputation, and possibly death.

Stress experienced due to disease conditions and treatment requirements for diabetic youth have been examined within the context of adolescent developmental issues such as peer conformity and body image concerns, which can be negatively impacted by requirements for self-care (e.g., Allen, Affleck, Tennen, McGrade, & Ratzen, 1984; Madsen, Roisman, & Collins, 2002; Masten & Coatsworth, 1988). Performance of self-management behaviors for diabetic adolescents is difficult to conceal, as pricking one's finger and administering insulin injections is often apparent to others. Such behaviors may lead healthy peers to stigmatize diabetic youth.

Monitoring glucose and adhering to prescribed treatment are two of the most stressful aspects of treatment management for diabetic youth (Delamater, 1992; Delamater et al., 1987; Fisher et al., 1982; Kovacs et al., 1986). Adherence is negatively correlated with age for this population and may reflect the conflict experienced "when the developmental tasks of normal adolescent transition are coupled with the task demands for adherence," (Ingersoll and Marrero, 1991). Examples of conflict may include wanting to succumb to the peer pressure to drink but knowing the harmful biological effects of consuming alcohol on blood glucose level; wanting to become intimate with a boyfriend or girlfriend but being aware of the necessity of performing self-management behaviors; and wanting to take sole responsibility for treatment but realizing that some parental involvement is necessary (Madsen et al., 2002).

In addition to reports of the hardships of disease-management, adolescents with Type 1 diabetes commonly report symptoms of anxiety and depression. Grey, Cameron, Lipman, and Thurber (1994) found that diabetic adolescents self-reported significantly higher rates of trait anxiety than their healthy peers. Kovacs, Goldston, Obrosky, and Bonar (1997) found that 47.6% of their sample met diagnostic criteria for at least one psychiatric disorder (most commonly depression, anxiety, and behavioral disorders). Of particular significance is that the results found by Kovacs et al. (1997) and Grey, Cameron, Lipman, & Thurber (1995) occurred within the first year of diabetes diagnosis. There is also evidence that the symptoms of anxiety and depression may decrease after this one-year mark (Kovacs et al., 1997; Grey et al., 1995); however, the literature is not consistent about whether psychological distress subsides completely.

Adolescent coping with type 1 diabetes. How do diabetic adolescents cope with the many demands and stressors of their condition and how does coping impact health outcome? Delamater et al. (1987), Reid et al. (1994), Seiffge-Krenke and Stemmler (2003), and Graue et al. (2004) found that diabetic adolescents use a higher frequency of avoidant coping behaviors to manage disease-specific stress. Additionally, a longitudinal analysis revealed that initial coping behavior preferences of adolescents immediately following diagnosis of Type 1 diabetes did not change significantly over a one-year time period (Grey, Lipman, Cameron, & Thurber, 1997). Thus, if an adolescent is not able to initially cope with his or her condition, then the prognosis for improvement with the first year is poor.

Coping and adjustment. Use of avoidant coping has subsequently been linked with poor adjustment (defined by the evaluation of social, psychological, and physiological domains; Grey, Cameron, and Thurber, 1991) and poor metabolic control (Grey et al., 1991;

Grey et al., 1997). Furthermore, results of Delamater et al.'s (1987) evaluation of adolescent stress and metabolic control demonstrated that it was the specific coping styles adolescents used in their management of prescribed self-care behaviors, not level of overall perceived stress, which was related to degree of metabolic control. Two studies, however, did not find this relationship between avoidant coping and decreased metabolic control (Hanson, Cigrang, Harris, Carle, Relyea, et al., 1989; Kager & Holden, 1992).

Coping and adherence. The relationship between coping and adherence has also been evaluated. Hanson et al. (1989) found that ventilation and avoidant coping accounted for 10% of the variance in adherence to diet, insulin adjustment, glucose testing, and foot care after controlling for age and disease duration. Similar results were produced by Reid, Dubow, Carey, & Dura (1994), who found that coping style accounted for 8-15% of the variance in adherence behaviors after controlling for age and disease duration. In this same study, avoidant coping was positively correlated with decreased adherence to performing finger-pricks (glucose monitoring) whereas approach coping was positively correlated to adherence to prescribed diet.

In summary, the potential stressors associated with diagnosis of Type 1 diabetes may result in increased psychological distress and difficulty adjusting to life with this chronic health condition, and researchers have demonstrated that coping is related to both of these variables. The high frequency of use of avoidant coping behaviors and their negative impact on health and functioning for diabetic adolescents implies the need for similar research with adolescents diagnosed with idiopathic scoliosis. What follows is a discussion of disease-specific stressors that may be experienced in relation to brace wear and surgical treatment

and the potential impact of these stressors on functioning for adolescents with idiopathic scoliosis.

Stressors and Treatment for Idiopathic Scoliosis

 Bracing treatment. Several treatment stressors have been identified for adolescents who must wear a brace. First, brace wear is well documented to be physically uncomfortable. Ramirez, Johnston, Browne, and Vazquez (1999) retrospectively reviewed medical records of 303 patients and found that adolescents often reported "skin irritation, sensory nerve compression, …respiratory and renal problems," (p. 198). Accounts of such side effects are complemented in the self-reports of 31 adolescents interviewed by MacLean, Green, Pierre, and Ray (1989), who experienced stress due to "soreness, skin irritation, uncertainty about fit, difficulty breathing and eating, torn clothing and bed sheets, and discomfort while being seated" (p. 258). Additional physical stressors include "cardiac palpitation, lack of appetite, vertigo, sleeping disorder, …headache" (Freidel, Petermann, Reichel, Steiner, Warschburger, et al., 2002, p. E88). Ultimately this discomfort and pain may lead to decreased participation in physical activities and sports (Andersen, Anderson, Thomsen, & Christensen, 2002; MacLean et al., 1989).

 Second, there is some evidence that brace wear is related to decreased self-image. Two studies found that males with scoliosis had significantly lower body image scores and were more likely to believe that their body was developing abnormally compared to their healthy peers, while body image for females with AIS did not differ significantly from their healthy peers (Payne, Ogilvie, Resnick, Rober, Transfeldt, et al., 1997; Sapountzi-Krepia, Valavanis, Panteleakis, Zangana, Vlachojiannis, et al. (2001). In contrast to the female samples in Payne et al. (1997) and Sapountzi-Krepia et al. (2001), the female participants in

Noonan, Dolan, Jacobson, and Weinstein (1997) reported feeling dissatisfied with their appearance and discriminated against due to their appearance. Despite these findings, Ólafsson, Saraste, and Ahlgren (1999) and Saccomani, Vercellino, Rizzo, and Becchetti (1998) reported that adolescents with scoliosis did not differ significantly from healthy controls, which may be related to ceiling effects of the measures used in these studies.

Third, adolescents who must wear a brace report more stress with respect to social relationships. Research suggests adolescents may try to hide their back brace and that some try to keep others from knowing about their brace and diagnosis of idiopathic scoliosis (Andersen et al., 2002). In addition, it is harder for braced adolescents to follow fashion trends as their brace may stick out from underneath clothing (Dell & Regan, 1987; Nicholson et al., 2003; Reichel & Schanz, 2003). Furthermore, some braced adolescents report worries about being attractive to the opposite sex (Barrett, 1977; Andersen et al, 2002).

Understanding the sources of treatment-related stress is important as there is evidence that increased stress leads to decreased treatment adherence, which potentially worsens the adolescent's condition and may result in the need for spinal fusion surgery (Andersen et al., 2002; Nicholson et al., 2003; Vandal, Rivard, & Bradet, 1999). It can be hypothesized that treatment related stress increases with age because age is negatively correlated with treatment adherence (DiRaimondo & Green, 1988; Gurnham, 1983; Johnson, Kelly, Henretta, Cunningham, Tomer, & Silverstein, 1992; Karol, 2001; Takemitsu, Bowen, Rahman, Glutting, & Scott, 2004).

In summary, adolescents may experience stress due to bracing treatment. While the negative impact of physical discomfort is consistently documented across studies, more discrepancies are reported pertaining to the psychosocial and psychological impact of

this treatment modality. Direct comparison between these studies on stress is difficult due to differences in measurement and methodology. Generalization of the findings to American adolescents is also limited, as several of the studies were performed on Scandinavian and European adolescents (Andersen et al., 2002; Freidel et al., 2002; Ólafsson et al., 1999; Saccomani et al., 1998; Sapountzi-Krepia et al., 2001); thus, future research should replicate these studies with American samples.

Psychological distress and brace-wear. The prevalence of psychological distress, such as depression and anxiety, within the adolescent idiopathic scoliosis population received much attention in the 1970s and 1980s (Clayson & Levine, 1976; Gratz & Papalia-Finlay, 1984; Schatzinger, Nash, Drotar, & Hall, 1977; Wickers, Bunch, & Barnett, 1977); however, generalization of these findings to current patients is difficult because of improvements in brace structure technology. Since these advancements, three studies have investigated psychological distress in adolescents with idiopathic scoliosis. Kahanovitz and Weiser (1989) found that adolescents whose mothers perceived scoliosis and persons with this condition in a negative manner reported increased levels of depression, anger, fatigue, and confusion and that this correlation was stronger than that between treatment type and psychological distress. In contrast, Freidel et al. (2002) found that anxiety for adolescents with idiopathic scoliosis did not differ significantly from that of healthy adolescents. Payne et al. (1997) found that male adolescents with scoliosis were 10.3 times more likely to report suicidal thoughts; no such relationship was reported for females with scoliosis. In addition, both males and females in their sample reported higher use of alcohol than the healthy controls.

The information provided by Kahanovitz and Weiser (1989) and Payne et al. (1997) indicates that psychological distress may be associated with bracing treatment. Causal

attributions cannot be made, however, for several reasons. First, both studies were cross-sectional in their design; thus, no information is available to compare current levels of psychological distress with those prior to diagnosis with idiopathic scoliosis. Second, the accuracy of detection of psychological distress for both studies is limited due to their use of general measures of health to assess the psychological burden of idiopathic scoliosis. Only one study used an anxiety-specific measure; however, this study was conducted with a German population (Freidel et al., 2002). Thus generalization to an American population must be done cautiously. Third, the adolescents included in Payne et al.'s 1997 study self-reported whether they had idiopathic scoliosis. Diagnoses of idiopathic scoliosis were not confirmed by a physician, and it is unclear whether those adolescents were currently in treatment for their chronic condition; thus, these adolescents may differ from those who are currently being treated for a confirmed case of idiopathic scoliosis.

It is possible that adolescents with idiopathic scoliosis, similar to those with Type 1 diabetes, may experience symptoms of depression and anxiety due to the constant reminders of their chronic illness and its intrusion on normal daily functioning. They may feel frustrated because of potential limits on their physical activity, may feel self-conscious about wearing their brace, or may feel guilty because their medical condition is financially burdensome to their family. More research is needed before inferences can be drawn pertaining to the psychological and psychosocial burden of idiopathic scoliosis.

In summary, brace wear is stressful for adolescents. Specific stressors identified in the literature include pain/discomfort, self-image, and social relationships. However, evidence pertaining to the severity of the stressful nature of these variables is not uniform. Inconsistencies also exist regarding whether adolescents who are braced for treatment of

idiopathic scoliosis experience high levels of psychological distress. Thus, it is difficult to make inferences regarding the aspects of bracing treatment that are stressful and the impact of treatment-related stress. Future research should address these voids and also address how coping may moderate or mediate the intensity of the physical and psychological stressors suggested to contribute to decreased brace-wear adherence.

Surgical treatment. By the time they are diagnosed with idiopathic scoliosis, most adolescents have not undergone a major surgical procedure; thus, it can be hypothesized that spinal fusion surgery will be stressful. Adolescents may fear the actual procedure, may be anxious about post-surgical pain, or may be uncertain about how they will be treated once they return to school. Surprisingly, little research has addressed these issues. As will be discussed below, few studies have examined pre-surgical coping, post-surgical coping, and post-surgical quality of life. The research that has been conducted provides evidence that adolescents are concerned about surgery and experience high rates of pain. In addition, some evaluation of long-term quality of life for spinal fusion patients has been performed.

Pre-surgical Stress. Three studies have examined pre-surgical anxiety and procedural concerns. Nathan (1977) used projective measures to evaluate the relationship of denial of scoliosis to expectations for surgery and to the ability to cope with pre-surgical stressors. Individuals who did not draw a curve in their spine on their pre-post surgical self-portraits were labeled as "deniers." Females labeled as "deniers" had more unrealistic expectations and experienced heightened anxiety concerning the surgery and its possible negative side effects such as pain and physical appearance; ten of 18 participants were labeled as "deniers." Additional support for the presence of adolescent preoperative anxiety is supplied by LaMontagne, Hepworth, Johnson, & Cohen (1996) who found that preoperative

adolescents were anxious and that level of self-reported anxiety was positively correlated with parental level of anxiety. Finally, Bridwell, Shufflebarger, Lenke, Lowe, Betz, et al. (2000) found that the primary concern about spinal fusion surgery for both adolescents and parents was the potential for neurological damage. While both adolescents and parents agreed that the surgery was necessary to prevent consequences of untreated scoliosis and relief of pain, parents were more concerned about the procedure than adolescents.

Bridwell et al. (2000), LaMontagne, Hepworth, Cohen, and Salisbury (2003), LaMontagne et al. (1996), and Nathan (1977) provide evidence that adolescents and their parents may experience stress prior to spinal fusion surgery. However, methodological problems limit the validity of some of these studies. First, even though Nathan used rating scales specific to the projective measures included in her study, conclusions about adolescent performance on these projective measures are still subjective. Second, some of the pre- and post-surgical medical requirements for spinal fusion surgery that existed when Nathan conducted her study are outdated. For example, adolescents may have been anxious about having to wear a body cast for one year post-surgery, which is no longer a post-surgical requirement. Third, while Bridwell et al. (2000) were able to find that adolescents and parents expressed valid concerns about upcoming surgeries, no measures of psychological distress were administered; thus, it is not clear whether or how concerns affected pre-surgical or post-surgical functioning.

Post-surgical stress. Research examining post-surgical stress is minimal. Areas that have been examined, however, include whether the degree of post-surgical pain changes in the four days immediately following spinal fusion surgery, whether medication (such as morphine) is effective in reducing post-surgical pain, whether there are factors (such as age

or previous pain experience) that predict how much pain will be experienced upon completion of surgery, and whether there are long-term effects of spinal fusion surgery on physical and psychological functioning.

Three studies have examined post-surgical stress within the first four days after the spinal fusion procedure has been completed. First, Kotzer and Foster (2000) found that the level of patient-controlled analgesia (PCA) did not differ significantly during the first four days after spinal fusion surgery. In addition, adolescents reported "good" to "fair" satisfaction with the ability of PCA to decrease pain. Furthermore, observed pain behaviors significantly decreased over this four-day span. Despite the evidence suggesting that pain was relieved, adolescent self-reports indicated no significant reduction in the moderate to severe levels of pain experienced. Second, Kotzer (2000) found that older adolescents, those who had undergone a more severe operative procedure, and those who endorsed a lower pain tolerance reported higher post-surgical pain. Third, LaMontagne et al. (1996) found that some adolescents reported high levels of anxiety upon completion of spinal fusion surgery.

Two studies have examined how quickly adolescents return to regular activity participation. LaMontagne, Hepworth, Cohen, and Salisbury (2004) found that adolescent's self-reported general and social activity participation significantly decreased between pre- and one month post-surgery. While these activity levels significantly increased from one to three months as well as from three to six months, they did not represent a return to pre-surgical level of activity. These results are both supported and contradicted by Asher, Lai, Burton, and Manna (2003*c*); specifically, participants in Asher et al. reported a significant decrease in activity in the first three months post-surgery but also reported a return to baseline level of activity at six months.

Several conclusions and questions can be posed when synthesizing the results presented by LaMontagne et al. (2004), Asher et al. (2003*c*), Kotzer and Foster (2000), Kotzer (2000), and LaMontagne et al. (1996). First, Kotzer and Foster note that pain medication was unsuccessful in eliminating all post-surgical pain; thus, additional research should examine non-medicinal interventions that may be required to assist adolescents with surgical recovery. Second, Kotzer and Foster found differences in pain as reported by adolescents versus observers; thus, additional research should examine factors contributing to and the consequences of such discrepancies. Third, while Kotzer (2000) found that age, severity of surgical procedure, and pain tolerance predicted pain, the predictive value of these factors was low; thus, additional research should examine how variables such as coping style may better predict post-surgical pain. Fourth, it is not clear how quickly adolescents who undergo spinal fusion surgery will return to pre-surgical level of activity participation (LaMontagne et al., 2004; Asher et al., 2003*c*); thus, additional research should examine how factors such as maladaptive coping with post-surgical stress may be related to speed of post-surgical recovery.

In summary, this small body of research suggests that adolescents experience stress both prior to and immediately after spinal fusion surgery. Adolescents and their parents are concerned with the physical impact of the spinal fusion procedure (Nathan, 1977; Bridwell et al., 2000); the findings that pain remains in the moderate to severe range for the four days immediately following surgery (Kotzer et al., 2000) validates adolescent worries. Lingering pain (Kotzer and Foster, 2000; Kotzer, 2000; LaMontagne et al., 1996) and reports of heightened anxiety (LaMontagne et al., 2004) are particularly concerning. In addition, conflicting results regarding return to pre-surgical activity level indicate that the move from

the hospital to home and eventually back to school and peers may be delayed. Preliminary research has indicated that pre-surgical coping skills interventions may be effective in reducing the degree of pain reported in the first four days after spinal fusion surgery (LaMontagne et al., 2004; LaMontagne et al., 2003; LaMontagne et al., 2003); these studies do not, however, directly assess the constructs of coping and quality of life. Thus, future research should do such direct measurement and examine how coping may moderate and/or mediate the physical and psychological stressors inherent in the pre- and post-surgical experience and subsequently moderate and/or mediate post-surgical quality of life.

Coping of Adolescents with Idiopathic Scoliosis

Despite the multitude of hypothesized stressors, little research has focused on how adolescents cope with treatment of idiopathic scoliosis. Two studies have indirectly examined coping in adolescents who were braced for treatment of idiopathic scoliosis (MacLean et al., 1989; Myers, Friedman, & Weiner, 1970). In both studies, coping was defined as adjustment, which was then evaluated by parental report of adolescent participation in physical and social activities, parental observed and adolescent self-reported levels of psychological distress, and adolescent completion of projective measures. Despite differences in their methodologies, both MacLean et al. (1989) and Myers et al. (1970) found that adolescents had the most difficulty coping during the initial phases (first month post-diagnosis) of bracing. Specifically, 60% of the participants in Myers et al. and 48% of the participants in MacLean et al. reported crying and feeling fearful and anxious about having to wear a brace. In addition, several of the females in both studies reported socially withdrawing shortly after bracing treatment began.

Coping has also been minimally investigated for adolescents who undergo spinal fusion surgery. A modified version of the Preoperative Mode of Coping Interview (PMCI; LaMontagne, 1987; LaMontagne 1984) was administered to pre-surgical adolescents in two separate studies (LaMontagne, Johnson, Hepworth, & Johnson, 1997; LaMontagne et al., 1996). Older adolescents in both studies endorsed higher use of vigilant coping; younger adolescents, avoidant coping.

Finally, two studies have evaluated coping with sample populations that included both braced and surgically treated adolescents (Anderson, Asher, Clark, Orrick, & Quiason, 1979; Scoloveno, Yarcheski, & Mahon, 1990). Anderson et al. found that coping (defined as how much an adolescent identified with her disability as measured by the *Attitudes Toward Disability Test;* Bontrager, 1965) predicted adjustment (defined as positive self-concept) for females being treated for idiopathic scoliosis. Specifically, adolescents who mildly denied and ignored their disability had the best outcome; differences in coping between braced and surgically treated adolescents were not investigated. Scoloveno et al. (1990) directly measured coping style with the Jalowiec Coping Scale (JCS; Jalowiec & Powers, 1981) and found that coping style preference differentiated adolescents in the bracing and surgical treatment groups. Specifically, adolescents who were braced endorsed less problem-solving coping.

Taken in sum, this small body of research presents a limited view of how adolescents with idiopathic scoliosis cope with disease and treatment-specific stressors. One reason for this lack of clarity is that only three studies (Scoloveno et al., 1990; LaMontagne, 1987; LaMontagne, 1984) used measures specific to the evaluation of coping style; direct comparison between studies is, however, limited because of differences in the measures used

to assess coping style. Secondly, several studies equated coping with adjustment; thus, results pertain more to understanding outcome rather than to understanding the process of coping.

Health-Related Quality of Life and its Measurement

Varni, Seid, and Rode (1999) describe health-related quality of life as "a patient's perceptions of the impact of disease and treatment functioning in a variety of dimensions including physical, mental, and social domains," (p. 126). Assessment of health-related quality of life is important for several reasons. First, it allows health care professionals to understand not only the impact of a chronic health condition on biological functioning, but also how such a diagnosis and its treatment may impact social and/or psychological functioning. Second, it allows health care professionals and researchers to compare how functioning and health-related quality of life may change as individuals progress through various stages of a chronic health condition; thus, preparations for and alterations to treatment can be made to help ease transitions through various disease treatment stages. Third, it allows health care professionals and researchers to compare how various aspects of functioning and quality of life may differ for individuals prescribed different treatments for the same chronic condition; thus, health care professionals will be better able to prepare individuals for how treatment may impact physical, mental, and social functioning, and recommend additional, non-biological treatments that may help to prevent decreases in those areas of functioning.

Health-related quality of life can be evaluated with either generic or disease-specific measures. The World Health Organization (1948) declared that, regardless of their specificity, measures of health-related quality of life should include assessment of the three functional domains (physical, mental, and social) mentioned by Varni et al. (1999) in order to

capture the true impact of a chronic health condition. Selection of a generic or disease-specific measure will depend upon the specificity of information desired, posed hypotheses or research questions, and availability of valid questionnaires for specific populations. Sawyer et al. (2004) noted that advantages of using generic health-related quality of life measures include the ability to compare individuals across chronic health conditions as well as to compare those with chronic health conditions to those who are healthy. Such measures do not, however, allow for assessment of the impact of disease-specific symptom and treatment stressors. Thus, an advantage of disease-specific health-related quality of life measures is that they can evaluate the impact of such stressors.

Children and adolescents diagnosed with chronic health conditions report a significantly lower health-related quality of life than their healthy peers (Sawyer et al., 2004). Research with diabetic youth shows that such a decrease often compromises effective treatment, with demonstrated relationships between low health-related quality of life and poor metabolic control and decreased adherence to self-management behaviors (Grey et al., 1998; Guttman-Bauman, Flaherty, Strugger, & McEvoy, 1998; Ingersoll & Marrero, 1991; Hesketh, Wake, & Cameron, 2004; Hoey, Aanstoot, Chiarelli, Daneman, Dane, et al., 2001). It can be hypothesized that treatment complications could further decrease adolescent health-related quality of life due to the likely development of physical and psychological complications associated with poorly managed diabetes.

Quality of life for those with adolescent idiopathic scoliosis. A modest body of literature exists reflecting the health-related quality of life of individuals with idiopathic scoliosis. Specific questions that have been addressed include whether health-related quality of life differs among the adolescent idiopathic scoliosis treatment groups (watchful waiting,

braced, post-surgery) and between adolescents with and without idiopathic scoliosis. A greater emphasis has been placed on whether there are differences in long-term quality of life for those in different treatment groups and for those with and without idiopathic scoliosis. This is surprising given the great level of stress experienced by adolescents who are currently in treatment. Summarizing across studies about health-related quality of life for this population is not easy, however, because investigators have used a variety of generic and disease-specific health-related quality of life measures and because of inconsistency and lack of replication of research findings. A brief review of the literature on health-related quality of life for individuals with idiopathic scoliosis will now be presented, beginning with information learned via use of generic health-related quality of life measures and concluding with information learned via use of disease-specific health-related quality of life measures.

Generic measurement. Three studies have used generic measures to examine quality of life for those with idiopathic scoliosis. Freidel et al. (2002) compared quality of life between adolescents who were currently in bracing treatment, young adults (ages 17-21) who had just completed bracing treatment, and adults who had completed treatment approximately seven years earlier. Participants under age 21 completed the Berner Questionnaire for Well-Being (BFW: Grob, Lüthi, Kaiser, et al., 1988); those ages 21 and over, the German translated version of the SF-36 (Ware, 1996; Bullinger & Kirchberger, 1998). Regardless of age, quality of life was significantly lower for those with idiopathic scoliosis compared to individuals in the normative population and healthy controls (young adults and adults). Those with idiopathic scoliosis in the 17-21 age group reported higher physical functioning than those over age 21. Both young adults and adults with idiopathic scoliosis also reported greater impairment in their mental health and scored significantly

lower on all domains of the SF-36 except physical functioning and general health than a sub-sample of the control group who reported back pain.

Three additional studies have used translated versions of the SF-36 (Ware & Sherbourne, 1992; Sullivan, Karlsson, & Ware, 1994; Apolone & Mosconi, 1998) to assess quality of life for those who had already completed treatment for idiopathic scoliosis. In contrast to the studies by Götze, Liljenqvist, Slomka, Götze, & Steinbeck (2002) and Freidel et al. (2002), Padua, Padua, Aulisa, Ceccarelli, Padua, et al. (2001) and Danielsson, Wiklund, Pehrsson, and Nachemson (2001) found that adults with idiopathic scoliosis scored significantly lower than healthy adults on the physical functioning domain of the SF-36. Discrepancies regarding mental health are also apparent. Specifically, Götze et al. (2002) and Padua et al. (2001) found surgically treated participants scored significantly worse on the mental health domain of the SF-36 than the normative values for the SF-36 and/or than healthy controls; a similar relationship was reported for braced participants in Freidel et al. In contrast to the findings by Götze et al., Padua et al., Freidel et al., and Danielsson et al., (2001) found that braced participants did not differ significantly with respect to mental health from healthy controls. A similar relationship with respect to mental health was evident for post-surgical patients and healthy controls.

Padua et al. (2001) and Danielsson et al. (2001) also compared quality of life as reported via generic and disease specific quality of life measures. Danielsson et al. found individuals in the treatment groups reported significantly lower scores on the physical functioning, bodily pain, and general health domains of the SF-36. Participants also completed the Oswestry Disability Back Pain Questionnaire, the SRS/MODEM'S questionnaire, and specific questions about treatment generated by the researchers. One

particularly interesting finding from these disease-specific quality of life questionnaires was that participants who underwent spinal fusion surgery felt that they received higher levels of social support and were treated better by their friends than adolescent participants who were braced. Comparison of results from generic and disease specific quality of life measures by Padua et al. (2001) also produced an interesting finding: patients who had previously completed spinal fusion surgery indicated virtually no pain on the Roland Disability Questionnaire (disease-specific), yet indicated significantly higher physical functioning impairment on the SF-36 (generic).

A third study to compare results of generic versus disease-specific measures of quality of life was performed by Ugwonali, Lomas, Choe, Hyman, Lee, et al. (2004). Unlike Götze et al. (2002), Danielsson et al. (2001), and Padua et al. (2001), all participants in the sample recruited by Ugwonali et al. were currently in treatment (watchful waiting or bracing). However, it was the parents who completed a generic (Child Health Questionnaire; CHQ; Landgraf, Abetz, & Ware, 1996) and a disease-specific measure (Pediatric Outcomes Data Collection Instrument; PODCI; American Academy of Orthopedic Surgeons, 1997) to describe quality of life for the adolescents described in their study.

Quality of life for adolescents who were braced, as assessed by the generic measure, did not differ significantly from adolescents who were being watched. However, adolescents who were being watched reported significantly higher scores on the global functioning and symptoms domain and significantly lower scores on the expectations domain than adolescents who were braced. What is of particular interest is that parents indicated that adolescents with idiopathic scoliosis had higher physical and psychosocial functioning than the healthy adolescents used in the normative samples for the CHQ and the PODCI.

The four studies that have used either only generic measures or a combination of generic and specific measures suggest that those who are treated for idiopathic scoliosis report decreased quality of life both during and after treatment is completed. However, between-studies comparisons and generalization of their collective conclusions are limited for four reasons. First, only two studies (Ugwonali et al., 2004; Freidel et al., 2002) examined quality of life for adolescents currently in treatment for idiopathic scoliosis. Second, Ugwonali et al. (2004) used parent-proxy reports, which the literature suggests may not accurately represent actual adolescent quality of life (Rinella, Lenke, Peelle, Edwards, Bridwell, et al., 2004; Levi and Drotar, 1998). Third, the samples recruited by Freidel et al. (2002) and Götze et al. (2002) were German, that by Padua et al. (2001) was Italian, and that by Danielsson et al. (2001) was Swedish. Thus, it is possible that cultural differences in how health-related quality of life is conceptualized will influence how it is reported, despite using translated versions of the same measure. Fourth, the validity of solely using generic measure to capture the impact of idiopathic scoliosis is questionable, as more precise information about quality of life has been gained via use of disease-specific measures (Ugwonali et al., 2004; Danielsson et al., 2001; Padua et al., 2001).

Disease-specific measurement. Disease-specific health-related quality of life measures may more accurately capture the impact of idiopathic scoliosis because they assess how specific disease-specific stressors alter physical, psychological, and psychosocial functioning. Several measures have been developed to assess health-related quality of life for individuals with idiopathic scoliosis, including the Pediatric Outcomes Data Collection Instrument (PODCI; American Academy of Orthopaedic Surgeons, 1997), the Oswestry Low Back Pain Disability Questionnaire (Fairbank, Couper, Davies, & O'Brien, 1980), the

Quality of Life Instrument for Adolescents with Spine Deformities (QLPSD; Climent, Sánchez, and the Group for the Study of Quality of Life in Spine Deformities, 1999) and the Scoliosis Research Society Outcomes Instrument-22r (SRS-22r; Asher, Lai, Glattes, Burton, Alanay, et al., 2006). These measures have been administered to evaluate the health-related quality of life for those in the bracing, surgery, and watchful waiting treatment groups as well as between adolescents with and without idiopathic scoliosis. In addition, they have been instrumental in providing information on whether variables such as gender, age, ethnicity, and degree of scoliotic curve can predict health-related quality of life.

One study used disease-specific measures to retrospectively examine quality of life for adolescents who were braced. Climent et al., (1999) administered the QLPSD and found that quality of life differed significantly by the type of brace prescribed. Specifically, individuals who had worn the Milwaukee brace reported the lowest quality of life and those who wore the Charleston brace reported the highest; individuals who wore the Boston brace or the TLSO brace fell midway between the quality of life reports for the other two bracing groups.

Two studies have examined differences in health-related quality of life/quality of life for adolescents in different treatment groups. Climent, Reig, Sánchez, and Roda (1995) found that quality of life for braced adolescents was significantly lower than those who underwent spinal fusion surgery and those who were performing prescribed exercises. Asher et al. (2003c), also found that health-related quality of life differed by treatment group. Specifically, adolescents scheduled for spinal fusion surgery reported lower health-related quality of life than adolescents who were being braced or watched.

Three studies have examined gender differences in health-related quality of life. Climent et al. (1995) found that braced female adolescents reported lower quality of life than braced males. Some evidence exists that this gender relationship does not exist for adolescents who are surgically treated (Helenius, Remes, Yrjönen, Yikoski, Schlenzka, et al., 2005; Wilson, Newton, Wenger, Haher, Merola, et al., 2002).

The impact of degree of curve on quality of life is also not clear. Wilson et al. (2002) and Asher et al. (2003*c*) found a negative correlation between post-surgical curve size and quality of life. In addition, Asher et al. noted that 25% of the variance in scores on the self-image domain of the health-related quality of life measure used in their study was accounted for by post-surgical curve size. In contrast, Rinella et al. (2004) found that post-surgical scoliotic curve size did not predict health-related quality of life.

Studies using disease-specific measures also suggest that those who are treated for idiopathic scoliosis report decreased quality of life both during and after treatment. There are, however, several factors that limit between-studies comparisons of studies using disease-specific measures and generalization of their collective conclusions. First, due to specificity of questions on disease-specific measures, few studies compared idiopathic scoliosis to healthy individuals. Second, only two studies examined differences among adolescents in different treatment groups (Climent et al., 1995; Asher et al., 2003*c*), and these findings contradicted each other with respect to which treatment group had higher quality of life. Third, a majority of the studies using disease-specific measures included only surgical patients. And fourth, investigators used different health-related quality of life/quality of life measures across studies (e.g., QLPSD and SRS-22), which may have conceptualized and assessed the construct of health-related quality of life in a different manner.

In summary, synthesis of the results from studies using generic, disease-specific, and a combination of generic and disease-specific measures suggests that individuals treated for idiopathic scoliosis may experience diminished health-related quality of life in some domains. In addition, it appears that use of disease-specific measures alone or use of a disease-specific measure with a generic measure produces the most clarity on how idiopathic scoliosis and its treatment impacts functioning. Further investigation must be done to increase the knowledge about how health-related quality of life may differ for individuals in different scoliosis treatment groups and also whether those with idiopathic scoliosis have a lower health-related quality of life than their healthy counterparts.

Coping and Quality of Life for Adolescents with a Chronic Health Condition

Adolescents living with chronic health conditions like AIS face a unique set of disease-specific stressors that may disrupt physical, psychological, and social functioning, domains which comprise what is usually assessed by quality of life measures. The disruption to quality of life may be moderated or mediated by coping, which is suggested in the adolescent diabetes literature that is reviewed below. Specifically, diabetic adolescents who used avoidant coping behaviors reported lower quality of life; those who used approach coping behaviors reported higher quality of life. Additional support for the relationship between coping and quality of life is provided by the marked increase in quality of life for adolescents who completed a disease-specific coping skills training course (Grey et al., 2000; Grey et al., 1998).

While it can be hypothesized that coping may be similarly related to quality of life for those with adolescent idiopathic scoliosis, only three studies to date have indirectly examined this potential relationship (LaMontagne et al., 2004; LaMontagne et al., 2003; LaMontagne,

Hepworth, Salisbury & Cohen, 2003). A brief review of the literature on coping and quality

of life for adolescents with Type 1 diabetes will be presented to make clear the necessity and

importance of similar research with adolescents who have idiopathic scoliosis. This review

will be followed by a presentation of the findings from LaMontagne et al. (2004),

LaMontagne et al., (2003) and LaMontagne et al. (2003) which, when placed in context of

the research with adolescents with Type 1 diabetes, provides evidence for the need of further

investigation of the mediating role coping for the quality of life for adolescents with

idiopathic scoliosis.

 Coping and quality of life for adolescents with type 1 diabetes. Two studies have

found a relationship between coping and quality of life for diabetic youth. First, Grey et al.

(1998) found that adolescents who reported a decreased quality of life also reported difficulty

coping with diabetes. In addition, these adolescents endorsed higher use of rebellious (such

as not following rules on purpose) and ventilating (such as yelling) behaviors to cope with

their condition. Graue et al. (2004) found that increased use of active coping (such as taking

direct action to address problems) was associated with increased quality of life.

 The positive impact of using problem-solving coping styles was also demonstrated in

the Adolescents Benefit from Control (ABCs) of Diabetes Study (Grey et al., 1998).

Adolescents in the control group of this large study participated in a coping skills training

course, which taught problem-solving and conflict resolution skills and required adolescents

to use those new skills in role-plays of problem situations often encountered by those with

diabetes. At three months after the intervention, adolescents who had received coping skills

training reported being less upset by their diabetes, that their diabetes had less of a negative

impact on quality of life, and that it was easier to cope with their illness than diabetic

adolescents who did not receive coping skills training. Furthermore, adolescents in the

treatment group showed improvement in treatment adherence, suggesting that improvement

of coping skills was related to increased ability to perform self-management behaviors. These

gains were maintained at 12 month follow-up assessment (Grey et al., 2000).

Coping and quality of life for adolescents with idiopathic scoliosis. Despite the

multitude of stressors adolescents with idiopathic scoliosis may experience due to their

condition, only five studies have examined the relationship between coping and quality of

life for this population. Although no direct measure of quality of life was included in these

studies, the domains assessed are similar to those the World Health Organization (1948)

specifies as comprising the construct of health-related quality of life. Thus, this collection of

studies is the closest representation of examination of the relationship between coping and

quality of life for adolescents with idiopathic scoliosis.

Two studies have examined whether coping accounted for a significant amount of the

variance in post-surgical anxiety and activity participation (LaMontagne et al., 1997;

LaMontagne et al., 1996). Specifically, use of avoidant coping was related to decreased

anxiety two days after spinal fusion surgery, and use of vigilant coping was related to

increased activity participation three months after spinal fusion surgery.

Three studies have examined the impact of coping skills intervention on post-surgical

anxiety, pain, and participation in activities (LaMontagne et al., 2004; LaMontagne et al.,

2003; LaMontagne et al., 2003). Adolescents in these three studies were randomly divided

into one of the following intervention groups prior to spinal fusion surgery: concrete-

objective information only (details about technical aspects of spinal fusion surgery as well as

likely physical impact), coping skills training only (provided coping skills to be used after

surgery), and coping skills training plus concrete-objective information (combination of the aforementioned treatment components).

The coping plus concrete-objective information intervention was the most effective in reducing postoperative anxiety when preoperative anxiety levels were high; if preoperative levels of anxiety were low, however, then the information only and coping only interventions were more effective. In addition, all adolescents except those in the coping skills training only group reported a significant decrease in postoperative pain. These results pertaining to pain were contradicted when LaMontagne et al. (2003) reassessed only the responses from the younger adolescents. Specifically, only adolescents in the coping intervention reported a significant decrease in pain two days after surgery and only those in the coping and the coping plus concrete-objective information reported significantly lower levels of pain four days after surgery. Finally, LaMontagne et al. (2004) found that younger adolescents in the coping plus information intervention group demonstrated a significant increase in social activity participation compared to those in the coping intervention.

In sum, adolescents diagnosed with idiopathic scoliosis who receive coping skills training may be better able to cope with post-surgical pain. Future research needs to be conducted not only to attempt to replicate these findings but also to determine whether similar interventions may be helpful for those who are braced and those who are being watched to increase positive coping skills for the management of disease-specific stressors. In addition, long-term follow-up with those who do receive interventions would provide insight as to whether the interventions impact ratings of quality of life both during and after adolescence.

Proposed study

Rationale

The research on idiopathic scoliosis is restricted to a narrow band of topics and covers only a small section of the variables that may moderate or mediate health-related quality of life for adolescents with this chronic health condition. Inconsistencies in terminology and lack of standardization in measurement and research methodology complicate drawing definitive conclusions about the impact of treatment on physical, psychological, and psychosocial functioning for adolescents in this population. Furthermore, several studies have been retrospective, asking adults to complete survey measures about scoliosis treatment during their adolescent years. Perhaps what is most surprising is that few studies have directly evaluated coping styles used to by this population to manage disease-specific stressors. In addition, it is peculiar that the potential moderating or mediating role of coping has not been evaluated in the small body of research examining factors that may predict quality of life for this population. The following study is proposed to address the void of research concerning coping and quality of life for adolescents with idiopathic scoliosis.

Research questions

The primary research question of interest is whether coping moderates the relationship between treatment group and quality of life for those in treatment for idiopathic scoliosis. Specifically, does coping influence the strength of the relationship between treatment type and quality of life? Four preliminary questions must be addressed before the primary question can be examined. First, do adolescents use approach or avoidant coping to manage stress related to their chronic health condition? Second, do treatment groups differ significantly in their use of approach and avoidant coping? Third, how do adolescents

currently being treated for idiopathic scoliosis perceive their quality of life? Finally, does quality of life differ significantly by treatment group?

Hypotheses

Four sets of hypotheses were suggested based upon trends and inferences drawn from the coping and quality of life literature for adolescents diagnosed with idiopathic scoliosis and Type 1 diabetes. The preliminary research questions are presented first as they guided the selection of data analysis strategies to assess whether coping was a moderating or mediating variable for quality of life within this population.

First, the literature suggests that diabetic adolescents are more likely to use avoidant coping (Seiffge-Krenke & Stemmler, 2003; Reid et al., 1994) and coping behaviors consistent with those of an avoidant coping style (Graue et al., 2004; Delamater et al., 1987) to manage disease-specific stressors; no such trend is evident in the small body of literature on coping styles used by adolescents with idiopathic scoliosis. What is implied, however, is that coping style preference differs significantly among the three treatment conditions (LaMontagne et al., 1997; LaMontagne et al., 1996; Scoloveno et al., 1990). Thus, it was hypothesized for this study that coping style preference would differ significantly by treatment group for those with adolescent idiopathic scoliosis as specified below.

Treatment for adolescents in the watchful waiting group consists only of attending check-up appointments every three to six months to ensure their curve has not progressed. Consequentially, they may not often think of or be reminded daily of their chronic health condition because they are not actively in treatment and because they often do not have activity restrictions. Therefore, adolescents who are in the watchful waiting treatment group may experience minimal stress due to their conditions, feel as though they can manage these

stressors, and subsequently may feel as though they have more control over their health with respect to their AIS. Thus, it was hypothesized for this study that adolescents in the watchful waiting treatment group would use significantly more approach coping behaviors to manage disease-specific stressors than the braced or post-surgical treatment groups.

Treatment for adolescents in the bracing group entails wearing a back brace 16-24 hours per day each day for several months and/or years. The literature suggests wearing a back brace is stressful physically, socially, and psychologically. In addition, the duration of these stressors continues for years with no overt avenue open to the adolescent to exert control over their treatment. This inability to gain control could be particularly frustrating for adolescents, especially as treatment for AIS tends to steer adolescents off course with respect to developmental goals such as being similar in appearance to their peers. Thus, it was hypothesized that adolescents in the bracing group would use significantly more avoidant coping behaviors to manage disease-specific stressors than adolescents in the watchful waiting or post-surgical treatment groups.

Treatment for adolescents in the post-surgical group includes a highly invasive surgical procedure resulting in fairly large scars across the back or abdomen. In addition, adolescents experience at least one month of extremely restricted activity and absence from school for recovery. Adolescents who are surgically treated experience stress prior to and immediately after surgery (LaMontagne et al., 2004; LaMontagne et al., 2003 *a, b*; Bridwell et al., 2000; Kotzer et al, 2000; Nathan, 1977). However, quality of life improves significantly as time since surgery increases (Asher, Lai, Burton, & Manna, 2003*b*). Inclusion criteria for this study specified that post-surgical adolescents should be at least six months post-surgery, which increases the likelihood that they were beyond the pain and

decreased functioning that is common immediately following spinal fusion surgery. Thus, it was hypothesized for this study that, similar to adolescents in the watchful waiting treatment group, adolescents who had spinal fusion surgery for treatment of idiopathic scoliosis would use significantly more approach coping behaviors than braced adolescents to manage disease-specific stressors.

Second, adolescents who are diagnosed with a chronic illness commonly report a significantly lower quality of life than their healthy peers (Sawyer et al., 2004). The existing literature does not provide definitive guidance regarding the disease impact on quality of life for adolescents being treated for idiopathic scoliosis. However, the literature does suggest that adolescents with this chronic condition cannot progress through this developmental period in a manner similar to their healthy peers. Thus, it was hypothesized for this study that adolescents being treated for idiopathic scoliosis would be significantly more likely to endorse a low quality of life. Specifically, it was hypothesized that adolescents would have significantly lower PedsQL mean scores than the PedsQL mean scores for healthy adolescents (Chan, Mangione-Smith, Burwinkle, Rosen, & Varni, 2003; Varni, Seid, Knight, Uzark, & Szer, 2002; Varni, Seid, & Kurtin, 2001; Seid, Varni, & Jacobs, 2000; Varni et al., 1999). In addition, it was hypothesized that adolescents in all treatment groups in the current study would obtain mean scores on the SRS-22r (Asher et al., 2006) equal to or within one standard deviation of the mean scores on the SRS-22r for a similar group of adolescents with AIS (Asher et al., 2006). This method of comparison was chosen because no normative values are available for the SRS-22r. Therefore, analyzing the data in this manner compared the mean values for the current sample with 34% of the comparison sample populations

within one standard deviation of either side of the mean, as is specified by distributions under the normal curve.

Third, the existing idiopathic scoliosis literature provides insufficient evidence from which to infer whether quality of life differs significantly by treatment group. However, the following hypotheses were suggested based upon the minimal information available and in light of the differences in treatment requirements and the acute versus chronic nature of individual treatment types. Adolescents in the bracing group must put on and take off their braces each day for several months or years. Thus, it was hypothesized for this study that adolescents in this treatment group would report significantly lower quality of life scores than adolescents in the watchful waiting and surgical treatment groups. Adolescents who receive spinal fusion surgery endure a highly invasive surgery but are expected to return to full activity within one year of surgery. Thus, it was hypothesized for this study that adolescents in this treatment group would report quality of life scores significantly higher than adolescents in the bracing treatment group but significantly lower than adolescents in the watchful waiting treatment group.

Finally, trends in the literature suggest a negative correlation between avoidant coping and quality of life and a positive correlation between approach coping and quality of life for adolescents diagnosed with Type 1 diabetes (Graue et al., 2004; Grey et al., 2000; Grey et al., 1998; Grey et al.1997; Grey et al. 1991; Reid et al., 1994; Seiffege-Krenke & Klessinger, 2000). Thus, it was hypothesized for this study that similar significant relationships would exist for adolescents being treated for idiopathic scoliosis. While it is possible to infer that coping is related to quality of life, no formal investigations have examined whether coping would either moderate or mediate quality of life for adolescents

with idiopathic scoliosis. The minimal coping literature available for adolescents with AIS suggests that the coping behaviors adolescents use to manage disease-specific stress influenced post-surgical level of anxiety and level of activity participation. Thus, it was hypothesized for this study that coping would moderate quality of life for adolescents being treated for idiopathic scoliosis.

In summary, four sets of hypotheses were examined in this study.

1.   Coping style preference would differ significantly by treatment group. Specifically, adolescents in the bracing treatment group would be significantly more likely to use an avoidant coping style and adolescents in the watchful waiting and surgical treatment groups would be significantly more likely to use an approach coping style to manage disease-specific stressors.

2.   Adolescents being treated for idiopathic scoliosis would be significantly more likely to endorse a low quality of life. Specifically, quality of life would be significantly lower for adolescents with idiopathic scoliosis when compared to healthy adolescents on the PedsQL (Chan et al., 2005; Varni et al., 2003; Varni et al., 2002; Varni et al., 2001; Seid et al., 2000; Varni et al., 1999). However quality of life for participants would not differ significantly from published mean values for the SRS-22 completed by adolescents with idiopathic scoliosis.

3.   Quality of life would differ significantly by treatment group. Specifically, adolescents in the watchful waiting treatment group would report significantly higher quality of life than adolescents in the bracing or surgical treatment groups, adolescents in the bracing treatment group would report significantly lower quality of life than adolescents in the watchful waiting and surgical treatment

groups, and adolescents in the surgical treatment group would report significantly

higher quality of life than adolescents in the bracing group but significantly lower

quality of life than adolescents in the watchful waiting treatment group.

4.   Quality of life would be related to coping. Specifically, avoidant coping would be

negatively related to quality of life, and approach coping would be positively

related to quality of life. In addition, coping would moderate quality of life for

adolescents being treated for idiopathic scoliosis.

Methods

Design

A cross-sectional design was employed to evaluate the aforementioned hypotheses. This study was conducted within the context of a larger study examining the psychosocial impact of adolescent idiopathic scoliosis. A cross-sectional design was advantageous because it allowed for the comparison of coping and quality of life at various stages of treatment and because it allowed for comparison of coping and quality of life among adolescents in different treatment groups.

Statistical Analyses

Six sets of statistical analyses were conducted to examine the research questions and hypotheses. First, descriptive statistics were calculated for all demographic variables, and total and scale scores for the included measures were tabulated. Independent *t*-tests and analyses of variance (ANOVAs) were used as appropriate to determine whether the treatment groups differed significantly by any demographic variables. Second, a correlation matrix of bivariate correlations was created to display relationships between the variables of interest. Third, based on the relationships in the correlation matrix, Hierarchical Multiple Regression Analyses were conducted as specified by Baron and Kenny (1986) to examine whether scoliosis treatment group was a predictor of coping (approach and avoidant) and quality of life and subsequently whether coping moderated or mediated quality of life.

Fourth, a series of exploratory analyses were performed including ANOVAs to examine whether idiopathic scoliosis treatment groups differed significantly in their use of approach and avoidant coping behaviors to manage disease-specific stress and in their quality of life. Fifth, the braced and post-surgical treatment groups were combined to form an active

treatment group variable and independent *t*-tests were conducted to examine whether

adolescents in active and non-active treatment differed significantly on the coping and

quality of life variables. Finally, disease-specific stressors reported by adolescent participants

were tabulated, categorized, and then quantitatively analyzed.

Finally, a preliminary cross-validation of the SRS-22r (Asher et al., 2006) and the

PedsQL (Chan et al., 2005; Varni et al., 2003; Varni et al., 2002; Varni et al., 2001; Seid et

al., 2000; Varni et al., 1999) was performed to address the question of whether the SRS-22r

is a developmentally appropriate measure of quality of life for adolescents with idiopathic

scoliosis. This analysis was done via matching individual questions from each measure based

upon thematic content and then calculating Pearson's product-moment correlation

coefficients for all corresponding items.

Procedure for Examining Variables as Moderators and Mediators

Multiple regression analyses were the primary statistical analyses for this study

because they are required to statistically test whether coping was a moderator or mediator of

quality of life (Barron & Kenny, 1986). According to Baron and Kenny, the strength of the

relation between the predictor variable and the outcome variable dictates whether a variable

should be examined as a moderator or a mediator. The literature on adolescents with

idiopathic scoliosis provides insufficient evidence to make this decision a priori; thus, coping

was statistically examined as both a moderating and a mediating variable. What follows is a

discussion of the conditions and statistical procedures required to assess moderating and

mediating variables.

A variable is a moderator if its interaction with the predictor variable causes changes

in the dependent variable (Baron & Kenny, 1986). Thus, the interaction of the predictor

variable (treatment group in this study) and the suggested moderator (coping in this study) should be significantly related to the outcome variable (quality of life in this study). It is also possible, but not necessary, that the predictor variable (treatment group) and the hypothesized moderator variable (coping) are each significantly related to the outcome variable (quality of life).

Hypothesized moderators are examined using hierarchical multiple regression analyses. Specifically, adolescent idiopathic scoliosis treatment type would be entered in block one, coping would be entered in block two, and the interaction term would be entered in block three. Quality of life would be the outcome variable of interest. A statistically significant interaction term would indicate that coping moderated quality of life.

Strengths of using a hierarchical regression include that it can determine the unique contribution of one independent variable to the variance of the dependent variable while controlling for the intercorrelations among the independent variables and also between specific alternate independent variables and the dependent variable. Independent variables are entered into the regression equation in blocks that have been rationally derived a priori: thus, this type of analysis allows for statistical control of variables that cannot be controlled for experimentally.

Four significant relationships must exist for a variable to be considered a mediator (Baron & Kenny, 1986). The first condition that must be satisfied is that the predictor variable (treatment group) is related to the outcome variable (quality of life). The second condition that must be satisfied is that the predictor variable (treatment group) is significantly related to the suggested mediator variable (coping style). The third condition that must be satisfied is that the suggested mediator (avoidant coping) is significantly related to the

outcome variable (quality of life). The fourth condition that must be satisfied is that the

relationship between the suggested mediator and the outcome variable is stronger than the

relationship between the predictor variable and the outcome variable.

Participants

Forty-eight adolescent-parent/legal guardian dyads were recruited for this study, and

full demographic information for the adolescents is presented in Appendix A. Adolescent

participants were a mean age of 14.4 years (standard deviation = 1.54) and were

predominantly female, European American, and in the eighth, ninth, and tenth grades. Sixty

percent of the population had an annual family income of $50,000 and above.

Participants were recruited by a medical assistant as they were called back for their

scheduled appointments with an orthopedic surgeon. Recruitment took place at Children's

Hospital of Michigan in Detroit and at an outpatient clinic in a suburb of Detroit. Dyads were

initially asked to participate if the adolescent had a diagnosis of idiopathic scoliosis and was

between the ages of 11 and 17 years, 11 months. This age range allowed for inclusion of a

spectrum of adolescents at various points of physical maturity, which is an important factor

considered when prescribing treatment for idiopathic scoliosis.

Adolescents who could not obtain parent/caregiver informed consent were excluded

from the study. Additional exclusion criteria included adolescents who had not yet begun

bracing treatment, adolescents who had not yet had spinal fusion surgery, adolescents and/or

parent/legal guardians who could not read, adolescents and/or parent/legal guardians who

could not speak English, and adolescents who had comorbid diagnoses of Duchene's

muscular dystrophy, other spinal deformities, or genetic abnormalities.

A power table (Cohen, 1992) was consulted to determine the number of participants needed to achieve a medium effect at the $\alpha = .05$ level for a hierarchical regression with three predictor variables (treatment, approach coping, and avoidant coping). Effect size for a hierarchical regression is calculated by $f^2 = (R^2)/(1- R^2)$, where R^2 is equivalent to either the squared multiple or squared multiple partial correlation. Use of this equation indicated that an effect size of .15 was needed to achieve a medium effect. In addition, Cohen's power table indicated that for three predictors a sample of 76 dyads was needed to achieve this medium effect.

Analyses of Variance (ANOVAs) were also calculated to evaluate whether between-group differences existed with respect to approach coping, avoidant coping, and quality of life as measured by the PedsQL and the SRS-22r. Effect size for an ANOVA is calculated by $f = \sigma_m/\sigma$, where σ is equivalent to the population mean. Use of this equation indicates that an effect size of .25 was needed to achieve a medium effect. In addition, Cohen's power table indicated that a sample size of 156 (52 for each of the three treatment groups) was needed to achieve this medium effect $\alpha = .05$ level. Because 192 is well beyond the proposed total sample size of 76, and because treatment group membership was not decided randomly, all ANOVAs were run as exploratory analyses.

The actual sample size for the current study, 48, results from the following barriers in participant recruitment. First, of the 40 patients seen on a typical scoliosis clinic day, fewer than anticipated met the inclusion criteria of being between 11 years and 17 years, 11 months and having no co-morbid medical diagnoses, leaving approximately five to six dyads per clinic day that might have been eligible for participation. Second, some participants were not fluent in English and some refused participation. Third, after three months of data collection,

dyads who had either participated previously or who had already declined participation were returning for their next clinic visit. Thus, the already small number of eligible dyads was further reduced to approximately three or four per clinic day. Fourth, medical assistants had to balance initial participant recruitment with all other clinical responsibilities and thus some eligible participants were missed. Fifth, only two to three scoliosis clinics were scheduled each month. When all of these barriers are combined, the result was that only one to two dyads were recruited at each scoliosis clinic over the course of five months.

Procedure

At the outpatient clinics, the medical assistant informed the principal investigator and/or the research assistants if volunteers met inclusion criteria. The following provisions were made to ensure the ethical guidelines for research outlined by the American Psychological Association are followed (1992). A scripted explanation of the informed consent form was read to the dyads by the principal investigator or research assistants before signatures of consent and assent were obtained from parents and adolescents respectively. Emphasis was placed on the purpose of the study, confidentiality of answered questionnaires, the right to refuse to participate, the right to exit the study prior to completion, and the potential benefits and risks of participation. Dyads were also informed of the professional status and affiliation of the principal investigator and research assistants and were provided with contact information for the principal investigator should they have any questions regarding the study. No deception was used.

Dyads completed the informed consent and assent process in their exam room and were told it would take 30-45 minutes to complete the survey packets. Individuals were asked to provide assent and consent to participate only when it was clear that they fully

understand the nature and purpose of the study and the consent form. An additional Health

Information Portability and Accountability Act (HIPPA) consent form was signed by both

the parent/legal guardian and the adolescent, permitting information pertaining to the

adolescent's spinal condition to be extracted from his or her medical chart. Dyads placed

their names only on the consent forms; code numbers were used to match the completed

surveys of each dyad.

Once the assent, informed consent, and HIPAA consent forms were signed,

adolescent-parent/legal guardian dyads were asked to complete the survey packets. All

components were completed and returned to the principal investigator or research assistants

before participants left the clinic or the hospital. Questionnaires were kept confidential and in

a locked file cabinet. When the survey packets were completed and returned to the principal

investigator or research assistant, then participation was terminated and participants received

a granola bar and a five dollar gift card to compensate them for volunteering.

Measures

Demographics questionnaire. The parent/legal guardian completed a demographics

questionnaire created by the researchers. Because the proposed study was conducted within

the context of a larger study on adolescents with idiopathic scoliosis, only questions that

provide information regarding adolescent treatment type, age, gender, and ethnicity were

examined from this questionnaire (see Appendix B).

Stress. Adolescents were asked to write a list of stressors they experience due to their

idiopathic scoliosis and its treatment. The purpose of this qualitative assessment was to

discern what aspects of AIS treatment are indeed stressful and to stimulate thought about the

specific coping behaviors used to manage such disease-specific stressors (see Appendix C).

Coping. Coping was examined via adolescent completion of *The Adolescent Coping Orientation for Problem Experiences Questionnaire* (A-COPE; Patterson & McCubbin, 1987, 1983; see Appendix D). This 54-item survey assesses coping behaviors and coping patterns adolescents use during problem experiences. Adolescents used a five-point Likert scale to indicate whether they used a particular coping behavior when feeling tense (1=never to 5=most of the time). The A-COPE was not constructed to assess coping behaviors used by chronically ill adolescents to manage disease-specific stressors. However, it has been used for this purpose and produced important results with adolescents with diabetes (Grey et al., 1998; Grey et al., 1997; Cappelli, McGrath, Heick, MacDonald, Feldman, et al., 1989; Hanson et al., 1989), cancer (Nichols, 1995), end stage renal disease (Snethen, Broome, Kelber, Warady, 2004), and cystic fibrosis (Patton, Ventura, & Savedra, 1986). Therefore, it seems justified to use the A-COPE in similar research with adolescents who are being treated for idiopathic scoliosis as AIS is also a chronic health condition.

The 54 questions of the A-COPE can be divided into 12 different coping pattern subscales: ventilating feeling (six behaviors performed to verbally release/express anger and/or frustration such as yelling at others), seeking diversions (six behaviors performed to forget about a particular stressor), developing self-reliance (six behaviors performed to actively attempt to change a situation), developing social support (six behaviors performed to increase reciprocal problem-solving and expressing emotions with others), solving family problems (six behaviors such as talking with a parent or sibling), avoiding problems (five behaviors related to removing oneself away from the stressor and using substances), seeking spiritual support (three behaviors such as seeing a priest or a rabbi), investing in close friends (two behaviors related to strengthening relations with peers), seeking professional support

(two behaviors such as talking with a counselor), engaging in demanding activity (four

behaviors such as exercising), being humorous (two behaviors such as telling jokes), and

relaxing (four behaviors such as listening to music) (Patterson & McCubbin, 1983). Internal

consistency values for the 12 coping pattern subscales ranges from $\alpha = .50-.76$. Concurrent

validity for the *A-COPE* has also been established (Patterson, 1985; Patterson & McCubbin,

1987).

A second, principal components factor analysis of the A-COPE was performed by

Hanson et al. (1989) in response to observed high intercorrelations between the coping

pattern subscales. Results of varimax factor rotation produced a 2-factor solution that

contained 10 of the 12 original coping patterns presented by Patterson (1985) and Patterson

& McCubbin (1987). The research questions and hypotheses for this proposed study address

the dimensions of approach and avoidant coping. The coping behavior groupings suggested

in Hanson et al.'s (1989) 2-factor solution for the items of the A-COPE were examined and

deemed to be similar in content to what the literature suggests as approach and avoidant

coping (Compas et al., 2001; Herman-Stahl et al., 1995; Roth & Cohen, 1986; Seiffege-

Krenke & Klessinger, 2000; Skinner et al., 2003). Thus, Factor One, Utilizing Personal and

Interpersonal Resources, was relabeled "Approach Coping," and Factor Two, Ventilation and

Avoidance, was relabeled "Avoidant Coping," for the purposes of this study (see Appendix

E).

Quality of life. Two measures were used to evaluate quality of life: the disease-

specific Scoliosis Research Society Outcomes Instrument (SRS-22r; Asher, Lai, Burton, &

Manna, 2003*a,* Asher et al., 2003*b*; Asher et al., 2006) and the generic Pediatric Quality of

Life Inventory (PedsQL; Chan et al., 2005; Varni et al., 2002; Varni, et al., 2003; Varni et al., 2001; Seid et al., 2000; Varni et al., 1999).

  SRS-22r. The SRS-22r (see Appendix F) is comprised of 22 items answered via a five-point Likert scale. A higher score on the instrument is representative of higher self-reported quality of life. Scale items can be subdivided into five domains: functioning/activity, pain, self-image/appearance, mental health, and satisfaction with management. The SRS-22r is adapted from the Modified Scoliosis Research Society Questionnaire (MSRS; Asher, Lai, & Burton, 2000), the SRS Patient Questionnaire (Haher, Gorup, Shin, Homel, Merola, et al., 1999), and the SRS-22r (Asher et al., *a, b, c*). Little psychometric data is available for the SRS-22r. However, because this version differs from the SRS-22 only by one question, it is likely that psychometric properties are not significantly different for the SRS-22r compared to the SRS-22. The only significant difference is with respect to the Function/Activity domain, which was improved as a result of revising the scale. Internal consistency alpha values of the SRS-22r are .78 for the Function/Activity Domain, .92 for the Pain Domain, .75 for the Self-image/Appearance Domain, .90 for the Mental Health domain, and .88 for the Satisfaction with Management Domain. The SRS-22r was found to have medium to high concurrent validity with the SF-36 (Asher et al., 2003*a*) and has demonstrated discriminant validity amongst individuals receiving different types of treatment for idiopathic scoliosis (Asher et al., 2003*c*).

  While the psychometric properties for the SRS-22r are moderate to high, three limitations may impact the validity of its use with adolescents. First, the SRS-22r has not yet been validated for an adolescent population. Two studies have compared the internal consistency of the SRS-22 between adolescents ages 10-16 and adults, finding lower internal

consistency alpha values when it is administered to adolescents (Asher et al., 2003*b, c*).

Second, in a similar vein, it is questionable whether the SRS-22 is written in a manner

reflecting the cognitive levels of children and adolescents at different developmental stages.

Third, only one study (Asher et al., 2003*b*) has used the SRS-22 with adolescents in bracing

and watchful waiting treatment groups; thus, discriminative validity is questionable due to

lack of replication of these findings.

In the light of these limitations, The Pediatric Quality of Life Inventory 4.0 (see

below, PedsQL; Chan et al., 2005; Varni et al., 2003; Varni et al., 2002; Varni et al., 2001;

Seid et al., 2000; & Varni et al., 1999) was included in the survey packet to address some of

the limitations of the SRS-22r outline above in the following ways. First, the PedsQL was

developed and is validated for children and adolescents. Second, each version of the PedsQL

is worded differently to be developmentally appropriate for the cognitive level of children in

the particular age range for that version. The content of each question, however, remains

consistent across all versions. Third, the reliability of the PedsQL has been well established

(see detailed description below).

PedsQL. The Pediatric Quality of Life Inventory (Chan et al., 2005; Varni et al.,

2002; Varni, et al., 2003; Varni et al., 2001; Seid et al., 2000; Varni et al., 1999; see

Appendix G) is a 23-item inventory that assesses health-related quality of life. A higher score

is representative of higher health-related quality of life. Four multidimensional scale scores

(physical functioning, emotional functioning, social functioning, school functioning) and

three summary scores (total scale score, physical health summary, and psychosocial health

summary) can be computed for the generic core of the PedsQL. The child self-report (8-12

age group) or the adolescent self-report form (13-18 age group) was be distributed accordingly.

The PedsQL has been found to have good psychometric properties. Internal consistency reliability of the PedsQL has produced the following alpha values for the child self-report form: .88 (total score), .80 (physical health), .83 (psychosocial health), .73 (emotional functioning), .71 (social functioning), and .68 (school functioning). The PedsQL is responsive to change over time, has high construct validity, and can discriminate between healthy, acutely ill, and chronically ill children.

Results

This study explored the potential relationship between coping and quality of life for adolescent patients being treated for idiopathic scoliosis. Key dependent variables of interest for this study included quality of life as measured by the SRS-22r and the PedsQL and coping (approach and avoidant) for some analyses; key independent variables of interest were AIS treatment type (watchful waiting, braced, post-surgical) and coping (approach and avoidant) for other analyses. Dummy coding was used for treatment group in all regression analyses. In this coding process, the watchful waiting treatment group was designated as the comparison group because this group had not yet received actual treatment for their chronic health condition. Ethnicity was collapsed into two categories (Caucasian and minority) because only three non-Caucasian participants were non-African American minorities.

One participant did not receive the A-COPE in his/her survey packet and one adolescent did not complete the A-COPE in full. Thus, the sample size was 46 instead of 48 for analyses with respect to this measure. Data for these two participants was, however, included in group analyses for the SRS-22r, PedsQL, and qualitatively reported stressors. Missing data were addressed using scoring rules (SRS-22r and PedsQL) and by procedures outlined in personal communication with one of the measure's authors (A-COPE). Descriptive information (means and standard deviations) for the coping and quality of life measures is presented in Table 1.

Table 1

Means (Standard Deviations) for Measures of Interest for the Entire Sample and by Treatment group

	Whole Sample (N = 48)	Watchful Waiting (n = 11)	Braced (n = 24)	Post-Surgical (n = 13)
Coping[a]				
Approach coping	110.06 (34.80)	93.72 (47.28)	109.20 (31.83)	125.34 (20.15)
Avoidant coping	20.59 (6.24)	18.82 (6.72)	20.46 (6.60)	22.31 (5.07)
SRS-22r				
Overall mean Quality of Life	89.33 (12.24)	89.45 (17.43)	88.83 (11.38)	91.08 (8.98)
Functioning	4.16 (.60)	4.33 (.80)	4.21 (.55)	3.94 (.46)
Pain	4.21 (.78)	3.91 (1.18)	4.24 (.63)	4.42 (.55)
Self-Image	3.84 (.70)	3.76 (1.05)	3.71 (.55)	4.14 (.55)
Mental Health	4.07 (.68)	4.23 (.78)	4.05 (.67)	4.00 (.65)
Satisfaction with Management	3.93 (1.02)	3.95 (.88)	3.71 (1.18)	4.31 (.72)
PedsQL				
Total Quality of Life	80.97 (14.14)	81.90 (15.61)	80.34 (14.42)	81.35 (13.40)

(Table 1 continued)

	Whole Sample (N = 48)	Watchful Waiting (n = 11)	Braced (n = 24)	Post-Surgical (n = 13)
Physical Health	79.75 (18. 47)	80.96 (21.44)	79.69 (18.75)	78.85 (16.64)
Psychological Health	81.63 (13.24)	82.40 (13.52)	80.96 (13.96)	80.69 (14.0)
Emotional Functioning	80.42 (18.68)	82.73 (19.02)	78.96 (18.94)	81.15 (19.17)
Social Functioning	88.20 (15.06)	93.07 (7.49)	87.92 (18.70)	84.62 (11.63)
School Functioning	76.25 (17.31)	71.36 (24.09)	75.21 (14.56)	82.31 (14.81)

[a] Information with respect to Approach and Avoidant Coping was calculated based upon data from 46

participants due to missing data for the A-COPE for two participants. Treatment group membership differed in

these calculations for the braced treatment group where $n = 20$. Information with respect to the SRS-22r and the

PedsQL reflects all 41 participants and treatment group membership is as noted in the column headings.

Preliminary analyses

Pearson's product-moment correlation coefficients were calculated on all variables of

interest. As noted in Table 2, Approach Coping was significantly negatively correlated with

Overall Mean Quality of Life as measured by the SRS-22r ($r = -.37, p \le .05$), and Avoidant

Coping was significantly negatively correlated with Total Quality of Life as measured by the

PedsQL ($r = -.36, p \le .05$) and Overall Mean Quality of Life score for the SRS-22r ($r = -.49$,

$p \le .01$). Approach Coping was not significantly related to Total Quality of Life as measured

by the PedsQL ($r = .12, p > .05$).

Table 2

Pearson's Product-Moment Correlation Coefficients for Dependent and Independent Variables of Interest (N = 46)

	1	2	3	4
1. Approach Coping	--			
2. Avoidant Coping	.43**	--		
3. Total Quality of Life (PedsQL) [a]	-.12	-.36*	--	
4. Overall Mean Quality of Life (SRS-22r)[a]	-.37*	-.49**	.71**	--

Note. Overall Mean Quality of Life score for the SRS-22r was not part of the scoring structure for this measure;

rather, it was generated by the researchers in this study.

[a] Information with respect to Total Quality of Life (PedsQL) and Overall Mean Quality of Life (SRS-22r) was

calculated based upon data from 46 participants because these correlation coefficients were used as indicators

for later regression analyses examining mediation and moderation.

* $p \le .05$

** $p \le .01$

Pearson's product-moment correlation coefficients for Approach and Avoidant

Coping and the five domains of the SRS-22r and the five subscales of the PedsQL are

presented in Table 3. With respect to the five domains of the SRS-22r, Approach Coping was

significantly negatively correlated with the Mental Health ($r = -.29, p \le .05$) and Satisfaction

with Management Domains ($r = -.38, p \le .05$), and Avoidant Coping was significantly

negatively correlated with the Function/Activity ($r = -.34, p \le .05$), Pain ($r = -.31, p \le .05$),

Self-Image ($r = -.34, p \le .05$), Mental Health ($r = -.41, p \le .01$), and the Satisfaction with

Management ($r = -.43$, $p \leq .01$) Domains. Thus, high use of both Approach and Avoidant

Coping were related to worse mental health and less satisfaction with management of AIS,

and higher use of Avoidant Coping was related to worse functioning, more pain, and lower

self-image and satisfaction with management of AIS.

Table 3

Pearson's Product-Moment Correlation Coefficients for Approach and Avoidant Coping and the Five Domains of the SRS-22r (N=46)

	Approach Coping	Avoidant Coping
SRS-22r		
Function/Activity	-.19	-.34*
Pain	-.15	-.31*
Self-Image	-.21	-.34*
Mental Health	-.26*	-.41*
Satisfaction with Management	-.38*	-.43**

*$p \leq .05$

**$p \leq .01$

With respect to the subscales of the PedsQL, Avoidant Coping was significantly

negatively correlated with the Psychological Health subscale ($r = -.46$, $p \leq .01$) and the

Emotional ($r = -.48$, $p \leq .01$) and School Functioning ($r = -.33$, $p \leq .05$), indicating that

higher use of Avoidant Coping was related to worse mental health and emotional and school

functioning. Approach Coping was not statistically significantly related to any of the PedsQL

subscales.

Table 4

Pearson's Product-Moment Correlation Coefficients for Approach and Avoidant Coping and the Five Subscales of the PedsQL (N=46)

	Approach Coping	Avoidant Coping
PedsQL		
Physical Health	.06	-.15
Psychological Health	-.10	-.46**
Emotional Functioning	.00	-.48**
Social Functioning	-.07	-.24
School Functioning	-.15	-.33*

* p ≤ .05

** p ≤ .01

Hypothesis one

Primary analyses

The first hypothesis was that coping would differ significantly by treatment group. Specifically, adolescents in the bracing treatment group would use significantly more Avoidant Coping, and adolescents in the watchful waiting and surgical treatment groups would use significantly more Approach Coping to manage disease-specific stressors. Two one-way ANOVAs (one each for Approach and Avoidant Coping) were used to examine this hypothesis. As indicated in Table 5, treatment groups did not differ significantly in their use of Avoidant Coping [$F_{(2, 43)} = .94$, $p > .05$] or Approach Coping [$F_{(2, 43)} = 2.65$, $p > .05$].

Thus, Hypothesis One was not supported.

Table 5

One-Way Analyses of Variance for the Effect of Treatment Group on Coping

Variable	df	SS	MS	F	p
Approach Coping					
Between groups	2	5984.46	2992.43	2.65	.08
Within groups	43	48508.48	1128.10		
Avoidant Coping					
Between groups	2	73.25	36.63	.94	.40
Within groups	43	1676.25	38.98		

One-way ANOVAs were also conducted to examine whether treatment groups differed significantly in their use of each of the 12 coping pattern subscales for the A-COPE. As is indicated in Table 6, treatment groups differed significantly only on the coping pattern subscales of Investing in Close Friends [F (2, 43) = 4.95, $p \leq .01$] and Being Humorous [F (2, 43) = 4.87, $p \leq .01$].

Table 6

One-Way Analyses of Variance for the Effect of Treatment Group on the 12 Coping Pattern Subscales of the A-COPE (N = 46)

Variable	df	SS	MS	F	p
Seeking Diversions					
Between groups	2	153.48	76.74	.86	.43
Within groups	43	3842.78	89.37		
Developing Self-Reliance					
Between groups	2	139.66	69.83	2.37	.12
Within groups	43	1268.59	29.50		
Developing Social Support					
Between groups	2	226.66	113.33	2.75	.08
Within groups	43	1770.67	41.19		
Solving Family Problems					
Between groups	2	131.72	65.86	2.00	.15
Within groups	43	1418.00	32.98		
Seeking Spiritual Support					
Between groups	2	47.79	23.90	2.18	.13
Within groups	43	470.82	10.95		
Investing in Close Friends					
Between groups	2	59.72	29.86	4.95	.01**
Within groups	43	259.50	6.04		

(Table 6 continued)

Variable	df	SS	MS	F	p
Engaging in Demanding Activities					
Between groups	2	73.15	36.58	1.52	.23
Within groups	43	1037.46	24.13		
Being Humorous					
Between groups	2	38.06	19.03	3.76	.03*
Within groups	43	217.67	5.06		
Ventilating Feelings					
Between groups	2	62.71	31.36	1.42	.25
Within groups	43	948.77	22.06		
Avoiding Problems					
Between groups	2	5.08	2.54	.50	.61
Within groups	43	218.03	5.07		
Seeking Professional Support					
Between groups	2	.77	.38	.24	.79
Within groups	43	69.15	1.61		
Relaxing					
Between groups	2	84.42	42.21	2.19	.12
Within groups	43	827.30	19.24		

* $p \leq .05$

** $p \leq .01$

Specifically, Tukey's post-hoc comparison indicated that the post-surgical treatment group coped by investing in close friends and being humorous significantly more frequently than the watchful waiting treatment group (see Table 7).

Table 7

Mean Scores (Standard Deviations) for Two Coping Pattern Subscales of the A-COPE by Treatment Group (N = 46)

	Treatment Group				
	Watchful Waiting (1)		Post-Surgical (3)		
	M	SD	M	SD	Post hoc[a]
Investing in Close Friends	4.55	2.84	7.5	1.80	3>1
Being Humorous	5.55	3.24	8.00	1.83	3>1

Note. The numbers in parentheses in column heads refer to the numbers used for illustrating significant differences in the last column titled "Post hoc."

[a] Tukey post-hoc test.

Coping by active versus non-active treatment. Independent samples *t*-tests were conducted to examine whether adolescents differed significantly in their coping depending upon whether they were in active (braced and post-surgical treatment groups) or non-active (watchful waiting) treatment for their idiopathic scoliosis. As is indicated in Table 8, adolescents in active and non-active treatment did not differ significantly in their use of Approach and Avoidant Coping, although there was a trend that adolescents in active treatment used more Approach Coping behaviors than adolescents in non-active treatment (*p* = .07). Adolescents in active and non-active treatment did differ significantly on two of the

coping pattern subscales of the A-COPE. Specifically, adolescent in active treatment were significantly more likely to cope by Investing in Close Friends [t (44) = -2.38, $p \leq .05$] and Being Humorous [t (44) = -2.61, $p \leq .01$] than adolescents in non-active treatment. Two trends were also apparent. First, adolescents in active treatment group endorsed coping by Developing Self-Reliance more than adolescents in the non-active treatment group ($p = .08$). Second, adolescents in non-active treatment endorsed coping by Solving Family Problems more than adolescents in active treatment group ($p = .06$).

Table 8

Differences in Means (Standard Deviations) for Two Coping Dimensions and the 12 Coping Pattern Subscales of the A-COPE for Adolescents in Active and Non-Active Treatment for Idiopathic Scoliosis

| | Treatment | | | | | |
| | Active (n = 35) | | Non-Active (n = 11) | | | |
Variable	M	SD	M	SD	t	p
Dimensions						
Approach Coping	115.19	28.84	93.73	47.28	-1.83	.07
Avoidant Coping	21.15	6.07	18.82	6.72	-1.08	.29
Coping Pattern Subscales (A-COPE)						
Seeking Diversions	25.03	8.47	21.64	12.09	-1.04	.30
Developing Self-Reliance	19.15	4.54	15.73	7.80	-1.82	.08

(Table 8 continued)

	Treatment					
	Active (n = 35)		Non-Active (n = 11)			
Variable	M	SD	M	SD	t	p
Developing Social Support	18.29	5.91	15.91	8.72	-1.03	.31
Solving Family Problems	18.47	5.17	14.73	7.23	-1.90	.06
Seeking Spiritual Support	7.23	3.26	5.55	3.64	-1.45	.15
Investing in Close Friends	6.63	2.44	4.55	2.84	-2.38	.02*
Engaging in Demanding Activities	12.83	4.44	10.09	6.14	-1.62	.11
Being Humorous	7.57	1.85	5.55	3.24	-2.61	.01**
Ventilating Feelings	12.91	4.66	11.27	5.00	-1.00	.32
Avoiding Problems	8.23	2.24	7.55	2.21	-.89	.38
Seeking Professional Support	2.89	1.13	3.18	1.60	.68	.50
Relaxing	11.98	4.10	9.82	5.49	-1.41	.18

* $p \le .05$

** $p \le .01$

Coping by gender and ethnicity. Independent samples *t*-tests were conducted to examine whether coping differed by gender and ethnicity. Approach Coping, Avoidant Coping, and the 12 coping pattern subscales did not differ significantly by gender or ethnicity (see Table 9).

Table 9

Gender Differences in Means (Standard Deviations) for Two Coping Dimensions and the 12
Coping Pattern Subscales of the A-COPE (N = 46)

	Gender					
	Females (n = 33)		Males (n = 13)			
Variable	M	SD	M	SD	t	p
Dimensions						
Approach Coping	112.74	34.96	103.26	34.80	.83	.41
Avoidant Coping	21.16	6.54	19.15	5.35	.98	.33
Coping Pattern Subscales (A-COPE)						
Seeking Diversions	24.43	9.55	23.69	9.46	.24	.81
Developing Self-Reliance	18.55	5.16	17.80	6.78	.40	.69
Developing Social Support	18.67	6.56	15.31	6.56	1.56	.13
Solving Family Problems	18.32	5.68	15.69	6.16	1.38	.18
Seeking Spiritual Support	7.15	3.50	6.00	3.08	1.04	.31
Investing in Close Friends	6.39	2.77	5.46	2.33	1.07	.29
Engaging in Demanding Activities	12.12	5.23	12.31	4.42	-.11	.91
Being Humorous	7.16	2.40	7.00	2.45	.15	.89
Ventilating Feelings	13.06	4.96	11.15	3.98	1.24	.22
Avoiding Problems	8.10	2.39	8.00	1.83	.13	.90
Seeking Professional Support	2.91	1.18	3.08	1.44	-.41	.69
Relaxing	11.64	4.68	11.03	4.17	.41	.69

However, as is indicated in Table 10, minorities used significantly more Avoidant Coping than European Americans [t (43) = -2.16, $p \leq .04$] and were significantly more likely to cope by Investing in Close Friends [t (43) = -2.06, $p \leq .05$] and Avoiding Problems [t (43) = -2.11, $p \leq .05$] than European Americans [t (43) = -2.05, $p \leq .05$]. In addition, three trends were apparent. Specifically, minorities tended to endorse coping by Developing Social Support [t (43) = -1.95, $p = .06$], Seeking Spiritual Support [t (43) = -1.91, $p = .06$], and Ventilating Feelings [t (42) = -1.79, $p = .08$] significantly more frequently than European Americans.

Table 10

Differences in Means (Standard Deviations) for Two Coping Dimensions and the 12 Coping Pattern Subscales of the A-COPE by Ethnicity (N = 46)

	Ethnicity					
	European Americans (n = 27)		Minorities (n = 18)			
Coping Pattern Subscale	M	SD	M	SD	t	p
Dimension						
Approach Coping	105.02	34.36	121.68	30.04	-1.67	.10
Avoidant Coping	19.26	5.14	23.12	6.89	-2.15	.04*
Coping Pattern Subscales (A-COPE)						
Seeking Diversions	22.97	9.72	27.00	8.03	-1.46	.15
Developing Self-Reliance	17.67	5.53	20.02	4.83	-1.47	.15
Developing Social Support	16.48	6.79	20.22	5.84	-1.95	.06
Solving Family Problems	17.35	6.21	18.56	4.82	-.70	.49

(Table 10 continues)

(Table 10 continued)

	Ethnicity					
	European Americans (n = 27)		Minorities (n = 18)			
Coping Pattern Subscale	M	SD	M	SD	t	p
Seeking Spiritual Support	6.15	2.92	8.06	3.78	-1.91	.06
Investing in Close Friends	5.59	2.53	7.17	2.53	-2.05	.05
Engaging in Demanding Activities	11.93	4.95	13.00	4.81	-.72	.48
Being Humorous	6.89	2.42	7.66	2.03	-1.12	.28
Ventilating Feelings	11.67	4.13	14.67	5.18	-1.80	.08
Avoiding Problems	7.59	2.06	8.95	2.21	-2.11	.04*
Seeking Professional Support	2.96	1.37	3.00	1.08	-.10	.92
Relaxing	10.41	4.24	13.47	4.10	-2.40	.02*

Note. One participant did not report ethnicity.

* $p \leq .05$

   Coping by age. Pearson's product-moment correlation coefficients were tabulated to examine whether age was related to the two dimensions of coping and to the 12 coping pattern subscales of the A-COPE. As is indicated in Table 11, age was only significantly positively related to the Avoiding Problems coping pattern subscale of the A-COPE ($r = .32$, $p \leq .05$), indicating that older adolescents were significantly more likely to cope by avoiding problems.

Table 11

Pearson's Product-Moment Correlation Coefficients for Age and Two Dimensions of Coping and the 12 Coping Pattern Subscales of the A-COPE

Subscale	Age
Dimensions	
Approach Coping	-.05
Avoidant Coping	.24
Coping Pattern Subscales (A-COPE)	
Seeking Diversions	-.02
Developing Self-Reliance	-.11
Developing Social Support	.01
Solving Family Problems	.19
Seeking Spiritual Support	-.11
Investing in Close Friends	.02
Engaging in Demanding Activities	.00
Being Humorous	.16
Ventilating Feelings	.16
Avoiding Problems	.32*
Seeking Professional Support	.01
Relaxing	.14

* $p \leq .05$

Based upon the above correlation analyses, a hierarchical multiple regression analysis was performed to examine whether age accounted for a significant amount of the variance in

the Avoiding Problems coping pattern subscale of the A-COPE. The Avoiding Problems

coping pattern subscale was regressed onto age (in the third block) while controlling for

ethnicity and gender in the first block and treatment group in the second block. The watchful

waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses. As is shown in Table 12, the

resulting model accounted for 23% of the variance in this subscale and approached

significance [F (5, 39) = 2.35, p = .06]. Age accounted for a significant portion of the

variance in this model ($p \leq .05$) such that older adolescents were more likely to cope with

stress by avoiding problems.

Table 12

Hierarchical Multiple Regression Analysis Summary for Age on the Avoiding Problems Coping Pattern Subscale of the A-COPE

Variable	F	B	SEB	ß	R^2	ΔR^2	p
	2.35						.06
Step 1						.10	
Gender		-.16	.71	-.03			.82
Ethnicity		1.36	.65	.31			.05
Step 2						.11	.02
Braced		.46	.84	.12			.59
Post-Surgical		-.16	.94	-.03			.86

(Table 12 continued)

Variable	F	B	SEB	ß	R^2	ΔR^2	p
Step 3					.23	.13	
Age		.57	.23	.41			.02*

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups.

* $p \leq .05$

Secondary analyses

Due to constraints in power resulting from a smaller sample size than originally proposed, regression analyses were performed to examine how much of the variance in coping was accounted for by treatment group. Two hierarchical multiple regression analyses were used to examine this relationship, one each for Approach and Avoidant Coping. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

In the first regression analysis, Approach Coping was regressed onto treatment group (in the second block) while controlling for age, ethnicity, and gender in the first block. As is indicated in Table 13, the resulting model accounted for 18% of the variance in approach coping [$F_{(5, 39)} = 1.67, p > .05$]. None of the individual variables in the model accounted for a significant amount of the variance in approach coping although the post-surgical variable approached significance ($p = .09$).

In the second regression analysis, avoidant coping was regressed onto treatment group (in the second block) while controlling for age, ethnicity, and gender in the first block.

As is indicated in Table 13, the resulting model accounted for 17% of the variance [F (5, 39) = 1.62, $p > .05$]. None of the individual variables in the model accounted for a significant amount of the variance in avoidant coping.

Table 13

Hierarchical Multiple Regression Analysis Summary for Treatment Group on Coping, Controlling for Demographic Variables

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
Approach coping	1.67						.17
Step 1						.10	
Age		-2.65	3.37	-.12			.44
Gender		-9.09	11.27	-.13			.42
Ethnicity		18.21	10.24	.27			.08
Step 2					.18	.07	
Braced		3.86	12.70	.06			.76
Post-Surgical		24.32	14.06	.33			.09
Avoidant coping	1.62						.18
Step 1						.17	
Age		.86	.60	.22			.16
Gender		-3.01	1.98	-.23			.14
Ethnicity		3.25	1.81	.26			.08

(Table 13 continues)

(Table 13 continued)

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
Step 2					.17	.07	
Braced		1.08	2.34	.09			.65
Post-Surgical		.91	2.59	.07			.73

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

Hypothesis two

Primary analyses

The second hypothesis was that adolescents being treated for idiopathic scoliosis would be significantly more likely to endorse a low quality of life. This hypothesis was segmented into two parts. First, it was hypothesized that adolescents with idiopathic scoliosis would endorse a significantly lower quality of life compared to healthy adolescents (Healthy samples) on the PedsQL. Second, it was hypothesized that adolescents with idiopathic scoliosis in the current sample would not fall outside of one standard deviation from published mean values for the SRS-22 completed by comparison samples of adolescents with and without idiopathic scoliosis (Asher et al., 2003b; Asher et al., 2006).

PedsQL. One-sample *t*-tests were used to examine Part One of Hypothesis Two with respect to the PedsQL. As is indicated in Table 14, adolescents in the current study did not

differ significantly from the Healthy samples on total quality of life as measured by the

PedsQL.

Thus, Part One of Hypothesis Two with respect to the PedsQL was not supported.

This relationship was further examined with respect to the PedsQL subscales using

similar statistical analyses. As is indicated in Table 14, adolescents in the current sample

differed significantly from only one Healthy sample with respect to physical health [t (47) = -

3.01, $p \leq .01$] and school functioning [t (47) = -2.03, $p \leq .05$]. Specifically, the current

sample exhibited significantly lower physical health and school functioning than this Healthy

sample. The current sample did not differ significantly from either Healthy comparison

sample on any other subscales.

Table 14

T-score Means (Standard Deviations) on the PedsQL for the Current Sample and Two Healthy Samples

	Current Sample	Healthy[a] Sample	Healthy[b] Sample
Total Quality of Life	80.97 (14.14)	83.91 (12.47)	83.00 (14.79)
Physical Health	79.75 (18.47)	87.77** (13.12)	84.41 (17.26)
Psychological Health	81.63 (13.24)	81.83 (13.97)	82.38 (15.51)
Emotional Functioning	80.42 (18.68)	79.21 (18.02)	80.86 (19.64)
Social Functioning	88.20 (15.06)	84.97 (16.71)	87.42 (17.18)
School Functioning	76.25 (17.31)	81.31* (16.09)	78.63 (20.53)

Note. Higher scores equal higher quality of life.

[a] Varni et al. (2003). [b] Varni et al. (2001).

* $p \leq .05$

** $p \leq .01$

   PedsQL as compared to acutely ill, chronically ill, and acute orthopedic samples.

This relationship was also examined comparing the current sample to acutely ill, chronically ill, and acute orthopedic patients. As is indicated in Table 15, adolescents in the current study reported significantly higher Psychological Health and Social Functioning compared to both Chronically Ill samples, significantly higher Total Quality of Life and higher Emotional and School Functioning than one Chronically Ill sample, significantly higher Social Functioning than the Acutely Ill sample, and significantly lower Physical Health than the Acute

Orthopedic sample. Adolescents in the current study did not differ significantly from the

comparison groups on any other subscales of the PedsQL.

Table 15

T-score Means (Standard Deviations) on the PedsQL for the Current Sample, Two
Chronically Ill Samples, One Acutely Ill Sample, and an Acute Orthopedic Sample

	Current Sample	Chronically Ill[a]	Chronically Ill[b]	Acutely Ill[b]	Orthopedic Sample[c]
Total Quality of Life	80.97 (14.14)	74.16** (15.38)	77.19 (15.53)	78.70 (14.03)	85.70* (12.78)
Physical Health	79.75 (18.47)	79.47 (17.07)	77.36 (20.36)	78.88 (19.10)	87.81* (14.34)
Psychological Health	81.63 (13.24)	71.32** (17.13)	77.10* (15.84)	78.68 (14.66)	85.06 (12.82)
Emotional Functioning	80.42 (18.68)	69.32** (21.36)	76.40 (21.48)	77.33 (20.04)	--
Social Functioning	88.20 (15.06)	76.36** (21.57)	81.60** (20.24)	82.83* (16.66)	--
School Functioning	76.25 (17.31)	68.27** (19.05)	73.43 (19.57)	75.68 (18.04)	--

Note. Higher scores represents higher quality of life.

[a]Varni et al. (2003) sample (N = 835) was comprised of children with asthma (n = 364), ADHD (n = 84),

depression (n = 54), diabetes (n = 10), and other chronic health conditions (n = 232).

[b]Varni et al. (2001) sample (N = 293) was comprised of children with cardiac conditions (n = 156), diabetes (n

= 42), and rheumatory conditions (n = 95).

[c]Varni et al. (2002) sample was comprised of children with bone fractures (N = 47).

* $p \leq .05$

** $p \leq .01$

SRS-22r. Standardized normative information is not available for the SRS-22r, but pilot data is available on small comparison samples for each of the five domains of this measure. The range of one standard deviation from the mean was calculated for all published data for the comparison samples with respect to each of the five domains of the SRS-22r. Mean scores for adolescents in the current sample were examined to discern whether they fell within or beyond these calculated ranges.

As is noted in Table 16, adolescents in the current sample reported a mean Mental Health Domain score lower than one standard deviation of the mean score reported by other adolescents with AIS, but within one standard deviation of the mean from adolescents with other spinal disorders. Thus, mental health for adolescents in the current sample was worse than a similar sample of adolescents with AIS.

Adolescents in the current study did not differ significantly from any of the aforementioned comparison samples on any other domains of the SRS-22r.

Thus, Part Two of Hypothesis Two with respect to the SRS-22r was not supported.

Table 16

Means (Standard Deviations) and Ranges of One Standard Deviation From The Mean on The SRS-22 and SRS-22r for The Current Sample and Two Comparison Samples

	Current Sample	AIS[a]	Other spinal[a] disorders
Function (SRS-22r)	4.16 (.60)	4.6 (.63) 4.03-5.23	4.6 (.52) 4.01-5.19
Pain	4.21 (.78)	4.3 (.82) 3.48-5.12	4.0 (.59) 3.17-4.83
Self-image	3.84 (.70)	4.1 (.66) 3.44-4.76	4.1 (.83) 3.33-4.87
Mental health	4.07 (.68)	4.9 (.45)* 4.45-5.35	4.3 (.60) 3.7-4.9
Satisfaction with Management	3.93 (1.02)	4.0 (1.05) 2.95-5.05	3.9 (1.32) 2.58-5.22

Note. Higher score indicates higher quality of life.

*mean scores for the current sample are beyond one standard deviation of the mean scores for the comparison samples.

[a]Asher et al. (2006). AIS (n = 37). Other spinal disorders (n = 17).

Secondary Analyses

Two sets of secondary analyses were performed to examine whether mean values on subscales of the five domains of the SRS-22r reported by adolescents in the current sample differed significantly from those reported by the aforementioned comparison groups and whether mean values on subscales of the five domains of the SRS-22r reported by braced and watched adolescents in the current sample differed significantly from those reported by braced and watched comparison samples. Independent samples *t*-tests were used in both sets of secondary analyses.

SRS-22r as compared to a similar sample of adolescents with AIS and a sample of

adolescents with other spinal disorders. As is indicated in Table 17, adolescents in the

current sample reported significantly lower functioning and activity than other adolescents

with AIS [t (47) = -4.75, $p \leq .01$] and adolescents with other spinal disorders [t (47) = -4.75,

$p \leq .01$]. Level of pain reported by adolescents in the current sample did not differ

significantly from other adolescents with AIS [t (47) = -.78, $p > .05$] or from adolescents with

other spinal disorders [t (47) = 1.89, $p > .05$]. Adolescents in the current sample reported

significantly lower self-image than other adolescents with AIS [t (47) = -2.59, $p \leq .01$] but

not differ significantly in their self-image from adolescents with other spinal disorders [t (47)

= -1.07, $p > .05$]. Adolescents in the current sample reported significantly worse mental

health than other adolescents with AIS [t (47) = -8.42, $p \leq .01$] and adolescents with other

spinal disorders [t (47) = -2.33, $p \leq .05$]. Finally, adolescents in the current sample did not

differ significantly in satisfaction with management from other adolescents with AIS [t (47)

= -.50, $p > .05$] or adolescents with other spinal disorders [t (47) = .18, $p > .05$].

Table 17

Means (Standard Deviations) on the SRS-22 and SRS-22r for the Current Sample and Two Comparison Samples

	Current Sample	AIS[a]	Other spinal[a] disorders
Function (SRS-22r)	4.16 (.60)	4.6 (.63)**	4.6 (.52)**
Pain	4.21 (.78)	4.3 (.82)	4.0 (.59)**
Self-image	3.84 (.70)	4.1 (.66)*	4.1 (.83)
Mental health	4.07 (.68)	4.9 (.45)**	4.3 (.60)*
Satisfaction with Management	3.93 (1.02)	4.0 (1.05)	3.9 (1.32)

Note. Higher score indicates higher quality of life.

* Mean scores for the current sample are beyond one standard deviation of the mean scores for the comparison samples.

[a]Asher et al. (2006). AIS (n = 37). Other spinal disorders (n = 17).

SRS-22r for adolescents in the braced and watchful waiting treatment groups with comparison treatment group samples. Mean scores for the Functioning/Activity Domain could not be compared for the braced and watched groups because no comparison data is available by treatment group for this domain as measured by the SRS-22r. As is indicated in Table 18, adolescents in bracing treatment group in the current sample scored significantly lower on the Pain [t (23) = -2.78, $p \le .01$], Self-Image [t (23) = -3.49, $p \le .01$], Mental Health [t (23) = -2.6, $p \le .05$], and Satisfaction with Management Domains [t (23) = -2.88, $p \le .01$] than the comparison braced sample (Asher et al., 2003b). Adolescents in the watchful waiting treatment group in the current sample, however, did not differ significantly on any of the

aforementioned domains from the adolescents in the watchful waiting treatment group in the

comparison sample (Asher et al., 2003*b*).

Table 18

Means (Standard Deviations) for the SRS-22 and the SRS-22r for Braced and Watchful
Waiting Adolescents in the Current Sample and Comparison Samples

	Braced[a]	Braced[b]	Watchful[a] Waiting	Watchful[b] Waiting
Pain	4.24 (.63)	4.6 (.50)*	3.91 (1.18)	4.6 (.55)
Self-Image	3.71 (.55)	4.1 (.53)**	3.76 (1.05)	4.2 (.50)
Mental Health	4.05 (.67)	4.4 (68)*	4.23 (.78)	4.4 (.51)
Satisfaction with Management	3.71 (1.18)	4.4 (.43)**	3.95 (.99)	4.4 (.31)

Note. Mean scores for the Functioning Domain are not included in this table because this domain was revised

when completed by adolescents in the current sample (SRS-22r) but not when completed by adolescents in

Asher et al. (2003*b*).

[a]Current sample. [b]Asher et al. (2003*b*).

* $p \le .05$

** $p \le .01$

In summary, with respect to the PedsQL, the current sample did not differ

significantly from healthy comparison samples except from one healthy sample with respect

to physical health. The clinical relevance of the significant differences between the current

sample and the chronically ill samples and the acute orthopedic sample is not known.

With respect to the SRS-22r, when examined in terms of one standard deviation of

the mean, the current sample appeared to be similar to the comparison sample of adolescents

with AIS except with respect to the Mental Health Domain. However, when one-sample *t*-

tests were used to compare means for the current sample and comparison samples of

adolescents with AIS and adolescents with other spinal disorders and to compare means for

the braced and watchful waiting treatment groups in the current sample to those in a

comparison AIS sample, numerous significant differences were apparent. The clinical

significance of these contrasts is yet to be determined.

Hypothesis Three

Primary Analyses

The third hypothesis was that quality of life would differ significantly by treatment

group. Specifically, adolescents in the watchful waiting treatment group would report

significantly higher quality of life than adolescents in the bracing or surgical treatment

groups, adolescents in the bracing treatment group would report significantly lower quality of

life than adolescents in the watchful waiting and surgical treatment groups, and adolescents

in the surgical treatment group would report significantly higher quality of life than

adolescents in the bracing group but significantly lower quality of life than adolescents in the

watchful waiting treatment group. One-way ANOVAs were conducted to examine this

hypothesis.

Two sets of ANOVAs were performed, one each for the PedsQL and the SRS-22r. As

is indicated in Table 19, treatment groups did not differ significantly in terms of total quality

of life as measured by the PedsQL [F (2, 45) = .05, p > .05] or on overall mean quality of life

on the SRS-22r [F (2, 45) = .21, p > .05].

Thus, Hypothesis Three was not supported.

Table 19

One-way Analyses of Variance for Treatment Group on Quality of Life

Measure and Variable	df	SS	MS	F	p
SRS-22r					
Overall Mean Quality of Life					
Between Groups	2	63.68	31.84	.21	.82
Within Groups	45	6982.98	155.18		
PedsQL					
Total Quality of Life					
Between Groups	2	20.73	10.37	.05	.95
Within Groups	45	9379.43	208.43		

In addition, as is noted in Tables 20 and 21, treatment groups did not differ significantly on any of the five subscales of the PedsQL or the five domain scores of the SRS-22r.

Table 20

One-way Analyses of Variance for the Effect of Treatment Group on the Subscales of the PedsQL

	df	SS	MS	F	p
Physical Health					
Between Groups	2	26.98	13.49	.04	.96
Within Groups	45	16007.98	355.73		
Psychological Health					
Between Groups	2	42.25	21.12	.12	.89
Within Groups	45	8197.86	182.18		
Emotional Functioning					
Between Groups	2	116.83	58.42	.16	.85
Within Groups	45	16274.83	361.66		
Social Functioning					
Between Groups	2	429.66	214.83	.95	.40
Within Groups	45	10229.42	227.32		
School Functioning					
Between Groups	2	765.73	382.86	1.30	.28
Within Groups	45	13309.27	295.76		

Table 21

One-way Analyses of Variance for the Effect of Treatment Group on the Five Domains of the SRS-22r

Variable	df	SS	MS	F	p
Functioning/Activity					
Between groups	2	1.00	.50	1.41	.26
Within groups	45	16.01	.36		
Pain					
Between groups	2	1.57	.78	1.32	.28
Within groups	45	26.70	.59		
Self-Image					
Between groups	2	1.64	.82	1.71	.19
Within groups	45	21.54	.48		
Mental Health					
Between groups	2	.32	.16	.34	.71
Within groups	45	21.56	.48		
Satisfaction with Management					
Between groups	2	3.04	1.52	1.49	.24
Within groups	45	45.96	1.02		

Secondary Analyses

Two sets of secondary analyses were conducted. The first set examined whether adolescents in active treatment reported significantly different mean values on the summary scores, domains, and subscales of PedsQL and the SRS-22r compared to those reported by adolescents in non-active treatment. The second set examined how much of the variance in quality of life was accounted for by treatment group.

Quality of life as measured by the PedsQL for active and non-active treatment. Independent *t*-tests revealed that adolescents in active treatment did not differ significantly from adolescents in non-active treatment on Total Quality of Life or any of the subscales of the PedsQL (see Table 22).

Table 22

Differences in Means (Standard Deviations) for Summary and Subscale Scores of the PedsQL for Adolescents in Active and Non-Active Treatment for Idiopathic Scoliosis

| | Treatment | | | | | |
| | Active (n = 37) | | Non-Active (n = 11) | | | |
Variable	M	SD	M	SD	t	p
Total Quality of Life	80.70	13.89	81.90	15.61	.24	.81
Physical Health	79.39	17.81	80.97	21.44	.25	.81
Psychological Health	81.40	13.34	82.40	13.52	.22	.83
Emotional Functioning	79.73	18.78	82.73	19.02	.46	.66
Social Functioning	86.76	16.47	93.06	7.49	1.22	.23
School Functioning	77.70	14.84	71.36	24.09	-1.07	.29

* $p \leq .05$

** $p \leq .01$

Quality of life as measured by the SRS-22r for active and non-active treatment.

Independent *t*-tests revealed that adolescents in active treatment did not differ significantly from adolescents in non-active treatment on Total Quality of Life or any of the subscales of the PedsQL (see Table 23).

Table 23

Differences in Means (Standard Deviations) for Summary and Domain Scores of the SRS-22r for Adolescents in Active and Non-Active Treatment for Idiopathic Scoliosis

	Treatment					
	Active (n = 37)		Non-Active (n = 11)			
Variable	M	SD	M	SD	t	p
Overall Mean Quality of Life	89.30	10.55	89.45	17.43	.04	.97
Function/Activity	4.11	.53	4.33	.80	1.04	.31
Pain	4.30	.60	3.91	1.18	-1.50	.14
Self-Image	3.86	.58	3.76	1.05	-.39	.70
Mental Health	4.03	.66	4.22	.78	.81	.42
Satisfaction with Management	3.92	1.07	3.95	.88	.01	.92

$* p \leq .05$

$** p \leq .01$

Treatment Group as a Predictor of Quality of Life. Two hierarchical multiple regression analyses were conducted to examine how much variance treatment group accounted for in quality of life. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

In the first regression analysis, total quality of life as measured by the PedsQL was regressed onto treatment group (in the second block) while controlling for age, ethnicity, and gender in the first block. As is indicated in Table 24, the resulting model accounted for 2% of

the variance in this scale [F (5, 41) = .18, p > .05]. None of the individual variables in the

model accounted for a significant amount of the variance in this model.

Table 24

*Hierarchical Regression Analysis Summary for Total Quality of Life as Measured by the
PedsQL*

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	.18						.97
Step 1	.23						.88
					.03	-.06	
Age		-.48	1.48	-.05			.75
Gender		2.78	4.93	.09			.58
Ethnicity		-2.22	4.48	-.08			.62
Step 2					.07	-.07	
Braced		-.64	5.78	-.02			.91
Post-Surgical		2.12	6.50	.07			.75

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses.

In the second regression analysis, total quality of life as measured by the SRS-22r

was regressed onto treatment group (in the second block) while controlling for age, ethnicity,

and gender in the first block. As is indicated in Table 25, the resulting model accounted for

7% of the variance in this scale [F (5, 41) = .60, p > .05]. None of the individual variables in

the model accounted for a significant amount of the variance in total quality of life.

Table 25

Hierarchical Regression Analysis Summary for Overall Mean Quality of Life as Measured by the SRS-22r

Predictor variable	*F*	*B*	SEB	ß	R^2	ΔR^2	*p*
	.60						.70
Step 1							
					.05	-.02	
Age		.33	1.25	.04			.79
Gender		1.52	4.16	.06			.72
Ethnicity		-5.09	3.78	-.21			.19
Step 2					.07	-.05	
Braced		.88	4.83	.04			.86
Post-Surgical		4.96	5.43	.18			.37

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

Hypothesis Four

Primary Analyses

The fourth hypothesis was segmented into two parts. First, it was originally hypothesized that coping would be related to quality of life. Specifically, avoidant coping would be negatively related to quality of life and approach coping would be positively related to quality of life. Second, it was also hypothesized that coping would moderate quality of life for adolescents being treated for idiopathic scoliosis. However, due to insufficient data to

formally make the aforementioned hypothesis a priori, coping was examined as both a

moderating and mediating variable. Regression analyses that apply to testing for moderation

and mediation were conducted and inspected to determine if approach and avoidant coping

moderated or mediated quality of life as measured by the PedsQL and/or the SRS-22r. These

regression analyses differed from similar regression analyses conducted in hypotheses one

and three because they did not control for age, gender, or ethnicity.

Coping and quality of life. Pearson's product-moment correlation coefficients were

tabulated to examine whether coping (approach and avoidant) was significantly related to

total quality of life as measured by both the SRS-22 and the PedsQL. As was indicated in

Table 3, approach coping was significantly negatively correlated with quality of life as

measured by the SRS-22r ($r = -.37$, $p \leq .05$), and avoidant coping was significantly

negatively related to quality of life as measured by both the PedsQL ($r = -.36$, $p \leq .05$) and the

SRS-22 ($r = -.49$, $p \leq .01$). Approach coping was not significantly correlated with quality of

life as measured by the PedsQL ($r = -.12$, $p > .05$).

Thus, part one of Hypothesis Four was partially supported, as higher use of avoidant

coping was significantly related to lower quality of life. However, higher use of approach

coping was not significantly related to higher quality of life.

Examination of coping as a moderator. The second part of Hypothesis Four was that

coping would moderate quality of life. According to Baron and Kenny (1986), the interaction

term of treatment group (predictor) and coping (suggested moderator) must be significantly

related to quality of life (the outcome variable) for coping to be considered a moderating

variable. Two sets of analyses were conducted to examine whether coping moderated quality

of life: one to examine each dimension of coping (approach and avoidant) on quality of life

as measured by each assessment tool (PedsQL and the SRS-22r). Within each set, interaction terms were generated and hierarchical multiple regression analyses were used to examine their significance. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in all regression analyses.

Coping as a moderator of quality of life as measured by the PedsQL. Four interaction terms were generated to examine whether coping moderated Total Quality of Life as measured by the PedsQL: one for approach coping and the braced treatment group versus the watchful waiting treatment group, one for approach coping and the post-surgical group versus the watchful waiting treatment group, one for avoidant coping and the braced treatment group versus the watchful waiting treatment group, and one for avoidant coping and the post-surgical group versus the watchful waiting treatment group. Interaction terms were not created for the watchful waiting treatment group because this treatment group served as the indicator/comparison group in all regression analyses.

Four hierarchical multiple regression analyses were conducted to examine the significance of each of the aforementioned interaction terms. In the first regression analysis, Total Quality of Life (PedsQL) was regressed on to the interaction term of approach coping with the braced treatment group (block three) while controlling for approach coping in the second block and the braced treatment group in the first block. As is indicated in Table 26, the resulting model accounted for 2% of the variance in Total Quality of Life [$F (3, 42) =$ .33, $p > .05$]. None of the individual variables in the model accounted for a statistically significant amount of the variance in Total Quality of Life. The interaction between the braced treatment group and Approach Coping was not statistically significant. Thus,

Approach Coping was not moderating the effects of bracing status on quality of life as

measured by the PedsQL.

Table 26

Hierarchical Multiple Regression Analysis Summary for Examination of Approach Coping as a Moderator of Total Quality of Life as Measured by the PedsQL for the Braced Treatment Group

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	.33						.81
Step 1					.02		
Braced		-1.61	4.27	-.06			.71
Step 2					.02	-.03	
Approach coping		-.05	.06	-.12			.43
Step 3					.02	-.05	
Interaction of Approach Coping and Braced Treatment Group		.06	.13	.24			.67

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses.

In the second regression analysis, Total Quality of Life (PedsQL) was regressed on to

the interaction term of Approach Coping and the post-surgical treatment group (block three)

while controlling for Approach Coping in the second block and the post-surgical treatment

group in the first block. As is indicated in Table 27, the resulting model accounted for 2% of

the variance in Total Quality of Life [F (3, 42) = .31, $p > .05$]. None of the individual

variables accounted for a significant amount of the variance in Total Quality of Life. The

interaction between the post-surgical treatment group and Approach Coping was not

statistically significant. Thus, Approach Coping was not moderating the effects of post-

surgical status on quality of life as measured by the PedsQL.

Table 27

Hierarchical Multiple Regression Analysis Summary for Examination of Approach Coping as a Moderator of Total Quality of Life as Measured by the PedsQL for the Post-Surgical Treatment Group

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	.31						.82
Step 1					.00		
Post-Surgical		.73	4.75	.02			.88
Step 2					.02	-.03	
Approach Coping		-.06	.07	-.14			.34
Step 3					.02	-.05	
Interaction of Approach Coping and post-surgical treatment group		.09	.22	.37			.69

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

In the third regression analysis, Total Quality of Life (PedsQL) was regressed on to the interaction term of Avoidant coping and the braced treatment group (block three) while controlling for Avoidant coping in the second block and the braced treatment group in the first block. As is indicated in Table 28, the resulting model accounted for 14% of the variance in Total Quality of Life [F (3, 42) = 2.22, p > .05]. The interaction between the braced treatment group and Avoidant Coping was not statistically significant. Thus, Avoidant Coping was not moderating the effects of bracing status on quality of life as measured by the PedsQL. However, Avoidant Coping did account for a significant amount of the variance in this model ($p \leq .01$), indicating that higher use of Avoidant Coping was predictive of lower quality of life for braced adolescents.

Table 28

Hierarchical Multiple Regression Analysis Summary for Examination of Avoidant Coping as a Moderator of Total Quality of Life as Measured by the PedsQL for the Braced Treatment Groups

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	2.22						.10
Step 1						.00	
Braced		-1.61	4.27	-.06			.71
Step 2						.14	.10
Avoidant coping		-.84	.33	-.37			.01**

(Table 28 continues)

(Table 28 continued)

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
Step 3					.14	.08	
Interaction of Avoidant Coping and Braced Treatment Group		-.01	.66	-.01			.99

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

$**p \le .01$

In the fourth regression analysis, Total Quality of Life (PedsQL) was regressed on to the interaction term of avoidant coping and the post-surgical treatment group (block three) while controlling for avoidant coping in the second block and the post-surgical treatment group in the first block. As is indicated in Table 29, the resulting model was statistically significant and accounted for 18% of the variance in Total Quality of Life [F (3, 42) = 3.01, $p \le .05$]. The interaction term between the post-surgical group and Avoidant Coping was not statistically significant. Thus, Avoidant Coping was not moderating the effects of post-surgical status on quality of life as measured by the PedsQL. However, Avoidant Coping accounted for a significant amount of the variance in this model ($p \le .01$), indicating that higher use of Avoidant Coping was predictive of lower quality of life for post-surgical adolescents.

Table 29

Hierarchical Multiple Regression Analysis Summary for Examination of Avoidant Coping as a Moderator of Total Quality of Life as Measured by the PedsQL for the Post-Surgical Treatment Group

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
Post-Surgical Group	3.01						.04*
Step 1					.00		
Post-Surgical		.73	4.75	.02			.88
Step 2					.14	.10	
Avoidant coping		-.87	.33	-.38			.01**
Step 3					.18	.12	
Interaction of Avoidant Coping and post-surgical treatment group		1.15	.85	.84			.18

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

* $p \le .05$

** $p \le .01$

In summary, these multiple regression analyses indicate that neither approach nor avoidant coping moderated Total Quality of Life as measured by the PedsQL.

Coping as a moderator of quality of life as measured by the SRS-22r. Four interaction terms were generated to examine whether coping moderated Overall Mean Quality of Life as measured by the SRS-22r: one for approach coping and the braced treatment group versus the watchful waiting treatment group, one for approach coping and the post-surgical group versus the watchful waiting treatment group, one for avoidant coping and the braced

treatment group versus the watchful waiting treatment group, and one for avoidant coping and the post-surgical group versus the watchful waiting treatment group. Interaction terms were not created for the watchful waiting treatment group because this treatment group served as the indicator/comparison group in all regression analyses.

Four hierarchical multiple regression analyses were conducted to examine the significance of each of the aforementioned interaction terms. In the first regression analysis, Overall Mean Quality of Life was regressed on to the interaction term of Approach Coping and the braced treatment group (block three) while controlling for Approach Coping in the second block and the braced treatment group in the first block. As is indicated in Table 30, the resulting model accounted for 15% of the variance in Overall Mean Quality of Life and approached statistical significance [F (3, 42) = 2.48, p = .07]. The interaction between the braced treatment group and Approach Coping was not statistically significant. Thus, Approach Coping was not moderating the effects of bracing status on quality of life as measured by the SRS-22r. However, Approach Coping accounted for a statistically significant amount of the variance in this model ($p \leq .01$), indicating that higher use of Approach Coping was predictive of lower quality of life as measured by the SRS-22r for braced adolescents.

Table 30

Hierarchical Multiple Regression Analysis Summary for Examination of Approach Coping as a Moderator of Overall Mean Quality of Life as Measured by the SRS-22r for the Braced Treatment Group

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	2.48						.07
Step 1							
					.00		
Braced		-.97	3.65	-.04			.79
Step 2					.14	.10	
Approach coping		-.13	.05	-.37			.01**
Step 3					.15	.09	
Interaction of Approach Coping and Braced Treatment Group		.07	.10	.36			.47

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

**$p \leq .01$

In the second regression analysis, Overall Mean Quality of Life (SRS-22r) was regressed on to the interaction term of Approach Coping and the post-surgical treatment group (block three) while controlling for Approach Coping in the second block and the post-surgical treatment group in the first block. As is indicated in Table 31, the resulting model was statistically significant and accounted for 17% of the variance in Total Quality of Life [F (3, 42) = 2.84, $p \leq .05$]. The interaction term between the post-surgical group and Approach Coping was not statistically significant. Thus, Approach Coping was not moderating the

effects of post-surgical status on quality of life as measured by the SRS-22r. However,

Approach Coping accounted for a statistically significant amount of the variance in this

model ($p \leq .01$), indicating that higher use of Approach Coping was predictive of lower

quality of life for post-surgical adolescents.

Table 31

Hierarchical Multiple Regression Analysis Summary for Examination of Approach Coping as a Moderator of Overall Mean Quality of Life as Measured by the SRS-22r for the Post-Surgical Treatment Group

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	2.84						.05*
Step 1						.00	
Post-Surgical		1.68	4.04	.06			.68
Step 2					.17	.13	
Approach Coping		-.15	.05	-.42			.01**
Step 3					.17	.11	
Interaction of Approach Coping and post-surgical treatment group		.05	.17	.22			.79

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

* $p \leq .05$

** $p \leq .01$

In the third regression analysis, Overall Mean Quality of Life (SRS-22r) was

regressed on to the interaction term of Avoidant coping and the braced treatment group

(block three) while controlling for Avoidant coping in the second block and the braced

treatment group in the first block. As is indicated in Table 32, the resulting model was

statistically significant and accounted for 24% of the variance in Overall Mean Quality of

Life [F (3, 42) = 4.50, $p \leq .01$]. The interaction between the braced treatment group and

Avoidant Coping was not statistically significant. Thus, Avoidant Coping was not

moderating the effects between bracing status and quality of life as measured by the SRS-

22r. However, Avoidant Coping accounted for a statistically significant amount of the

variance in this model ($p \leq .01$) indicating that higher use of Avoidant Coping was predictive

of lower quality of life for post-surgical adolescents.

Table 32

Hierarchical Multiple Regression Analysis Summary for Examination of Avoidant Coping as a Moderator of Overall Mean Quality of Life as Measured by the SRS-22r for the Braced Treatment Group

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	4.51						.01**
Step 1						.00	
Braced		-,97	3.64	-.04			.79
Step 2					.24	.21	
Avoidant coping		-.96	.26	-.49			.01**
Step 3					.24	.19	
Interaction of Avoidant Coping and Braced Treatment Group		.22	.53	,20			.68

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

** $p \le .01$

In the fourth regression analysis, Overall Mean Quality of Life (SRS-22r) was regressed on to the interaction term of Avoidant coping and the post-surgical treatment group (block three) while controlling for Avoidant coping in the second block and the post-surgical treatment group in the first block. As is indicated in Table 33, the resulting model was statistically significant and accounted for 28% of the variance in Overall Mean Quality of Life [$F (3, 42) = 5.55, p \le .01$]. The interaction term of the post-surgical treatment group and Avoidant Coping was not statistically significant. Thus, Avoidant Coping was not

moderating the effects of post-surgical status and quality of life as measured by the SRS-22r.

However, Avoidant Coping accounted for a significant amount of the variance in this model

($p \leq .01$), indicating that higher use of Avoidant Coping was predictive of lower quality of

life for post-surgical adolescents.

Table 33

Hierarchical Regression Analysis Summary for Examination of Avoidant Coping as a
Moderator of Overall Mean Quality of Life as Measured by the SRS-22r for the Post-
Surgical Treatment Group

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	5.55						.01**
Step 1					.00		
Post-Surgical		1.68	4.04	.06			.68
Step 2					.26	.23	
Avoidant coping		-1.01	.26	-.51			.00**
Step 3					.28	.13	
Interaction of Avoidant Coping and post-surgical treatment group		.79	.67	.68			.25

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses.

* *$p \leq .01$

    In sum, neither Approach nor Avoidant coping moderated generic quality of life (as

measured by the PedsQL) or disease specific quality of life (as measured by the SRS-22r).

    Coping as a mediator of quality of life. According to Barron and Kenny (1986), a

significant relationship must exist between the predictor variable (treatment group) and the

outcome variable (quality of life) in order to test for mediation. Two regression analyses

were conducted to examine this relationship, one for Total Quality of Life as measured by the

PedsQL and one for Overall Mean Quality of Life for the SRS-22r. The watchful waiting

treatment group was used as the indicator/comparison group for the dummy-coded braced

and post-surgical groups in both regression analyses.

In the first regression analysis, Total Quality of Life as measured by the PedsQL was

regressed onto treatment group. As is indicated in Table 34, the resulting model accounted

for 0% of the variance in total quality of life as measured by the PedsQL [F (2, 45) = .05, $p >$

.05]. None of the individual variables in the model accounted for a statistically significant

amount of the variance.

Table 34

*Regression Analysis Summary for Treatment Group on Total Quality of Life as Measured by
the PedsQL*

Predictor variable	F	B	SEB	ß	R^2	p
	.05					.95
Braced		-1.55	5.26	-.06		.77
Post-Surgical		-.54	5.92	-.02		.93

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses.

In the second regression analysis, Overall Mean Quality of Life as measured by the

SRS-22r was regressed onto treatment group. As is indicated in Table 35, the resulting model

accounted for 1% of the variance in overall mean quality of life as measured by the SRS-22r

[F (2, 45) = .21, p > .05]. None of the individual variables in the model accounted for a

statistically significant amount of variance.

Table 35

*Regression Analysis Summary for Treatment Group on Overall Mean Quality of Life as
Measured by the SRS-22r*

Predictor variable	F	B	SEB	ß	R^2	p
	.21					.82
Braced		-1.12	.544	-.05		.81
Post-Surgical		1.62	5.10	.06		.75

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses.

Because treatment group was not significantly related to quality of life as measured

by the PedsQL or the SRS-22r, examination of coping as a mediator of quality of life was not

indicated.

In sum, tests of moderation revealed that neither Approach nor Avoidant Coping

moderated generic or disease-specific quality of life. However, part two of Hypothesis Four

could not be fully tested because coping could not be examined as a mediator.

Secondary exploratory analysis

In the spirit of exploratory analyses, and to fully evaluate Hypothesis Four, the

appropriate regression and hierarchical multiple regression analyses were conducted to

examine coping as a mediator.

Coping as a mediator of quality of life as measured by the PedsQL. The first

significant relationship that needed to be established to test for mediation was that the

predictor variable (treatment group) needed to account for a statistically significant amount of the variance in the outcome variable (quality of life). As was noted earlier (see Table 34), treatment group did not account for a statistically significant amount of the variance in quality of life as measured by the PedsQL.

Thus, the first significant relationship needed to test for mediation was absent.

The second condition needed to test for mediation was that predictor variable (treatment group) had to account for a statistically significant amount of the variance in the hypothesized mediator (coping). Two regression analyses were conducted to examine this relationship, one each for Approach and Avoidant Coping. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses. Although the same information can be revealed by bivariate correlation, because Baron and Kenny (1986) recommend using regression analyses, these procedures were followed.

In the first analysis, approach coping was regressed onto treatment group. As is indicated in Table 36, the resulting model accounted for 11% of the variance in Approach Coping [F (2, 45) = 2.65, p > .05]. The post-surgical variable accounted for a statistically significant amount of the variance in this model ($p \leq .05$). Thus, post-surgical status was predictive of higher use of Approach Coping.

Table 36

Regression Analysis Summary for Treatment Group on Approach Coping.

Predictor variable	F	B	SEB	ß	R^2	p
	2.65					.08
					.11	
Braced		15.47	12.40	.23		.22
Post-Surgical		31.61	13.76	.41		.03*

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

p ≤ .05

In the second analysis, avoidant coping was regressed onto the treatment group. As is indicated in Table 37, the resulting model accounted for 4% of the variance in avoidant coping [F (2, 45) = .94, *p* > .05]. None of the individual variables in the model accounted for a statistically significant amount of the variance in this model.

Table 37

Regression Analysis Summary for Treatment Group on Avoidant Coping.

Predictor variable	F	B	SEB	ß	R^2	p
	.94					.40
					.04	
Braced		1.64	2.31	.13		.48
Post-Surgical		3.49	2.56	.26		.16

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

Thus, the second significant relationship needed to test mediation was partially present with respect to the post-surgical treatment group.

The third condition needed to test for mediation was that the hypothesized mediator (coping) should account for a significant amount of the variance in the outcome variable (quality of life). Two regression analyses were conducted to examine this relationship, one each for Approach and Avoidant Coping. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

In the first regression analysis, Approach Coping was regressed onto Total Quality of Life. As is indicated in Table 38, the resulting model accounted for 1% of the variance in Approach Coping [F (1, 44) = .64, p > .05]. Approach Coping did not account for a statistically significant amount of the variance in this model.

Table 38

Regression Analysis Summary for Approach Coping onto Total Quality of Life as Measured by the PedsQL

Predictor variable	F	B	SEB	ß	R^2	p
	.64					.43
					.01	
Approach Coping		-.05	.06	-.12		.43

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

In the second regression analysis, Avoidant Coping was regressed onto Total Quality of Life. As is indicated in Table 39, the resulting model was statistically significant and accounted for 13% of the variance in Avoidant Coping [$F (1, 44) = 6.74$, $p \leq .01$]. Avoidant Coping accounted for a statistically significant amount of the variance in this model ($p \leq$ .01). Thus, higher use of Avoidant Coping was predictive of lower quality of life as measured by the PedsQL.

Table 39

Regression Analysis Summary for Avoidant Coping onto Total Quality of Life as Measured by the PedsQL

Predictor variable	F	B	SEB	$ß$	R^2	p
	6.74					.01**
					.13	
Avoidant Coping		-.84	.32	-.36		.01**

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses

** $p \leq .01$

Thus, the third significant relationship needed to test for mediation was found for Avoidant Coping but not for Approach Coping.

The fourth relationship that needed to be present to test for mediation was that the mediator (coping) should account for significantly more variance in the outcome variable (quality of life) than the predictor (treatment group). Two hierarchical regression analyses were conducted, one for Approach Coping and one for Avoidant Coping. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

In the first regression analysis, Total Quality of Life (PedsQL) was regressed onto Approach Coping (second block) while controlling for treatment group in the first block. As is indicated in Table 40, the resulting model accounted for 2% of the variance in Total Quality of Life [F (3, 42) = .27, $p > .05$). None of the individual variables accounted for a statistically significant amount of the variance in this model.

Table 40

Hierarchical Regression Analysis Summary for Approach Coping on Total Quality of Life as Measured by the PedsQL Treatment Group

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	.27						.85
Step 1							
					.00		
Braced		-1.91	5.41	-.07			.73
Post-Surgical		-.54	6.00	-.02			.93
Step 2					.02	-.05	
Approach coping		-.05	.07	-.13			.42

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses

In the second regression analysis, Total Quality of Life (PedsQL) was regressed onto Avoidant Coping (second block) while controlling for treatment group in the first block. As is indicated in Table 41, the resulting model accounted for 14% of the variance in Total Quality of Life [F (3, 42) = 2.29, $p > .05$). The Avoidant Coping variable accounted for a statistically significant amount of the variance in this model ($p \leq .01$). Thus, higher use of Avoidant Coping was predictive of lower quality of life as measured by the PedsQL when controlling for treatment group.

Table 41

Hierarchical Regression Analysis Summary for Avoidant Coping on Total Quality of Life as Measured by the PedsQL, Controlling for Treatment Group

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	2.29						.09
Step 1							
					.00		
Braced		-1.91	5.41	-.07			.73
Post-Surgical		-.54	6.00	-.02			.93
Step 2					.14	.08	
Avoidant coping		-.87	.34	-.38			.01**

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

** $p \leq .01$

In sum, Avoidant Coping accounted for a statistically significant amount of the variance in Total Quality of Life as measured by the PedsQL when controlling for treatment group. However, it could not be said that the relationship between Avoidant Coping and Total Quality of Life (controlling for treatment group) was more significant than the relationship between treatment group and Total Quality of Life because the latter relationship was not statistically significant. Thus, Avoidant Coping did not mediate generic quality of life as measured by the PedsQL.

Approach Coping did not account for a statistically significant amount of the variance in Total Quality of Life when controlling for treatment group. Thus, Approach Coping also did not mediate generic quality of life as measured by the PedsQL.

Coping as a mediator of quality of life as measured by the SRS-22r. The first significant relationship that needed to be established to test for mediation was that the predictor variable (treatment group) needed to account for a statistically significant amount of the variance in the outcome variable (quality of life). As was noted earlier (see Table 35), treatment group did not account for a statistically significant amount of the variance in quality of life as measured by the SRS-22r.

Thus, the first significant relationship needed to test for mediation was absent.

The second condition needed to test for mediation was that predictor variable (treatment group) had to account for a statistically significant amount of the variance in the hypothesized mediator (coping). Two regression analyses were conducted to examine this relationship, one each for Approach and Avoidant Coping. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses. As was noted earlier (see Tables 36 and 37), use of Approach Coping was predicted by membership in the post-surgical treatment group but use of Avoidant Coping was not predicted by membership in either treatment group.

Thus, the second significant relationship needed to test for mediation was partially absent.

The third condition needed to test for mediation was that the hypothesized mediator (coping) should account for a significant amount of the variance in the outcome variable (quality of life). Two regression analyses were conducted to examine this relationship, one

each for Approach and Avoidant Coping. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

In the first regression analysis, Approach Coping was regressed onto Overall Mean Quality of Life. As is indicated in Table 42, the resulting model was statistically significant and accounted for 14% of the variance in Approach Coping [$F(1, 44) = 7.01, p \leq .01$]. Approach Coping accounted for a statistically significant amount of the variance in this model ($p \leq .01$). Thus, higher use of Approach Coping was predictive of lower quality of life as measured by the SRS-22r.

Table 42

Regression Analysis Summary for Approach Coping onto Overall Mean Quality of life as Measured by the SRS-22r

Predictor variable	*F*	*B*	SEB	ß	R^2	*p*
	7.01					.01**
					.14	
Approach Coping		-.13	.05	-.37		.01**

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses

** $p \leq .01$

In the second regression analysis, Avoidant Coping was regressed onto Overall Mean Quality of Life. As is indicated in Table 43, the resulting model was statistically significant and accounted for 24% of the variance in Avoidant Coping [$F(1, 44) = 13.74, p \leq .01$]. Avoidant Coping accounted for a statistically significant amount of the variance in this

model ($p \leq .01$). Thus, higher use of Avoidant Coping was predictive of lower quality of life as measured by the SRS-22r.

Table 43

Regression Analysis Summary for Avoidant Coping Onto Overall Mean Quality of Life as Measured by the SRS-22r

Predictor variable	*F*	*B*	SEB	ß	R^2	*p*
	13.74					.01**
					.24	
Avoidant Coping		-.96	.26	-.49		.01**

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses

** $p \leq .01$

Thus, the third significant relationship needed to test for mediation was found for both Approach and Avoidant Coping.

The fourth relationship that needed to be present to test for mediation was that the mediator (coping) should account for significantly more variance in the outcome variable (quality of life) than the predictor (treatment group). Two hierarchical regression analyses were conducted, one for Approach Coping and one for Avoidant Coping. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

In the first regression analysis, Overall Mean Quality of Life (SRS-22r) was regressed onto Approach Coping (second block) while controlling for treatment group in the first block. As is indicated in Table 44, the resulting model accounted for 17% of the variance in

Overall Mean Quality of Life [F (3, 42) = 2.92, $p \leq .05$). Approach Coping accounted for a

statistically significant amount of the variance in this model ($p \leq .01$). Thus, higher use of

Approach Coping was predictive of lower quality of life when controlling for treatment

group.

Table 44

Hierarchical Regression Analysis Summary for Approach Coping Onto Overall Mean
Quality of Life as Measured by the SRS-22r

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	2.92						.05*
Step 1							
					.00		
Braced		-.09	4.61	-.00			.98
Post-Surgical		1.62	5.11	.06			.75
Step 2					.17	.11	
Approach coping		-.15	.05	-.44			.01**

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses

* $p \leq .05$

** $p \leq .01$

In the second regression analysis, Overall Mean Quality of Life (SRS-22r) was

regressed onto Avoidant Coping (second block) while controlling for treatment group in the

first block. As is indicated in Table 45, the resulting model accounted for 26% of the

variance in Overall Mean Quality of Life [F (3, 42) = 5.00, $p \leq$ .01). The Avoidant Coping

variable accounted for a statistically significant amount of the variance in this model ($p \leq$

.01). Thus, higher use of Avoidant Coping was predictive of lower quality of life while

controlling for treatment group.

Table 45

Hierarchical Regression Analysis Summary for Avoidant Coping Onto Overall Quality of Life as Measured by the SRR-22r

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	5.00						.01**
Step 1							
					.00		
Braced		-.91	4.61	-.01			.98
Post-Surgical		1.62	5.11	.06			.75
Step 2					.26	.21	
Avoidant coping		-1.02	.27	-.52			.01**

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses.

** $p \leq .01$

In sum, Approach and Avoidant Coping accounted for a statistically significant

amount of the variance in Overall Mean Quality of Life as measured by the SRS-22r when

controlling for treatment group. However, it could not be said that that the relationships

between Approach Coping and Overall Mean Quality of Life (controlling for treatment group) and Avoidant Coping and Overall Mean Quality of Life (controlling for treatment group) were more significant than the relationship between treatment group and Overall Mean Quality of Life because the latter relationship was not statistically significant. Thus, neither Approach nor Avoidant Coping mediated disease-specific quality of life.

Secondary Analyses

Secondary analyses were performed to examine whether coping (approach and avoidant) accounted for a significant portion of the variance in Total Quality of Life as measured by the PedsQL, Overall Mean Quality of Life as measured by the SRS-22r, the subscales of the PedsQL, or the five domains of the SRS-22. The analyses with respect to Total Quality of Life (PedsQL) and Overall Mean Quality of Life (SRS-22r) differed from those conducted in the examination of mediation and moderation because demographic variables were controlled for in these secondary analyses.

In the first regression analysis, Total Quality of Life (PedsQL) was regressed onto Approach Coping in the third block while controlling for treatment group in the second block and for age, ethnicity, and gender in the first block. As is indicated in Table 46, the resulting model accounted for 4% of the variance in total quality of life [$F (6, 38) = .23, p > .05$]. None of the individual variables accounted for a significant amount of the variance in this model.

Table 46

Hierarchical Multiple Regression Analysis Summary for Approach Coping on Total Quality of Life as Measured by the PedsQL, Controlling for Demographic Variables

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
Step 1	.23					.02	.96
Age		-.67	1.52	-.07			.66
Gender		3.15	5.05	.10			.54
Ethnicity		-1.86	4.61	-.06			.69
Step 2					.03	-.09	
Braced		-1.22	5.95	-.04			.84
Post-Surgical		2.28	6.59	.07			.73
Step 3					.04	-.12	
Avoidant Coping		-.04	.08	-.10			.56

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

In the second regression analysis, Total Quality of Life (PedsQL) was regressed onto Avoidant Coping in the third block while controlling for treatment group in the second block and for age, ethnicity, and gender in the first block. As is indicated in Table 47, the resulting model accounted for 13% of the variance in total quality of life [F (6, 38) = .96, p > .05]. Avoidant Coping accounted for a significant amount of variance in this model ($p \le .05$).

Table 47

Hierarchical Multiple Regression Analysis Summary for Avoidant Coping on Total Quality of Life as Measured by the PedsQL, Controlling for Demographic Variables

Predictor variable	*F*	*B*	SEB	ß	R²	ΔR²	*p*
Step 1	.96				.02		.47
Age		-.67	1.52	-.07			.66
Gender		3.15	5.05	.10			.54
Ethnicity		-1.86	4.61	-.07			.69
Step 2					.03	-.10	
Braced		-1.22	5.95	-.04			.84
Post-Surgical		2.28	6.59	.07			.73
Step 3					.13	-.01	
Avoidant Coping		-.84	.39	.36			.04*

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

* *p* ≤ .05

In the third regression analysis, Overall Mean Quality of Life (SRS-22r) was regressed onto Approach Coping in the third block while controlling for treatment group in the second block and for age, ethnicity, and gender in the first block. As is indicated in Table 48, the resulting model accounted for 19% of the variance in overall mean quality of life [*F*

(6, 38) = 1.49, $p > .05$]. The Approach Coping variable accounted for a significant amount of

the variance ($p \le .05$) in model.

Table 48

Hierarchical Multiple Regression Analysis Summary for Approach Coping on Overall Mean
Quality of Life as Measured by the SRS-22r, Controlling for Demographic Variables

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
Step 1	1.49				.06		.21
Age		.34	1.25	.04			.79
Gender		.65	4.17	.03			.88
Ethnicity		-6.10	3.81	-.25			.12
Step 2					.08	-.04	
Braced		2.12	4.88	.09			.67
Post-Surgical		4.93	5.41	.19			.37
Step 3					.19	.06	
Approach Coping		-.13	.06	-.37			.03*

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses.

* $p \le .05$

In the fourth regression analysis, Overall Mean Quality of Life (SRS-22r) was

regressed onto Avoidant Coping in the third block while controlling for treatment group in

the second block and for age, ethnicity, and gender in the first block. As is indicated in Table

49, the resulting model accounted for 27% of the variance in overall mean quality of life [F

(6, 38) = 2.38, $p \leq .05$]. The avoidant coping variable accounted for a significant amount of

the variance ($p \leq .01$) in model.

Table 49

Hierarchical Multiple Regression Analysis Summary for Avoidant Coping on Overall Mean
Quality of Life as Measured by the SRS-22r, Controlling for Demographic Variables

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	2.38						.05*
Step 1					.06		
Age		.34	1.25	.04			.79
Gender		.65	4.17	.03			.88
Ethnicity		-6.10	3.81	-.25			.12
Step 2					.08	-.04	
Braced		2.12	4.88	.09			.67
Post-Surgical		4.93	5.41	.19			.37
Step 3					.27	.16	
Avoidant Coping		-.96	.30	-.48			.01**

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses.

* $p \leq .05$

** $p \leq .01$

      Subscales of the PedsQL. First, Pearson product moment correlation coefficients were

tabulated for Approach and Avoidant Coping and the subscales of the PedsQL. As was

indicated in Table 4, Avoidant Coping was significantly negatively related to Psychological Health ($r = -.46$, $p \leq .01$) and Emotional ($r = -.48$, $p \leq .01$) and School Functioning ($r = -.33$, $p \leq .05$). Approach coping was not significantly related to any of the subscales of the PedsQL.

Second, three hierarchical regression analyses were conducted to examine whether the bivariate relationship of avoidant coping with the aforementioned three subscales remained after controlling for demographic and treatment variables. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in all three regression analyses.

In the first regression analysis, Psychological Health was regressed onto Avoidant Coping (in the third block) while controlling for age, ethnicity, and gender in the first block and treatment group in the second block. As is indicated in Table 50, the resulting model accounted for 23% of the variance in this subscale [F (6, 38) = 1.86, $p > .05$]. Avoidant Coping accounted for a significant proportion of the variance ($p \leq .01$) in this model.

Table 50

Hierarchical multiple regression analysis summary for Avoidant Coping and the Psychological Health Score of the PedsQL

Predictor variable	*F*	*B*	SEB	ß	R^2	ΔR^2	*p*
	1.86						.11
Step 1					.01		
Age		-.49	1.42	-.06			.73
Gender		2.87	4.72	.10			.55
Ethnicity		-1.44	4.31	-.05			.74
Step 2					.03	-.09	
Braced		-1.95	5.54	-.07			.73
Post-Surgical		2.68	6.13	.09			.66
Step 3					.23	.10	
Avoidant Coping		-1.06	.34	-.49			.01**

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

** $p \leq .01$

In the second regression analysis, Emotional Functioning was regressed onto Avoidant Coping (in the third block) while controlling for age, ethnicity, and gender in the first block and treatment group in the second block. As is indicated in Table 51, the resulting model was significant accounted for 29% of the variance in this subscale [$F (6, 38) = 2.59$ $p \leq .05$]. Avoidant Coping accounted for a significant proportion of the variance ($p \leq .01$) in

this model. Thus, adolescents who reported higher use of avoidant coping behaviors also

reported lower emotional functioning.

Table 51

Hierarchical Multiple Regression Analysis Summary for Avoidant Coping and the Emotional Functioning Subscale of the PedsQL

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	2.59						.03*
Step 1					.08		
Age		-2.47	1.95	-.20			.21
Gender		8.07	6.49	.19			.22
Ethnicity		-3.81	5.92	-.10			.52
Step 2					.12	.01	
Braced		-6.93	7.49	-.18			.36
Post-Surgical		2.92	8.30	.07			.73
Step 3					.29	.18	
Avoidant Coping		-1.40	.47	-.45			.01**

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses.

** $p \le .01$

In the third regression analysis, School Functioning was regressed onto Avoidant

Coping (in the third block) while controlling for age, ethnicity, and gender in the first block

and treatment group in the second block. As is indicated in Table 52, the resulting model

accounted for 22% of the variance in this subscale [F (6, 38 = 1.73, p > .05]. Avoidant

coping accounted for a significant proportion of the variance ($p \leq .05$) in this model.

Table 52

Hierarchical Multiple Regression Analysis Summary for Avoidant Coping and the School Functioning Subscale of the PedsQL

Predictor variable	*F*	*B*	SEB	ß	R^2	ΔR^2	*p*
	1.73						.14
Step 1						.02	
Age		1.23	1.85	-.11			.52
Gender		-1.86	6.17	-.05			.77
Ethnicity		-3.22	5.63	-.09			.57
Step 2					.09	-.03	
Braced		6.27	7.03	.18			.38
Post-Surgical		13.58	7.79	.35			.09
Step 3					.22	.09	
Avoidant Coping		-1.12	.45	-.39			.02*

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses.

* $p \leq .05$

Domains of the SRS-22r. First, Pearson product correlation coefficients were

tabulated for coping and the five domains of the SRS-22r. As is indicated in Table 3,

Avoidant Coping was significantly negatively related to all five domains, whereas Approach

Coping was not significantly related to any of the five domains of the SRS-22r.

Second, five hierarchical regression analyses were conducted to examine whether the

bivariate relationship between Avoidant Coping and each of the domains of the SRS-22r

remained after controlling for demographic and treatment variables. In the first regression

analysis, Functioning was regressed onto Avoidant Coping (in the third block) while

controlling for age, ethnicity, and gender in the first block and treatment group in the second

block. As is indicated in Table 53, the resulting model accounted for 15% of the variance in

this subscale [F (6, 38) = 1.12, p > .05]. None of the individual variables accounted for a

significant amount of the variance in this model although the Avoidant Coping approached

significance (p = .06).

Table 53

Hierarchical Multiple Regression Analysis Summary for Avoidant Coping and the Functioning Domain of the SRS-22r

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	1.12						.37
Step 1					.01		
Age		-.02	.06	-.05			.75
Gender		.00	.21	.00			.99
Ethnicity		-.08	.19	-.06			.70
Step 2					.06	-.06	
Braced		.01	.24	.01			.38
Post-Surgical		-.33	.27	-.25			.22
Step 3					.15	.02	
Avoidant Coping		-.03	.02	-.32			.06

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

In the second regression analysis, Pain was regressed onto Avoidant Coping (in the third block) while controlling for age, ethnicity, and gender in the first block and treatment group in the second block. As is indicated in Table 54, the resulting model was significant and accounted for 33% of the variance in this subscale [F (6, 38) = 3.12, $p \leq .01$]. None of

the individual variables accounted for a significant amount of the variance in this model

although the Avoidant Coping approached significance ($p = .06$).

Table 54

Hierarchical Multiple Regression Analysis Summary for Avoidant Coping and the Pain Domain of the SRS-22r

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	3.12						.01**
Step 1					.79		
Age		.01	.07	.03			.86
Gender		-.11	.26	-.06			.67
Ethnicity		-.66	.23	-.41			.01
Step 2					.26	.16	
Braced		.44	.28	.28			.13
Post-Surgical		.69	.32	.40			.04
Step 3					.33	.22	
Avoidant Coping		-.04	.02	-.28			.06

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

** $p \le .01$

In the third regression analysis, Self-Image was regressed onto Avoidant Coping (in the third block) while controlling for age, ethnicity, and gender in the first block and treatment group in the second block. As is indicated in Table 55, the resulting model

accounted for 24% of the variance in this subscale [F (6, 38) = 1.94, p > .05]. Avoidant

coping accounted for a significant proportion of the variance ($p \le .01$) in this model.

Table 55

Hierarchical Multiple Regression Analysis Summary for Avoidant Coping and the Self-Image Domain of the SRS-22r

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	1.94						.10
Step 1					.03		
Age		.08	.08	.17			.30
Gender		-.01	.25	-.01			.96
Ethnicity		-.03	.23	-.03			.87
Step 2					.09	-.03	
Braced		.10	.29	.07			.74
Post-Surgical		.46	.32	.30			.15
Step 3					.24	.11	
Avoidant Coping		-.05	.02	-.42			.01**

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses.

** $p \le .01$

In the fourth regression analysis, Mental Health was regressed onto Avoidant Coping

(in the third block) while controlling for age, ethnicity, and gender in the first block and

treatment group in the second block. As is indicated in Table 56, the resulting model

accounted for 17% of the variance in this subscale [F (6, 38) = 1.33, p > .05]. Avoidant

Coping accounted for a significant proportion of the variance ($p \leq .01$) in this model.

Table 56

Hierarchical Multiple Regression Analysis Summary for Avoidant Coping and the Mental Health Domain of the SRS-22r

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	1.33						.27
Step 1					.03		
Age		-.01	.07	-.02			.90
Gender		.10	.24	.06			.70
Ethnicity		-.20	.22	-.14			.39
Step 2					.03	-.10	
Braced		-.10	.29	-.07			.75
Post-Surgical		-.14	.32	-.10			.66
Step 3					.17	.04	
Avoidant Coping		-.05	.02	-.42			.01**

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded braced and post-surgical groups in both regression analyses.

** $p \leq .01$

In the fifth regression analysis, Satisfaction with Management was regressed onto

Avoidant Coping (in the third block) while controlling for age, ethnicity, and gender in the

first block and treatment group in the second block. As is indicated in Table 57, the resulting

model was significant and accounted for 32% of the variance in this subscale [F (6, 38) = 3.0,

$p \leq .05$]. Avoidant Coping accounted for a significant proportion of the variance ($p \leq .05$) in

this model. Thus, adolescents who used more avoidant coping were less satisfied with the

management of their AIS.

Table 57

Hierarchical Multiple Regression Analysis Summary for Avoidant Coping and the
Satisfaction with Management Domain of the SRS-22r

Predictor variable	F	B	SEB	ß	R^2	ΔR^2	p
	3.00						.02*
Step 1					.11		
Age		.02	.10	.03			.85
Gender		.36	.33	.16			.29
Ethnicity		-.58	.30	-.29			.06
Step 2					.21	.11	
Braced		-.01	.37	-.01			.98
Post-Surgical		.73	.41	.34			.08
Step 3					.32	.21	
Avoidant Coping		-.06	.02	-.37			.02*

Note. The watchful waiting treatment group was used as the indicator/comparison group for the dummy-coded

braced and post-surgical groups in both regression analyses.

* $p \leq .05$

Supplemental Analyses

Qualitative Analysis of Disease-Specific Stressors

Adolescents were asked to list stressors they experienced with respect to their AIS treatment. The frequency of each stressor was tabulated and stressors were sorted into categories based upon similarity in content (see Appendix H).

Thirty-one percent (n =15) of the sample reported experiencing no stress in relation to treatment of idiopathic scoliosis. This segment of the sample included four adolescents in the watchful waiting group, eight adolescents who were braced, and three adolescents in the post-surgical group. With respect to the watchful waiting group, the most frequently reported stressor was pain (27%). With respect to the braced group, the most frequently reported stressors were fear of having surgery (21%), discomfort of the brace (21%), and appearance of clothing due to the brace (14%). With respect to the post-surgical group, the most frequently reported stressor was the appearance of their scar (31%).

Irrespective of treatment group, adolescents frequently reported stress over being in pain (13%) and the limitations posed by treatment for AIS (6%). Percent agreement in these analyses may appear low, but consideration must be given to the fact that adolescents self-reported stressors rather than endorsing stressors from a pre-generated list. Thus, in actuality, stressors were somewhat similar for the entire sample.

Cross-Validation of the SRS-22r and the PedsQL

Although similar in their titles, the five domains of the SRS-22r and the subscales of the PedsQL could not be directly compared due to differences in the thematic content of the items that comprised each domain/subscale. Thus, items of the PedsQL were matched to

items of the SRS-22 based upon similarity in thematic content, and then bivariate correlations were calculated for each item set (see Appendix I).

Nine questions of the SRS-22r did not match thematically with any questions on the PedsQL. With respect to questions that did match thematically, items on the PedsQL were significantly positively correlated (r = .34-.66) with items of the SRS-22r that addressed depression, anxiety, functioning/activity, and pain (the majority significant at the $p \leq .01$ level). This suggests that measures are examining similar constructs. While matching thematically, question stems on the PedsQL were all written in the present tense, phrased as brief statements, and included wording that may be more child-friendly (i.e., "I worry about what will happen to me" from the PedsQL versus "During the past 6 months have you been a nervous person" on the SRS-22r).

Examination of Floor and Ceiling Effects for the SRS-22r

Floor and ceiling effects were examined for the current study in efforts to replicate those found by Asher et al. (2006). A frequency table was calculated for mean values for each of the five domains of the SRS-22. Tables were inspected for floor and ceiling values. As is indicated in Table 58, the minimum domain score (1.0) was not achieved in any domain by the current sample and the maximum domain score (5.0) was achieved in all five domains.

Table 58

Comparison of Floor and Ceiling Effects for the Domains of the SRS-22r Between the Current Sample (N=48) and Asher et al. (2006) (N=48)

Domain	Floor					Ceiling			
	Score[a]	N (%) With Score[a]	Score[b]	N (%) with Score[b]		Score[a]	N(%) with Score[a]	Score[b]	N (%) with Score[b]
Function	2.4	1 (2.1)	3.0	0		5.0	5 (10.4)	5.0	17 (47)
Pain	1.2	1 (2.1)	2.3	0		5.0	11 (22.9)	5.0	13 (35.3)
Self-Image	1.4	1 (2.1)	2.6	0		5.0	2 (4.2)	5.0	7 (17.6)
Mental Health	2.4	1 (2.1)	3.4	0		5.0	6 (12.5)	5.0	11 (29.4)
Satisfaction with Management	1.5	1 (2.1)	1.0	2 (5.8)		5.0	14 (29.2)	5.0	13 (35.5)

Note. Higher score represents higher quality of life.

[a] Current sample.

[b] Asher et al. (2006). Although suspicious, information about floor effects from the Asher et al. (2006) was taken directly from a table published by Asher et al. (2006).

Floor and ceiling values for the current sample were then compared to the floor and ceiling values reported for the SRS-22r by Asher et al. (2006). With respect to floor scores, the lowest mean scores for the current sample were lower than the lowest mean scores for Asher et al. (2006) for four domains (Function/Activity, Pain, Self-Image, and Mental Health) and were higher than Asher et al. (2006) for one domain (Satisfaction with Management).

With respect to ceiling effects, the highest mean scores for the current sample were the same as the highest mean scores for Asher et al. (2006) for all five domains. However, the percentage of participants who achieved the ceiling scores for each domain score for the current sample and for Asher et al. (2006) differed. The largest discrepancy occurred for the Function/Activity domain, where a higher percentage of the participants in Asher et al. (2006) reported the ceiling score than participants in the current sample. The significance of this difference is to be determined.

Discussion

This pilot study examined coping and quality of life for adolescents with idiopathic scoliosis. More specific aims included examination of how adolescents cope with stress related to AIS treatment, examination of generic and disease-specific quality of life, comparison of quality of life to other adolescents with AIS and to healthy, acutely ill, and chronically ill adolescents, and examination of how coping and quality of life might differ depending upon the type of treatment adolescents received for their AIS. The findings of this study will now be discussed and integrated with the coping and quality of life literature. This will be followed by a review of strengths and limitations of the study as a whole and suggestions for future directions for research.

Hypothesis One

The first hypothesis, that AIS treatment groups would differ significantly in use of approach and avoidant coping, was not supported. This finding was not expected, given that the literature cited differences in the type, frequency, severity, and duration of stressors experienced by adolescents in different treatment groups (Andersen et al., 2002; Freidel et al., 2002; Kotzer and Foster, 2000; LaMontagne et al., 2004; LaMontagne et al., 1996; MacLean et al., 1989; Nicholson et al., 2003; Noonan et al., 1997; Ramirez, et al.,1999). While mean values reported by treatment groups did differ in the hypothesized direction, it is possible that the small sample size did not provide enough power for statistically significant differences to be detected. Alternatively, it is possible that some variable other than the type of treatment received for AIS may have accounted for differences in coping style preference, such as premorbid externalizing problems.

Use of approach and avoidant coping also did not differ significantly by age or gender. This finding with respect to age supports those of Blanchard-Fields et al. (1987) but contradicts those of Compas et al. (1988) and Griffith et al. (2000), who found that older adolescents were more likely to use approach coping behaviors to manage stress. In addition, the trend observed in the secondary analyses, that older adolescents scored significantly higher on the avoiding problems subscale of the A-COPE, also contradicts the findings of Compas et al. (1988) and Griffith et al. (2000). The findings that males and females did not differ significantly on any of the 12 coping pattern subscales of the A-COPE contrasts findings by Patterson (1985), Patterson & McCubbin (1987), Plancherel & Bolognini (1995), and Reclitis & Noam (1999). A possible reason is that adolescent participants in Compas et al. (1988), Griffith et al. (2000), Patterson (1985), Patterson & McCubbin (1987), Plancherel & Bolognini (1995), and Reclitis & Noam (1999) were asked to complete the A-COPE in reference to daily stressors. Thus, the fact that our findings differed from these studies suggests that perhaps adolescents use different coping behaviors to manage stressors due to the management of a chronic health condition from those they use to manage common, daily stressors.

Four limitations may have accounted for Hypothesis One not being supported: use of a dimensional conceptualization of coping, cross-sectional analysis of coping, problems inherent in the use of the A-COPE, and small sample size. Concerns with respect to the small sample size will be addressed in the upcoming section that reviews statistical limitations to the study in its entirety.

First, the decision to evaluate coping from a dimensional approach is controversial. Specifically, there is no gold-standard methodology for conceptualizing coping; rather, there

are several methodologies, all of which have varying degrees of support (Compas et al., 2001). In addition, even those who have used the approach and avoidant coping dimensional approach disagree about which specific coping behaviors comprise the approach and avoidant coping dimensions (Compas et al., 2001; Skinner et al., 2003). Furthermore, the dimensions of approach and avoidant coping are not necessarily mutually exclusive (Compas et al., 2001; Skinner et al., 2003). Finally, the factor structure proposed by Hanson et al. (1989) for the A-COPE was based upon an adolescent diabetic sample. Thus, this is the first study to apply it to an orthopedic sample in which the factor structure of the A-COPE has not been assessed.

Second, use of a cross-sectional design allowed for assessment of coping behaviors at only one point in time. Coping behavior use may well change based upon exposure to different disease-specific stressors and depending upon which coping behaviors the adolescent deems as adaptive in those situations. Thus, it may be more accurate and necessary to measure coping over time (longitudinally) and look for stability of coping behavior use before arriving at conclusions about the relationship between treatment type and coping.

Problems Inherent in the Use of the A-COPE

Use of the A-COPE posed six challenges. First, it is not clear whether adolescents truly endorsed items on this measure with respect to behaviors they performed to manage stress specific to treatment of their AIS. Specifically, 15 adolescents self-reported experiencing no stress, yet these adolescents chose response choices greater than "1" (indicates that a particular behavior is never used to manage stress) on several items of the A-COPE. This contradiction suggests adolescents may have actually endorsed either the

frequency with which they performed specific behaviors to manage non-AIS related stressors or the frequency with which they engaged in the listed behaviors in general (no relation to disease-specific or non-disease specific stressors).

Second, as noted by Phelps and Jarvis (1994), "Selecting a measure is one of the major problems facing researchers conducting investigations on adolescent stress and coping," (p. 360). The A-COPE was selected as the coping measure for this study because of its frequent use in measuring adolescent coping and it was developed specifically for adolescents. Because the coping behaviors used to manage disease-specific stressors may be different than those used to manage non-disease-specific stressors, and because there was no way to validate that adolescents were endorsing use of coping behaviors on the A-COPE with respect to disease-specific stressors, it is not clear that this is the best measure of coping for adolescents with a chronic health condition.

Third, several adolescents were not able to complete this measure without assistance from their parent or legal-guardian. This study was designed to have adolescents complete all questionnaires independently and to have all questions about the survey measures posed to the primary investigator and/or research assistants. This was not the reality, however, as several adolescents directed questions to and received assistance from their parent/legal-guardian. It is possible that adults may have influenced adolescent response choices by explaining the item and then telling the adolescent whether he or she actually used a particular coping behavior.

Fourth, although the A-COPE has been used by several researchers with healthy adolescents (Patterson & McCubbin, 1987) and chronically ill adolescents (e.g., Grey et al., 1998), it is not clear whether the items in the A-COPE are valid for individuals in early

adolescence. The items of the A-COPE were generated based upon self-reported coping behaviors of adolescents in the 10th, 11th, and 12th grades (ages 15-18) and validated on adolescent populations in which the majority of participants fell within this age range (Patterson & McCubbin, 1987). It could be expected that younger adolescents (ages 12-14) would cope differently than older adolescents (ages 15-18) for two reasons. First, adolescents in these age ranges are in different stages of cognitive development. Second, the stressors encountered by younger adolescents in the middle school years are very different from those experienced by older adolescents in the high school years. Thus, differences in stressor exposure would promote development of different coping behaviors.

There are three theoretical and research implications of the null findings of the analyses used to test Hypothesis One. Specifically, rather than evaluating coping from a dimensional approach, it may be more accurate to conduct a factor analysis of the A-COPE for the current sample. This is warranted to discern whether the 12-factor solution proposed by Patterson & McCubbin (1983), the two-factor solution proposed by Hanson et al. (1989), or a different factor-solution is most appropriate when using the A-COPE to evaluate coping for adolescents with AIS. Second, because adolescents would be expected to cope differently during early adolescence compared to late adolescence, at least two, age-specific versions of the A-COPE may be necessary to more validly and reliably assess coping across adolescence. Third, in order to strengthen the likelihood that adolescents endorse coping items that are actually used to manage disease-specific stress, it may be necessary to generate a disease-specific measure of coping for adolescents with AIS, just as the Issues in Coping with IDDM (Kovacs et al., 1986) was designed for diabetic adolescents. This suggestion is discussed again in more detail in the section focused on suggestions for future research.

Hypothesis Two

The second hypothesis, that quality of life for adolescents being treated for AIS would be low, was not supported.

PedsQL

Adolescents in the current sample did not report significantly lower quality of life than healthy adolescents on the PedsQL. This finding was not expected as it contradicts trends in the literature that total quality of life is lower for those diagnosed with a chronic health condition (e.g., Danielsson et al., 2001; Freidel et al., 2002; Sawyer et al., 2004). The implication of this finding is positive as it suggests that treatment for AIS may not significantly impair quality of life. While mean values reported by adolescents were lower than those of healthy adolescents, it is possible that the small sample size of adolescents surveyed in this study did not provide enough power for statistically significant differences to be detected.

It was not surprising that adolescents in the current sample reported significantly lower physical functioning than one healthy sample as pain and physical restrictions and limitations can be enduring effects of bracing and surgical treatment for AIS. What is surprising is that while physical functioning for the current sample was lower than both healthy samples, this difference was significant for only one. The implications of this finding are positive as they suggest that physical functioning may not be significantly impaired due to treatment for AIS. The adolescent literature on quality of life and physical functioning is very sparse. However, similar to our findings, information from the adult AIS literature is not consistent as to whether physical functioning is compromised by AIS and its treatment. It must be noted that adult completion of quality of life measures reflected functioning as

adults, not physical functioning during treatment for AIS (Danielsson et al., 2003; Freidel et al., 2002; Götze et al., 2002; Padua et al., 2001).

The finding that the current sample reported significantly higher quality of life, psychological health, and social and school functioning when compared to other chronically ill children was also not surprising. Specifically, it could be expected that quality of life for adolescents with AIS would be higher than for children with diabetes (a population included in one of the chronic illness comparison samples) as the daily treatment regimen for diabetes is much more time consuming, socially invasive, and longer in duration than the treatment for AIS (Delamater, 1992; Delamater, Kurtz, Bubb, White, & Santiago, 1987; Fisher et al., 1982; Kovacs et al., 1986). The finding that the current sample did not differ significantly from the Acutely Ill sample is curious, as it could be anticipated that the longer duration of wearing a brace or recovering from spinal fusion surgery would be more disruptive to quality of life than brief treatment for other acute health conditions.

Factors that may have contributed to the current sample not being significantly different from the Healthy and Acutely Ill samples include differences in sample size and the fact that the PedsQL is a generic measure of quality of life. First, the current sample included 41 participants whereas the Healthy (Varni et al., 2003; Varni et al., 2001) and Acutely Ill (Varni et al., 2001) comparison samples ranged from 207 to 8,836 participants. Thus, while adolescents with AIS reported lower mean values than the Healthy comparison groups on Total Quality of Life and all subscales except for Emotional Functioning, the current sample may not have been large enough for significant differences in quality of life to be detected. A similar rationale may explain why the higher mean values reported by adolescents in the current sample differed significantly from one, but not both, Chronically Ill comparison

groups. Second, the PedsQL may not be effective in discriminating between adolescents with AIS and healthy and acutely ill adolescents. This suggests that a disease-specific module of the PedsQL may be warranted for the AIS population or that the SRS-22r could be adapted along the lines of the PedsQL. Third, the PedsQL is a generic measure of quality of life and therefore may not be structured in a manner to validly discriminate quality of life for those with AIS versus those without this chronic health condition.

There are three theoretical and research implications of the null findings of the analyses used to test Hypothesis Two with respect to the PedsQL. First, the finding that adolescents did not differ significantly from healthy adolescents except with respect to physical functioning implies that treatment for AIS does not severely disrupt quality of life. Thus, the perception that a chronic health condition diagnosis will severely decrease quality of life may not be accurate for all chronic health populations. Second, the PedsQL may not be effective in discriminating between adolescents with AIS and healthy and acutely ill adolescents. This suggests that a disease-specific module of the PedsQL may be warranted for the AIS population or that the SRS-22r could be adapted along the lines of the PedsQL. Third, the PedsQL is a generic measure of quality of life and therefore may not be structured in manner to validly discriminate quality of life for those with AIS versus those without this chronic health condition.

SRS-22r

It was not surprising that adolescents in the current sample did not differ significantly from a comparison sample of adolescents with AIS in relation to functioning and activity participation, self-image, level of pain, and satisfaction with their treatment, as the two samples were similar with respect to treatment group membership, age, gender, and ethnicity.

What is puzzling is that the current sample reported significantly lower mental health than the comparison group. The exact reason for this difference is not known.

There are three research and practical implications of the null findings of Hypothesis Two with respect to the SRS-22r. First, adolescents endorsed responses on the SRS-22r that clustered above "3" on the five-point Likert scale for response choices, which indicated that their quality of life is high. This is positive as it implies that quality of life is not disrupted by AIS treatment. Second, information on how adolescents in the current study truly compare with other adolescents in treatment for AIS may not be accurate due to the limitations in normative values and standardization of the SRS-22r. Future research should select a generic or disease-specific measure depending upon the research questions that are being asked. Third, because adolescents reported high quality of life on both the SRS-22r and the PedsQL, it is not clear which one of these measures is better at describing quality of life for this population.

Hypothesis Three

The third hypothesis, that quality of life would differ significantly by AIS treatment group, was not supported. While mean values reported by treatment groups did differ in the hypothesized direction, it is possible that the small sample size did not provide enough power for statistically significant differences to be detected. Our findings are in contrast to those of Asher et al. (2003*c*), who did find significant differences between adolescents who were being watched and those who were braced. In addition, Climent et al. (1995) and Danielsson et al. (2001) found that quality of life differed significantly by AIS treatment group using different disease-specific quality of life measures. Two factors may have contributed to mean value differences not being statistically significant and thus Hypothesis Three not being

supported: small sample size and unequal treatment group membership. Both factors will be reviewed in a later section addressing statistical limitations for the study as a whole.

There are two research and practical implications of the null findings of the analyses used to test Hypothesis Three. First, because no significant between-group differences were found with respect to the domains of the SRS-22r, it implies that the discriminant validity of this measure may not be as high as anticipated or that quality of life truly does not differ significantly by AIS treatment type. Second, lack of between-groups differences also implies that the type of treatment prescribed for AIS does not impact quality of life and that differences in quality of life may be accounted for by some other variable such as psychosocial functioning. Thus, physicians should continue to use medical variables such as degree of curve and stage of puberty to make treatment decisions. If they use the SRS-22r clinically, they should be cautious about placing emphasis on evaluation of psychosocial characteristics as operationalized by this measure. Rather, other validated and highly used measures, such as the Child Behavior Checklist (Achenbach, 1991), might prove to be more informative with respect to psychosocial functioning that may have the potential to affect individual patient response to AIS treatment.

Hypothesis Four

The fourth hypothesis, that quality of life would differ significantly by coping (part one) and that coping would either moderate or mediate quality of life (part two), was partially supported. Specifically, with respect to part one, Avoidant Coping was significantly negatively related to quality of life, but Approach Coping was not significantly positively related to quality of life. Rather, approach coping was significantly negatively related to quality of life as measured by the PedsQL. The finding that avoidant coping was related to

quality of life was not surprising for two reasons. First, a similar relationship between use of behaviors consistent with the dimension of avoidant coping and low quality of life was found in the adolescent diabetes literature (Reid et al., 1994; Seiffege-Krenke & Klessinger, 2000). Second, the coping behaviors frequently included in the avoidant coping dimension typically do not resolve problems and do not allow adolescents to feel as though they have more control over the stress they are experiencing (Roth & Cohen, 1986; Seiffege-Krenke & Klessinger, 2000; Herman-Stahl et al., 1995).

It was interesting that approach coping was not significantly positively related to quality of life for two reasons. First, coping skills interventions in the diabetes literature found that teaching diabetic adolescents coping skills that were consistent with the dimension of approach coping improved their quality of life (Grey et al., 2000; Grey et al., 1998). In addition, it could be expected that managing one's stress as it occurs (one of the major defining features of coping behaviors that are consistent with the approach coping dimension) would lead to decreased overall stress and subsequently higher quality of life (Roth & Cohen, 1986l; Seiffege-Krenke & Klessinger, 2000; Herman-Stahl et al., 1995). This finding implies that some other variable besides approach coping, such as lower level of depression or anxiety, might influence higher quality of life. In addition, the finding that approach coping was significantly related to quality of life as measured by the PedsQL was surprising. The exact interpretation of this finding is not known but may be reflective of the high intercorrelation between the approach and avoidant coping dimensions.

The finding that coping was not a moderating variable was unexpected, given the noted relationship between coping and quality of life in the adolescent diabetes literature (Graue et al., 2004; Reid et al., 1994; Seiffege-Krenke & Klessinger, 2000) and the positive

influence of coping skills interventions on quality of life in the AIS (LaMontagne et al., 2004; LaMontagne et al., 2003; LaMontagne et al., 2003) and adolescent diabetes literatures (Grey et al., 2000; Grey et al., 1998; Grey et al.1997; Grey et al. 1991). The fact that coping was not a moderating variable of quality of life could be explained by the lack of power to detect significant findings due to the small sample size and/or that some other variable, such as high levels of depression, may be accounting for the observed differences in quality of life.

As has been mentioned, coping could not be evaluated as a mediator because the first condition needed to test for mediation was absent (Barron & Kenny; 1986).

There are three factors that may have contributed to outcomes of the analyses of Hypothesis Four: small sample size, use of the A-COPE, and examination of coping via the dimensions of approach and avoidant coping. The second two factors, use of the A-COPE and the dimensions of approach and avoidant coping, were addressed previously in the limitations with respect to Hypothesis One. The first factor, small sample size, will be addressed in the upcoming section that reviews statistical limitations to the study in its entirety.

There are two research and practical implications of the null findings of Hypothesis Four. First, the fact that avoidant coping accounted for a significant amount of the variance in overall mean quality of life for only the SRS-22r suggests that the use of a disease-specific measure of quality of life may be best when assessing this construct for adolescents with AIS.

Second, because avoidant coping was significantly negatively related to quality of life, it implies that adolescents who are identified as using an avoidant coping style may

benefit from a coping skills intervention focused on managing stress related to AIS. In addition, this relationship indicates the importance of physicians inquiring about whether adolescents are experiencing stress related to the treatment of their AIS and how they are managing those stressors. For example, if adolescents report that physical functioning is significantly decreased because of AIS treatment, then physicians may be able to alter treatment recommendations so physical functioning is not as strongly impaired. For example, if an adolescent is not wearing his or her brace due to discomfort during a low-impact sports activity, then it may be possible for the orthopedic surgeon to rearrange the treatment schedule so the brace can be removed when the adolescent is engaging in physical activity. Or, alternatively, if adolescents report that treatment has increased their feelings of depression or anxiety, then physicians can make an appropriate referral to mental health care professionals.

Study Strengths

There were five strengths to this study. First, it updates the literature on coping for adolescents with AIS. The most recent series of studies to examine coping in this population were performed by LaMontagne and colleagues in 2003 and 2004. However, their studies focused on the effectiveness of coping skills taught as part of a cognitive-behavioral intervention for adolescents undergoing spinal fusion surgery. Prior to this, only six studies had examined coping, most in the 1980s and early 1990s and most equating coping with adjustment instead of evaluating actual coping behaviors.

Second, this is the first study to use the PedsQL with adolescents who have idiopathic scoliosis and to compare quality of life of adolescents with AIS to healthy adolescents and adolescents with acute health conditions. This was the second study to compare quality of

life of adolescents with AIS to adolescents with alternate chronic health conditions (see

Asher et al., 2006). In these ways, the current study adds to the quality of life literature for

adolescents with AIS as well as to the literature on the use of the PedsQL.

Third, the fact that adolescents in the current study did not fall beyond one standard

deviation of the mean scores for a comparison sample of adolescents with AIS on four of the

five domain scores for the SRS-22r provides more evidence for the reliability and validity of

this measure when examining adolescents with AIS as a whole.

Fourth, an overall mean quality of life score for responses to the SRS-22r was not

originally specified by the measure's authors (Asher et al, 2006; Asher et al., 2003*a,b,c*) but

was included in the current study. It should be noted that a summary score was used in Asher

et al. (2003*c*), which included all domains of the SRS-22 except for the Satisfaction with

Management Domain. The Satisfaction with Management Domain was excluded from this

summary score because a significant portion of this sample had either not been formally

diagnosed with AIS or had not yet begun treatment for AIS. This summary score has not

been reported in any other studies that utilize the SRS-22 or the SRS-22r and is not included

in the scoring guidelines for the SRS-22r.

Creation of such a score for this study thus contributes to the literature about the SRS-

22r in three ways. First, while it is important to examine individual functioning domains,

most quality of life measures include an overall summary score indicative of overall

functioning. Second, Varni et al. (1999) describe quality of life as "a patient's perceptions of

the impact of disease and treatment functioning in a variety of dimensions including physical,

mental, and social domains," (p. 126). Thus, it is important to include the Satisfaction with

Management Domain into an overall mean quality of life score for the SRS-22r because level

of satisfaction with treatment might be related to an adolescent's level happiness (e.g.,

whether they want to wear their brace) or level of functioning (e.g., activity level may be

lower for adolescents who refuse to wear their brace because their curve is getting larger).

Third, generation of this summary score allows for the SRS-22r to be even more consistent

with the quality of life literature.

Finally, this study updates the literature on what is stressful about AIS treatment as

some of the earlier studies (Andersen et al., 2002; Friedel et al., 2002; MacLean et al., 1989;

Ramirez et al., 1999) were conducted before current medical treatment advances. While

some stressors that adolescents reported were expected, others were not; thus, the qualitative

analyses performed in this study provide valuable insight on additional aspects of this

chronic health condition that adolescents find stressful.

Limitations

Internal Validity

This study had two limitations with respect to internal validity. First, this was a

descriptive study, and thus adolescents were not randomly assigned to treatment group.

Second, while there were many significant correlational relationships between the variables

of interest in this study, it was not possible to determine the true direction of these

relationships because manipulating the independent variables (i.e. coping and scoliosis

treatment type) was not part of the research design.

External Validity

This study had one limitation with respect to external validity. Specifically, the ratio

of females to males in our sample was 2.7:1 whereas most descriptions of the AIS population

state that the disorder occurs at an 8:1 ratio. Thus, the current sample included an

overrepresentation of males. However, males did not differ significantly from females on any of the independent or dependent variables. Third, as was mentioned previously, only a small amount of comparison data is available for the SRS-22r. Thus, it is difficult to generalize the findings of this study with respect to this measure to all adolescents being treated for AIS.

Measurement Issues

Limitations with respect to measurement span three categories: data collection procedure, use of the SRS-22r, and use of he A-COPE. Limitations of the A-COPE were addressed previously.

Data collection. First, all data were completed by adolescent self-report, which is typically subject to memory and recency effects. In addition, social desirability bias could have been quite strong because adolescents completed survey packets in the presence of their parent/legal guardian. For example, with respect to the A-COPE, 100% of the sample population endorsed that they never smoked and 95.7% of the population endorsed that they never drank alcohol to cope with their stress. This finding contrasts with Payne et al. (1997), who collected data in a school setting and found that female adolescents with AIS were 3.5 times more likely to drink than their healthy peers. Thus, adolescents in the current sample may not have wanted to report partaking in the illegal behaviors of drinking or smoking in front of their parents/legal guardians.

SRS-22r. It is still not clear whether this measure is developmentally appropriate for adolescents and whether it most accurately captures quality of life for those with AIS. Because the PedsQL has been validated for adolescents, it is possible that its structure should serve as a model for the SRS-22r. There are three structural differences between the PedsQL and the SRS-22r. First, all questions on the PedsQL are worded in the present tense, whereas

questions on the SRS-22r are worded in the both the present and past tense. Further, the

PedsQL asks respondents to complete questions with respect to how they have functioned

and felt in the last month, whereas items of the SRS-22r differ between how respondents feel

currently, in the past month, in the past three months, and in the past six months.

Second, questions with similar thematic content are worded differently on the

PedsQL versus the SRS-22r. Because the PedsQL has been validated for use with

adolescents, the wording used on the PedsQL may be more developmentally appropriate.

Third, questions in the Physical Functioning subscale of the PedsQL provide more

information about specific physical limitations experienced by the adolescent than the

questions for the Functioning/Activity Domain of the SRS-22r. Specific examples, such as

"It is hard for me to lift something heavy" or "It is hard for me to do chores around the

house," may help adolescents to sort just how their condition limits their level of activity and

also may provide a clearer picture of just how exactly their physical functioning is impaired.

Analyses Challenges

Small sample size. Perhaps the largest limitation to this study was the small sample

size recruited. The number of participants included in the analyses for this study allowed for

the detection of only large effects at the $\alpha = .05$ level when using hierarchical multiple

regression to analyze the data. Thus, it is possible that the independent variables may account

for more variance in the dependent variables than was found in the current study. In addition,

all ANOVAs were exploratory as treatment group membership was not equal, thus violating

one of the major assumptions of the ANOVA analysis. Hence, it is possible that between-

group differences would have been found had treatment group membership been equal. It is

important to also reiterate difficulties with participant recruitment within this chronic health

condition population as these difficulties may be experienced by others who wish to do

research with those who have AIS. Specifically, it may be difficult to recruit a large sample

of adolescents with pure idiopathic scoliosis as many have medical co-morbidities such as

Duchene's muscular dystrophy, cerebral palsy, other spinal deformities, or genetic

abnormalities.

Future Directions For Research

The findings of this study imply several directions for future research. First and

foremost, the proposed hypotheses should be reevaluated once the originally proposed

sample size has been achieved. It is possible that with this larger number, the relationships

between the independent and dependent variables of interest will change. In addition, with

respect to the hierarchical regression analyses, if the sample size reaches the originally

proposed number of 76, then medium effects could be detected.

Second, despite a small sample size, avoidant coping still accounted for a significant

amount of the variance in quality of life as measured by the SRS-22r and must be an effect of

some magnitude. Therefore, researchers should examine the effectiveness of a coping skills

intervention on improving quality of life for adolescents who are identified as using an

avoidant coping style to manage AIS-related stress. This is warranted not only due to the

statistically significant relationship between avoidant coping and quality of life, but also

because of the positive impact of coping skills interventions on quality of life for pre- and

immediately post-surgical adolescents (LaMontagne et al., 2004; LaMontagne et al., 2003)

and for diabetic adolescents (Grey et al., 2000; Grey et al., 1998).

Third, a factor analysis of the A-COPE for the current sample is warranted to

examine whether a different factor structure is produced for orthopedic populations. Factor

analyses are also warranted to discern whether a different factor structure is more valid for younger adolescents.

Fourth, researchers should continue to examine whether the SRS-22r is a valid and reliable measure for adolescents by continuing to cross-validate it with the PedsQL and other generic quality of life measures (i.e., the CHQ; Landgraf et al., 1996). In addition, individual domains of the SRS-22r should be cross-validated with other measures of social and psychological functioning such as the Child Behavior Checklist (CBCL; Achenbach, 1991).

Fifth, based upon published literature with respect to quality of life for children with AIS, the data should be re-evaluated using degree of curve and length of time since treatment began as independent variables. Such analyses may increase the external validity of this study and may provide further assistance in generating normative data for the SRS-22r.

Sixth, it may be valuable to continue to collect qualitative information with respect to individual AIS-stressors for each adolescent and use this information to generate a disease-specific stress questionnaire. Such a questionnaire may be a rapid assessment tool to promote physician identification of stress caused by AIS and would promote a multi-disciplinary approach to treatment. The structure of the PedsQL is a promising model for such a questionnaire. Specifically, the core of the measure should contain AIS stressors applicable to all adolescents with AIS, and the modules should be developed for stressors specific to each treatment type. This structure may be beneficial in discerning more valid information about differences in quality of life by AIS treatment type.

Seventh, researchers should continue to examine whether other variables (such as level of non-disease-specific stress experienced by the adolescent, parental pathology, and parental coping) may moderate quality of life. It is important to examine and identify the

variables that do moderate quality of life so that physicians and other health care

professionals can intervene as necessary to promote the highest level of quality of life

possible for their adolescent patients and their families.

In sum, the current study produced two important findings. First, quality of life did

not differ significantly by AIS treatment group. Thus, orthopedic surgeons can be assured

that quality of life is not significantly impaired whether an adolescent is watched, braced, or

has received spinal fusion surgery. Second, use of avoidant coping is significantly negatively

related to quality of life and accounts for a significant amount of the variance in disease-

specific quality of life. Future research should replicate this study, continue to examine the

psychometric properties of the SRS-22r and other quality of life measures for this population,

and examine whether quality of life improves with a disease-specific coping skills

intervention for adolescents who use high levels of avoidant coping to manage disease

specific stress.

References

Achenbach, T. M. (1991). *Integrative guide for the 1991 CBCL/4-18, YSR, and TRF profiles*. Burlington, VT: University of Vermont, Department of Psychiatry.

Allen, D. A., Affleck, G., Tennen, H., McGrade, B., & Ratzen, S. (1984). Concerns of children with a chronic illness: A cognitive developmental study of juvenile diabetes. *Child: Care, Health, and Development*, *10*, 211-218.

American Academy of Orthopaedic Surgeons. (1993). *Pediatric outcomes data collection instrument*, Version 2.0, 1997.

American Psychological Association. (1992). Report of the association: Ethical principles of psychologists. In A. E. Kazdin (Ed.), *Methodological issues and strategies in clinical research,* (pp. 651-653). Washington DC: American Psychological Association.

Andersen, M. Ø., Anderson, G. R., Thomsen, K., & Christensen, S. B. (2002). Early brace weaning might reduce the psychological strain of Boston bracing: A study of 136 patients with adolescent idiopathic scoliosis at 3.5 years after termination of brace treatment. *Journal of Pediatric Orthopedics Part B, 11,* 97-99.

Anderson, F. J., Asher, M. A., Clark, G. M., Orrick, J. M., & Quiason, E. P. (1979). Adjustment of adolescents to chronic disability. *Rehabilitation Psychology, 26,* 177-185.

Apolone, G., & Mosconi, P. (1998). The Italian health survey: translation, validation, and norming. *Journal of Clinical Epidemiology, 51*, 1025-1036.

Asher, M. A., Lai, S-M., Burton, D., & Manna, B. (2003*a*). The reliability and concurrent validity of the Scoliosis Research Society-22 Patient Questionnaire for idiopathic scoliosis. *Spine, 28,* 63-69.

Asher, M. A., Lai, S-M., Burton, D., & Manna, B. (2003*b*). Scoliosis Research Society-22

    Patient Questionnaire: Responsiveness to change associated with surgical treatment.

    Spine, 28, 70-73

Asher, M. A., Lai, S-M., Burton, D., & Manna, B. (2003*c*). Discrimination validity of the

    Scoliosis Research Society-22 Patient Questionnaire: Relationship to idiopathic

    scoliosis curve pattern and curve size. *Spine, 28,* 74-78.

Asher, M. A., Lai, S. M., & Burton, D. C. (2000). Further development and validation of the

    Scoliosis Research Society (SRS) Outcomes Instrument. *Spine, 25,* 2381-2386.

Asher, M. A., Lai, S. M., Glattes, R. C., Burton, D. C., Alanay, A., & Bago, J. (2006).

    Refinement of the SRS-22 Health-Related Quality of Life questionnaire function

    domain. *Spine, 31,* 593-597.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social

    psychological research: Conceptual, strategic, and statistical considerations. *Journal*

    of Personality and Social Psychology, 51, 1173-1182.

Barrett, M. J. (1977). Surviving adolescence in a back brace: Laura's experience. *The*

    American Journal of Maternal Child Nursing, 2, 160-163.

Blanchard-Fields, F., & Irion, J. C. (1988). Coping strategies from the perspective of two

    developmental markers: Age and social reasoning. *Journal of Genetic Psychology,*

    149, 141-151.

Bontrager, H. (1965). *Some psychological correlates of disabled person's conscious*

    attitudes towards their disabilities. Unpublished master's thesis, University of

    Kansas.

Bridwell, K. H., Shufflebarger, H. L., Lenke, L. G., Lowe, T. G., et al. (2000). Parents' and

    patients' preferences and concerns in idiopathic adolescent scoliosis. *Spine, 25,* 2392-

    2399.

Bullinger, M., & Kirchberger, I. (1998). SF-36 Fragebogen zum Gesundheitsstatus.

    Göttingen: Hogrefe Verlag für Psychologie.

Cappelli, M., McGrath, P. J., Heick, C. E., MacDonald, N. E., Feldman, W., & Rowe, P.

    (1989). Chronic disease and its impact. *Journal of Adolescent Health Care, 10,* 283-

    288.

Chan, K. S., Mangione-Smith, R., Burwinkle, T. M., Rosen, M., & Varni, J. W. (2005). The

    PedsQL TM: Reliability and validity of the Short-Form Generic Core Scales and

    Asthma Module. *Medical Care, 43,* 256-265.

Clayson, D., & Levine, D.B. (1976). Adolescent scoliosis patients: Personality patterns and

    effects of corrective surgery. *Clinical Orthopedics, 116,* 99-102.

Climent, J. M., Sánchez, J., and the Group for the Study of Quality of Life in Spine

    Deformities. (1999). Impact of the type of brace on the quality of life of adolescents

    with spine deformities. *Spine, 24,* 1903-1908.

Climent, J. M., Reig, A., Sánchez, J., & Roda, C. (1995). Construction and validation of a

    quality of life instrument for adolescents with spine deformities. *Spine, 18,* 2006-

    2011.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112,* 155-159.

Compas, B. E., Connor-Smith, J. K., Saltzman, A. H. T., & Wadsworth, M. E. (2001).

    Coping with stress during childhood and adolescence: Problems, progress, and

    potential in theory and research. *Psychological Bulletin, 127,* 87-127.

Compas, B. E., Malcarne, V. L., & Fondacaro, K. M. (1988). Coping with stressful events in older children and young adolescents. *Journal of Consulting and Clinical Psychology, 56,* 405-411.

Danielsson, A. J., Wiklund, I., Pehrsson, K., & Nachemson, A. L. (2001). Health-related quality of life in patients with adolescent idiopathic scoliosis: a matched follow-up at least 20 years after treatment with brace or surgery. *European Spine Journal, 10,* 278-288.

Delamater, A. M. (1992). Stress, coping, and metabolic control among youngsters with diabetes. In A. M. La Greca, L. J. Siegel, J. L. Wallander, & C. E. Walker (Eds.), *Stress and coping in child health*, (pp. 191-211). New York, NY: Guilford Press.

Delamater, A. M., Kurtz, S. M., Bubb, J., White, N. H., & Santiago, J. V. (1987). Stress and coping in relation to metabolic control of adolescents with type 1 diabetes. *Developmental and Behavioral Pediatrics, 8,* 136-140.

Dell, D. D., & Regan, R. (1987). Juvenile idiopathic scoliosis. *Orthopaedic Nursing, 6,* 23-29.

DiRaimondo, C. V., & Green, N. E. (1988). Brace-wear compliance in patients with adolescent idiopathic scoliosis. *Journal of Pediatric Orthopaedics, 8,* 143-146.

Fairbank, J. C., Couper, J., Davies, J. B., & O'Brien, J. P. (1980). The Oswestry Low Back Pain Disability Questionnaire. *Physiotherapy, 66,* 271-273.

Fisher, E. B., Jr., Delamater, A. M., Bertleson, A. D., and Kirkley, B. G. (1982). Psychological factors in diabetes and its treatment. *Journal of Consulting and Clinical Psychology, 50,* 993-1003.

Fowles, J. V., Drummond, D. S., Ecuyer, S., Roy, L., & Kassab, M. T. (1978). Untreated

    scoliosis in the adult. *Clinical Orthopaedics and Related Research, 134,* 212-217.

Freidel, K., Petermann, F., Reichel, D., Steiner, A., Warschburger, P., et al. (2002). Quality

    of life in women with idiopathic scoliosis. *Spine, 27,* E87-E91.

Götze, C., Liljenqvist, U. R., Slomka, A., Götze, H. G., & Steinbeck, J. (2002). Quality of

    life and back pain: Outcome 16.7 years after Harrington instrumentation. *Spine, 27,*

    1456-1463.

Gratz, R. R., & Paplia-Finlay, D. (1984). Psychosocial adaptation to wearing the Milwaukee

    brace for scoliosis. *Journal of Adolescent Health Care, 5,* 237-242.

Graue, M., Wentzel-Larsen, T., Bru, E., Hanestad, B. R., & Søvik, O. (2004). The coping

    styles of adolescents with Type 1 diabetes are associated with degree of metabolic

    control. *Diabetes Care, 27,* 1313-1317.

Grey, M., Boland, E. A., Davidson, M., Li, J., & Tamborlane, W. V. (2000). Coping skills

    training for youth with diabetes mellitus has long-lasting effects on metabolic control

    and quality of life. *The Journal of Pediatrics, 137,* 107-113.

Grey, M., Boland, E. A., Davidson, M., Yu, C., Sullivan-Bolyai, S., & Tamborlane, W. V.

    (1998). Short-term effects of coping skills training as adjunct to intensive therapy in

    adolescents. *Diabetes Care, 21,* 902-908.

Grey, M., Boland, E. A., Yu, C., Sullivan-Bolyai, S., & Tamborlane, W. V. (1998). Personal

    and family factors associated with quality of life in adolescents with diabetes.

    Diabetes Care, 21, 909-914.

Grey, M., Cameron, M. E., Lipman, T. H., & Thurber, F. W. (1995). Psychosocial status of children with diabetes in the first 2 years after diagnosis. *Diabetes Care, 18,* 1330-1336.

Grey, M., Cameron, M. E., Lipman, T. H., & Thurber, F. W. (1994). Initial adaptation in children with newly diagnosed diabetes and healthy children. *Pediatric Nursing, 20,* 17-22.

Grey, M., Cameron, M. E., & Thurber, F. W. (1991). Coping and adaptation in children with diabetes. *Nursing Research, 40,* 144-149.

Grey, M., Davidson, M., Boland, E. A., & Tamborlane, W. V. (2001). Clinical and psychosocial factors associated with achievement of treatment goals in adolescents with diabetes mellitus. *Journal of Adolescent Health, 28,* 377-385.

Grey, M., Lipman, T., Cameron, M. E., & Thurber, F. W. (1997). Coping behaviors at diagnosis and in adjustment one year later in children with diabetes. *Nursing Research, 46,* 312-317.

Griffith, M. A., Dubow, E. F., & Ippolito, M. F. (2000). Developmental and cross-situational differences in adolescents' coping strategies. *Journal of Youth and Adolescence, 29,* 183-204.

Grob, A., Lüthi, R., Kaiser, F. G., et al. (1991). Berner fragebogen zum wohlbefinden jugendlicher (BFW). *Diagnostica, 37,* 66-75.

Gurnham, R. B. (1983). Adolescent compliance with spinal brace wear. *Orthopaedic Nursing, 2,* 13-17.

Guttman-Bauman, I., Flaherty, B. P., Strugger, M., & McEnvoy, R. C. (1998). Metabolic

control and quality-of-life self-assessment in adolescents with IDDM. *Diabetes Care,*

21, 1998.

Haher, T. R., Gorup, J. M., Shin, T. M., Homel, P., Merola, A. A., Grogan, D. P., Pugh, L.,

Lowe, T. G., & Murray, M. (1999). Results of the Scoliosis Research Society

instrument for evaluation of surgical outcome in adolescent idiopathic scoliosis.

Spine, 24, 1435-1440.

Hanson, C., Cigrang, J., Harris, M., Carle, D., Relyea, G., & Burghen, G. (1989). Coping

styles in youths with insulin-dependent diabetes mellitus. *Journal of Consulting and*

Clinical Psychology, 5, 644-651.

Helenius, I., Remes, V., Yrjonen, T., Yikoski, M., Schlenzka, D., et al. (2005). Does gender

affect outcome of surgery in adolescent idiopathic scoliosis? *Spine, 30,* 462-467.

Herman-Stahl, M. A., Stemmler, M., & Petersen, A. C. (1995). Approach and avoidant

coping: Implications for adolescent mental health. *Journal of Youth and Adolescence,*

24, 649-665.

Hesketh, K. D., Wake, M. A., & Camerson, F. J. (2004). Health-related quality of life and

metabolic control in children with Type 1 diabetes. *Diabetes Care, 27,* 415-420.

Hoey, H., Aanstoot, H-J., Chiarelli, F., Daneman, D., Danne, T., et al. (2001). Good

metabolic control is associated with better quality of life in 2,101 adolescents with

Type 1 diabetes. *Diabetes Care, 24,* 1923-1928.

Ingersoll, G. M., & Marrero, D. G. (1991). A modified quality-of-life measure for youths:

Psychometric properties. *The Diabetes Educator, 17,* 114-118.

Jalowiec, A., & Powers, M. J. (1984). Psychometric assessment of the Jalowiec Coping

    Scale. *Nursing Research, 30,* 10-15.

Johnson, S. B., Kelly, M., Henretta, J. C., Cunningham, W. R., Tomer, A., & Silverstein, J.

    H. (1992). A longitudinal analysis of adherence and health status in childhood

    diabetes. *Journal of Pediatric Psychology, 17,* 537-533.

Kager, V. A., & Holden, E. W. (1992). Preliminary investigation of the direct and

    moderating effects of family and individual variables on the adjustment of children

    and adolescents with diabetes. *Journal of Pediatric Psychology, 17,* 491-502.

Kahanovitz, N., & Weiser, S. (1988). The psychological impact of idiopathic scoliosis on the

    adolescent female: A preliminary multi-center study. *Spine, 14,* 483-485.

Karol, L. A. (2001). Effectiveness of bracing in male patients with idiopathic scoliosis.

    Spine, 26, 2001-2005.

Kotzer, A. M. (2000). Factors predicting postoperative pain in children and adolescents

    following spine fusion. *Issues in Comprehensive Pediatric Nursing, 23*, 83-102.

Kotzer, A. M., & Foster, R. (2000). Children's use of PCA following spinal fusion.

    Orthopaedic Nursing, 19, 19-30.

Kovacs, M., Brent, D., Steinberg, T. F., Paulauskas, S., & Reid, J. (1986). Children's self-

    reports of psychologic adjustment and coping strategies during first year of insulin-

    dependent diabetes mellitus. *Diabetes Care, 9,* 472-479.

Kovacs, M, Goldston, D., Obrosky, D. S., & Bonar, L. K. (1997). Psychiatric disorders in

    youths with IDDM: Rates and risk factors. *Diabetes Care, 20,* 36-44.

LaMontagne, L. L. (1987). Children's preoperative coping: Replication and extension.

    Nursing Research, 36, 163-167.

La Montagne, L. L. (1984). Children's locus of control beliefs as predictors of preoperative coping behaviors. *Nursing Research, 33,* 76-79.

LaMontagne, L. L., Hepworth, J. T., Cohen, F., & Salisbury, M. H. (2004). Adolescent scoliosis: Effects of corrective surgery, cognitive-behavioral interventions, and age on activity outcomes. *Applied Nursing Research, 17,* 168-177.

LaMontagne, L., Hepworth, J. T., Cohen, F., Salisbury, M. H. (2003). Cognitive-behavioral intervention effects on adolescents' anxiety and pain following spinal fusion surgery. *Nursing Research, 52,* 183-190.

LaMontagne, L. L., Hepworth, J. T., Johnson, B. D., & Cohen, F. (1996). Children's preoperative coping and its effects on postoperative anxiety and return to normal activity. *Nursing Research, 45,* 141-147.

LaMontagne, L., Hepworth, J. T., Salisbury, M. H., & Cohen, F. (2003). Effects of coping instruction in reducing young adolescents' pain after major spinal surgery. *Orthopaedic Nursing, 22,* 398-403.

LaMontagne, L. L., Johnson, J. E., Hepworth, J. T., & Johnson, B. D. (1997). Attention, coping, and activity in children undergoing orthopaedic surgery. *Research in Nursing & Health, 20,* 487-494.

Landgraf, J. M., Abetz, L., & Ware, J. (1996). *Child Health Questionnaire user's manual*, 1st ed. Boston, MA: The Health Institute; New England Medical Center.

Lazarus, R. S. (1998). *Fifty years of the research and theory of R.S. Lazarus: An analysis of historical and perennial issues*. Mahwah, NJ: Lawrence Erlbaum Associates.

Lazarus, R. S. (1996). *Psychological stress and the coping process*. New York, NY: McGraw-Hill.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York, NY: Springer.

Levi, R., & Drotar, D. (1998). Critical issues and needs in health-related quality of life assessment of children and adolescents with chronic health conditions. In D. Drotar (Ed.), *Measuring health-related quality of life in children and adolescents: Implications for research and practice*, (pp. 3-24). Mahwah, NJ: Lawrence Erlbaum Associates.

Lyons, B., Boachie-Adjei, O., Podzius, J., & Podzius, C. (1999). *Scoliosis: Ascending the curve*. New York, NY: M. Evans and Company, Inc.

Madsen, S. D., Roisman, G. I., & Collins, W. A. (2002). The intersection of adolescent development and intensive intervention: Age-related psychosocial correlates of treatment regimens in the Diabetes Control and Complication Trial. *Journal of Pediatric Psychology, 27,* 451-459.

MacLean, W. E., Jr., Green, N. E., Pierre, C. B., & Ray, D. C. (1989). Stress and coping with scoliosis: Psychological effects on adolescents and their families. *Journal of Pediatric Orthopaedics, 9,* 257-261.

Masten, A. S., & Coatsworth, J. D. (1988). The development of competence in favorable and unfavorable environments: Lessons from research on successful children. *American Psychologist, 53,* 205-220.

Mendelow, M. (personal communication October, 2003).

Mina, E. (1995). Research into the causes of adolescent idiopathic scoliosis. www.microconn.com/scoliosis/idioemina.htm.

Myers, B. A., Friedman, S. B., & Weiner, I. B. (1970). Coping with a chronic disability: Psychosocial observations of girls with scoliosis treated with the Milwaukee brace. *American Journal of the Disabled Child, 120,* 175-181.

Nathan, S. W. (1977). Body image of scoliotic adolescents before and after surgery. *Maternal-Child Nursing Journal, 6,* 139-149.

Neurwirth, M., & Osborn, K. (2001). *The scoliosis sourcebook*. Chicago, IL: Contemporary Books.

Nichols, M. L. (1995). Social support and coping in young adolescents with cancer. *Pediatric Nursing, 21,* 235-240.

Noonan, K. J., Dolan, L. A., Jacobson, W. C., & Weinstein, S. L. (1997). Long-term psychosocial characteristics of patients treated for idiopathic scoliosis. *Journal of Pediatric Orthopaedics, 17,* 712-717.

Ólafsson, Y., Saraste, H., Ahlgren, R-M. (1999). Does bracing affect self-image? A prospective study on 54 patients with adolescent idiopathic scoliosis. *European Spine Journal, 8,* 402-405.

Padua, R., Padua, S., Auslisa, L., Ceccarelli, E., Padua, L., et al. (2001). Patient outcomes after Harrington instrumentation for idiopathic scoliosis: A 15-to-28-year evaluation. *Spine, 26,* 1268-1273.

Pashman, R. Retrieved May, 2005, from http://espine.com/scoliosis2.html.

Patterson, J.M. (1985). A-COPE: Adolescent Coping Orientation for Problem Experiences. In H.I. McCubbin & A.I. Thompson (Eds.), *Family assessment inventories for research and practice* (pp. 226-243). Madison, WI: University of Wisconsin-Madison.

Patterson, J. M, & McCubbin, H. (1987). Adolescent coping style and behaviors: conceptualization and measurement. *Journal of Adolescence, 10,* 163-186.

Patterson, J. M, & McCubbin, H. (1983). *A-COPE-Adolescent Coping Orientation for Problem Experiences* (Research Instrument). Madison, WI: University of Wisconsin.

Patton, A. C., Ventura, J. N., & Savedra, M. (1986). Stress and coping responses of adolescents with cystic fibrosis. *Children's Health Care, 14,* 153-156.

Payne, W. K., III, Ogilvie, J. W., Resnick, M. D., Kane, R. L., Ensor, E. T., et al. (1997). Does scoliosis have a psychological impact and does gender make a difference? *Spine, 22,* 1380-1384.

Petersen, C., Schmidt, S., Bullinger, M., & the DISABKIDS Group. (2004). Brief report: Development and pilot testing of a coping questionnaire for children and adolescents with chronic health conditions. *Journal of Pediatric Psychology, 29,* 635-640.

Piko, B. (2001). Gender differences and similarities in adolescents' ways of coping. *The Psychological Record, 51,* 223-235.

Plancherel, B., & Bolognini, M. (1995). Coping and mental health in early adolescence. *Journal of Adolescence, 18,* 459-474.

Ramírez, N., Johnston, C. E., Browne, R. H., & Vazquez, S. (1999). Back pain during orthotic treatment of idiopathic scoliosis. *Journal of Pediatric Orthopaedics, 19,* 198-201.

Reamy, B. V., & Slakey, J. B. (2001). Adolescent idiopathic scoliosis: Review and current concepts. *American Family Physician, 64,* 111-116.

Reclitis, C. J., & Noam, G. G. (1999). Clinical and developmental perspectives on adolescent coping. *Child Psychiatry and Human Development, 30,* 87-101.

Reichel, D., & Schanz, J. (2003). Developmental psychological aspects of scoliosis

treatment. *Pediatric Rehabilitation, 6,* 221-225.

Reid, G. J., Dubow, E. F., Carey, C. C., & Dura, J. R. (1994). Contribution of coping to

medical adjustment and treatment responsibility among children and adolescents with

diabetes. *Developmental and Behavioral Pediatrics, 15,* 327-335.

Renk, K., & Creasey, G. (2003). The relationship of gender, gender identity, and coping

strategies in late adolescents. *Journal of Adolescence, 62,* 159-168.

Rinella, A., Bridwell, K., Kim, Y., Rudzki, J., Edwards, C., Roh, M., et al. (2004). Late

complications of adult idiopathic scoliosis primary fusions to L4 and above: the

effects of age and distal fusion level. *Spine, 29,* 318-325.

Roach, J. W. (1999). Adolescent idiopathic scoliosis. *The Orthopedic clinics of North

America, 30,* 353-365.

Roth, S., & Cohen, L. J. (1986). Approach, avoidance, and coping with stress. *American

Psychologist, 41,* 813-819.

Saccomanni, L., Vercellino, F., Rizzo, P., & Becchetti, S. (1998). Adolescents with scoliosis:

psychological and psychopathological aspects. *Minerva Pediatrica, 50,* 9-14.

Sapountzi-Krepia, D. S., Valavanis, J., Panteleakis, G. P., Zangana, D. T., Vlachojiannis, P.

C., & Sapkas, G. S. (2001). Perceptions of body image, happiness and satisfaction in

adolescents wearing a Boston brace for scoliosis treatment. *Issues and Innovations in

Nursing Practice, 35,* 683-690.

Sawyer, M. G., Reynolds, K. E., Couper, J. J., French, D. J., Kennedy, D., et al. (2004).

Health-related quality of life of children and adolescents with chronic illness-a two

year prospective study. *Quality of Life Research, 13,* 1309-1319.

Schatzinger, L. A. H., Nash, C. L., Drotar, D. D., & Hall, T. W. (1977). Emotional
adjustment in scoliosis. *Clinical Orthopaedics and Related Research, 125,* 145-150.

Scoloveno, M. A., Yarcheski, A., & Mahon, N. E. (1990). Scoliosis effects on selected
variables among adolescents. *Western Journal of Nursing Research, 12,* 601-618.

Seid, M., Varni, J. W., & Jacobs, J. R. (2000). Pediatric health-related quality of life
measurement technology: Intersections between science, managed care, and clinical
care. *Journal of Clinical Psychology in Medical Settings, 7,* 17-27.

Seiffege-Krenke, I. (2000). Causal links between stressful events, coping style, and
adolescent symptomatology. *Journal of Adolescence, 23,* 675-691.

Seiffege-Krenke, I., & Klessinger, N. (2000). Long-term effects of avoidant coping on
adolescents' depressive symptoms. *Journal of Youth and Adolescence, 29,* 617- 630.

Skinner, E. A., Edge, K., Altman, J., & Sherwood, H. (2003). Searching for the structure of
coping: A review and critique of category systems for classifying ways of coping.

Snethen, J. A., Broome, M. E., Kelber, S., & Warady, B. A. (2004). Coping strategies
utilized by adolescents with end stage renal disease. *Nephrology Nursing Journal, 31,*
41-49.

Sullivan, M., Karlsson, J., & Ware, J. (1994). SF-36, Swedish manual and interpretation
guide. Gothenburg University and Sahlgrenska Hospital, Gothenburg.

Takemitsu, M., Bowen, J. R., Rahman, T., Glutting, J. J., & Scott, C. B. (2004). Compliance
monitoring of brace treatment for patients with idiopathic scoliosis. *Spine, 29,* 2070-
2074.

Ugwonali, O. F., Lomas, G., Choe, J. C., Hyman, J. E., Lee, F. Y., et al. (2004). Effect of

bracing on the quality of life of adolescents with idiopathic scoliosis. *The Spine

Journal, 4,* 254-260.

Ullrich, P. F. (2001). *Scoliosis surgery*. Retrieved on May, 2004, from http://www.spine-

health.com/print/topics/cd/scoliosis/scoliosis004.html.

Vandal, S., Rivard, C-H., & Bradet, R. (1999). Measuring the compliance behavior of

adolescents wearing orthopedic braces. *Issues in Comprehensive Pediatric Nursing,

22,* 59-73.

Varni, J. W., Burwinkle, T. M., Seid, S. M., & Skarr, D. (2003). The PedsQL™ 4.0 as a

pediatric population health measure: Feasibility, reliability, and validity. *Ambulatory

Pediatrics, 3*, 329-341.

Varni, J. W., Seid, M., Knight, T. S., Uzark, K., & Szer, I. S. (2002). The PedsQL™ 4.0

generic core scales: Sensitivity, responsiveness, and impact on clinical decision-

making. *Journal of Behavioral Medicine, 25,* 175-193.

Varni, J. W., Seid, M., & Kurtin, P. S. (2001). PedsQL™ 4.0 Reliability and validity of the

Pediatric Quality of Life Inventory™ Version 4.0 generic core scales in healthy and

patient populations. *Medical Care, 39,* 800-812.

Varni, J. W., Seid, M., & Rode, C. A. (1999). The PedsQL™: Measurement model for the

Pediatric Quality of Life Inventory. *Medical Care, 37,* 126-139.

Ware, J. E., Jr., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey

(SF-36): Conceptual framework and item selection. *Medical Care, 30,* 473-483.

Weinstein, S. L., Dolan, L. A., Spratt, K. F., Peterson, K. K., Spoonamore, M. J., & Ponseti,

I. V. (2003). Health and function of patients with untreated idiopathic scoliosis: A 50-

year natural history study. *Journal of the American Medical Association, 289,* 559-567.

Wickers, F. C., Bunch, W. H., & Barnett, P. M. (1977). Psychological factors in failure to wear the Milwaukee brace for treatment of idiopathic scoliosis. *Clinical Orthopaedics and Related Research, 126,* 62-66.

Wilkinson, R. B., Walford, W. A., & Espnes, G. Å. (2000). Coping styles and psychological health in adolescents and young adults: A comparison of moderator and main effects models. *Australian Journal of Psychology, 52,* 155-162.

Wilson, P. L., Newton, P. O., Wenger, D. R., Haher, T., Merola, A., Lenke, L., Lowe, T., Clements, D., & Betz, R. (2002). A multicenter study analyzing the relationship of a standardized radiographic scoring system of adolescent idiopathic scoliosis and the Scoliosis Research Society Outcomes Instrument. *Spine, 27,* 2036-2040.

World Health Organization. (1948). *Constitution of the World Health Organization Basic Document*, World Health Organization, Geneva, Switzerland.

Appendix A

Full demographic information for adolescent participants as a whole sample and by treatment group [n (percentage of the sample)]

Characteristic	Whole (N = 48)	Watched (n = 11)	Braced (n = 24)	Post-Surgical (n = 13)
Age (years)				
11	2 (4.9)	-	2 (8.3)	-
12	3 (6.3)	-	3 (12.5)	-
13	9 (18.8)	3 (27.3)	6 (25.0)	-
14	10 (20.8)	2 (18.2)	5 (20.8)	3 (23.1)
15	12 (25)	4 (36.4)	4 (16.7)	4 (30.8)
16	8 (16.7)	1 (9.1)	2 (8.3)	5 (38.5)
17	4 (8.3)	1 (9.1)	2 (8.3)	1 (7.7)
Gender				
Female	35 (72.9)	7 (63.6)	18 (75.0)	10 (76.9)
Male	13 (27.1)	4 (36.4)	6 (25.0)	3 (23.1)
Ethnicity				
European American	29 (60.4)	7 (63.6)	16 (66.7)	6 (46.2)
African American	16 (33.3)	2 (18.2)	8 (33.3)	6 (46.2)
Middle Eastern	2 (4.2)	1 (9.1)	-	1 (7.7)
Other	1 (2.1)	1 (9.1)		

Characteristic	Whole (N = 48)	Watched (n = 11)	Braced (n = 24)	Post-Surgical (n = 13)
Grade				
6th	3 (6.3)	-	3 (12.5)	-
7th	3 (6.3)	-	3 (12.5)	-
8th	12 (25)	3 (27.3)	7 (29.2)	2 (15.4)
9th	11 (22.9)	4 (36.4)	4 (16.7)	3 (23.1)
10th	9 (18.8)	3 (27.3)	4 (16.7)	2 (15.4)
11th	4 (8.3)	-	-	4 (30.8)
12th	5 (10.4)	1 (9.1)	3 (12.5)	1 (7.7)
Annual Family Income				
Less than $10,000	1 (2.1)	-	-	1 (7.7)
$10,000-$24,999	5 (10.4)	2 (18.2)	3 (12.5)	-
$25,000-$49,999	8 (16.7)	1 (9.1)	4 (16.7)	3 (23.1)
$50,000-$74,999	13 (27.1)	4 (36.4)	6 (25.0)	3 (23.1)
$75,000-$99,999	8 (16.7)	-	4 (16.7)	4 (30.8)
$100,000 or more	10 (20.8)	3 (27.3)	5 (20.8)	2 (15.4)

Appendix B

Demographics Questionnaire

Demographic Questionnaire

Today's Date _____ _____ _____

                   Month   Day   Year

The purpose of this questionnaire is to help us better understand your child's general health, any problems related to bone and muscle conditions, and how you and your family may be affected by your child's condition.

It is completely up to you to decide whether or not you want to fill out this questionnaire. If you don't want to, you don't have to. Your child's treatment at this office will not change in any way as a result of your decision to participate or not.

Your questions will be kept confidential to the extent allowed by law.

If you choose to participate, please answer every question. Some questions may look like others, but each one is different. There are no right or wrong answers. If you are not sure how to answer a question, just give the best answer you can. You can make comments in the margin. We do read all your comments, so feel free to make as many as you wish.

Thank you for completing this questionnaire!

Please answer the questions <u>only</u> about your child whom the physician is examining <u>today</u>.

PART A: BACKGROUND INFORMATION AND HOME RESOURCES

1. I am the patient's (check **all** that apply)

O Natural parent   O Step parent

O Adopted parent   O Legal Guardian

O Foster parent   O State assigned custodian

O Grandparent   O Other (describe)_____

2. **Your** gender: O   Male   O   Female

3. **Your** age in years   _____

4. **Your** ethnic background (check **all** that apply)

O   White/European American   O   Black/ African American/African

O   Spanish/Hispanic/Latino

O   Asian/Pacific Islander/Asian Indian

O   Native American Indian/Alaskan Native

O   Middle Eastern/Indigenous

O   Other _____

5. **Your child's** ethnic background (check **all** that apply)

O   White/European American   O   Black/ African American/African

O   Spanish/Hispanic/Latino

O   Asian/Pacific Islander/Asian Indian

O   Native American Indian/Alaskan Native

O   Middle Eastern/Indigenous

O   Other _____

6. Which language(s) is spoken in the home _____

7. Your country of birth?   O USA   O Other, please specify: _____

    Your child's country of birth?   O USA   O Other, please specify: _____

8**. Your** current marital status

      O Never married   O Divorced

      O Now married   O Living with partner

      O Separated   O Widowed

Please answer the questions <u>only</u> about your child whom the physician is examining <u>today</u>.
9. Are you the child's primary caregiver?   O YES   O NO

      If **NO**, who is your child's primary caregiver? _____

      What is their relationship to your child? _____

10. Which statement best describes your and your child's current housing situation?

      O Own home   O Rent   O Live in relative's home

      O Live in friend's home   O Other, please specify: _____

11. How many bedrooms does the home/apartment have? _____

12. a. How many adults, including yourself, are *currently* living in your household? _____

12. b. How many children are *currently* living in your household, including the child whom you are bringing for services today? _____

13. How many adults in the household work and bring home money?   _____

14. How many children in the household receive child support? _____

15. How many people in the home are receiving government support (for example public assistance/ welfare, SSI, unemployment, food stamps, WIC, AFDC, disability)? _____

Please answer the questions <u>only</u> about your child whom the physician is examining <u>today</u>.
16. What is your annual household income **now**?

      O   Less than $10,000   O $50,000 to $74,999

      O $10,000 to $24,999   O $75,000 to $99,999

      O $25,000 to $49,999   O $100,000 or more

PART B: MEDICAL INFORMATION

17. Who first noticed or told you of your child's back problem?

O . I did   O Medical professional

O Child   O School screening

O Family   O Other _____

O Friend

18. Have you previously seen a physician about your child's back?   O YES   O NO

     If YES, what type of doctor? (check **all** that apply)

     O Orthopedic spine surgeon   O Primary care/family physician

     O Neurosurgical spine surgeon   O Physical therapist

     O Chiropractor   O Other, please specify: _____

19. Is this the first time your child is being evaluated by a spine specialist?   O YES   O NO

20. Have you been told that your child needs any particular treatment for his or her back?

     O Bracing   O Surgery   O Not known

21. Have you been told of any measurements or degrees of curvature of scoliosis/kyphosis your child may

have?   O YES   O NO

     If YES, what degrees are your child's curve(s)? _____

Please answer the questions <u>only</u> about your child whom the physician is examining <u>today</u>.

22. Please indicate how many of each type of medical visit your child has had in the past 6 months:

     a. Spine-related <u>scheduled</u> medical visits

       O **0**   O **1 - 3**   O **4 - 8**   O **9 or more**

     b. Other <u>scheduled</u> medical check-ups (for example- well child, sports physical)

       O **0**   O **1 - 3**   O **4 - 8**   O **9 or more**

     c. Unplanned medical appointments for other problems (for example- flu symptoms, asthma attacks)

       O **0**   O **1 - 3**   O **4 - 8**   O **9 or more**

     d. Emergency room visits for any problem

       O **0**   O **1 - 3**   O **4 - 8**   O **9 or more**

23. How many days has your child been hospitalized **in the past 6 months?**

     O **0**   O **1 - 3**   O **4 - 8**   O **9 or more**

     For what conditions? _____

24. Does your child have other chronic medical conditions requiring medical treatment?   O YES   O

NO

     If YES**,** please list (e.g., obesity, epilepsy, diabetes, etc.):

25. Has your child been diagnosed with a behavioral or psychological condition requiring treatment?

     O YES   O NO

     If YES, please list (e.g., ADHD, depression, anxiety, conduct disorder,

     etc.):_____

26. Does your child currently have health insurance?   O YES   O NO

27. What type of health insurance does your child currently have?

     O Medicaid   O Medicare/HMO   O HMO

     O POS   O PPO   O Traditional (indemnity)

     O Not sure   O Other, please specify: _____

28. Has your child's health insurance changed in the last 6 months?   O YES   O NO

     If YES, why? _____

Please answer the questions <u>only</u> about your child whom the physician is examining <u>today</u>.

29. Do you pay your child's insurance premiums yourself?

     O YES   O NO   O Partial

30. How much do you worry about being able to afford your child's premiums?

     O Not at all   O A little   O Some   O A lot   O Very much

31. How do you worry about your child being insurable?

     O Not at all   O A little   O Some   O A lot   O Very much

32. How difficult is it for you to afford your child's deductible amounts?

     O N/A   O Not at all   O A little   O Some   O A lot   O Very
much

33. How difficult is it for you to afford your child's co-pay amounts?

     O N/A   O Not at all   O A little   O Some   O A lot   O Very
much

34. Do you require referrals for your child's back problems?   O YES   O NO   O Unsure

     If YES, how difficult is it for you to obtain your child's medical referrals?

O Not at all   O A little   O Some   O A lot   O Very much

35. How much have difficulties with health insurance affected your ability to keep your child's medical appointments?

O Not at all   O A little   O Some   O A lot   O Very much

36. How much have difficulties with health insurance made your child's condition worse?

O Not at all   O A little   O Some   O A lot   O Very much

37. How much have difficulties with transportation affected your ability to keep medical appointments?

O None   O A little   O Some   O A lot   O Very much

38. How much difficulty did you have **today** with transportation?

O None   O A little   O Some   O A lot   O Very much

Please answer the questions <u>only</u> about your child whom the physician is examining <u>today</u>.
39. Are there other children in the home who require more than routine medical care?   O YES   O NO

If YES, for what conditions?_____

If YES, how many medical visits did he or she have in the in the past 6 months?

O **0**   O **1 - 3**   O **4 - 8**   O **9 or more**

40. Are there other children in the home who have been diagnosed with a behavioral or psychological condition requiring treatment?   O YES   O NO

If YES, for what condition(s)?_____

41. Are there any adults in the home who require more than routine medical care?   O YES   O NO

If YES, for what condition(s)?_____

If YES, how many medical visits did he or she have in the in the past 6 months?

O **0**   O **1 - 3**   O **4 - 8**   O **9 or more**

42. Are there other adults in the home who have been diagnosed with a behavioral or psychological condition requiring treatment?   O YES   O NO

If YES, for what condition(s)?_____

43. **How likely are you and/or your child to:** (circle the number that best applies)

	None of the time		Some of the time			All the time	
a. Use braces as prescribed	1	2	3	4	5	6	7
b. Keep all medical appointments	1	2	3	4	5	6	7
c. Follow activity restrictions	1	2	3	4	5	6	7

44. Do you know anyone who currently has or once had scoliosis?   O YES   O NO

    If YES, which treatment did he or she receive for his or her back problem? (check **all** that apply)

        O Bracing   O Surgery   O Not known

45. How have you researched your child's back problem (check **all** that apply)

    O   Internet   O Friends

    O   Library   O Other _____

    O   Family

Please answer the questions <u>only</u> about your child whom the physician is examining <u>today</u>.
PART C: EDUCATION AND EMPLOYMENT INFORMATION
46. How far did you get in school?

    O Grade 7 to 11   O Graduated high school or GED

    O Some college credits   O Graduated 2-yr degree or certificate program
    O Graduated 4-yr college   O Completed graduate/professional school

47. What was your major in college? _____

48. What is your employment status? (check **all** that apply)

    O Full-time (40 hrs/wk or more)   O Part-time   O On disability

    O Retired (on social security)   O Student   O Self-employed

    O Homemaker   O Receiving public   O Receiving
supplemental

                assistance/welfare   security income

49. If you are **currently working**, what type of work do you do: _____

       (e.g., secretary, heating and cooling technician, teacher, manager, etc.)

50. How many workdays have you missed **in the past <u>6 months</u> due to your child's health problems**?

    O   None   O 1-5 days   O 6-10 days

    O 11-20 days   O 21-30 days   O 31-40 days

    O more than 40 days

51. How many workdays have you missed **in the past <u>4 weeks </u>due to your child's health problems**?

    O   None   O 1-5 days   O 6-10 days   O 11-15 days   O 16-20 days

Please answer the questions <u>only</u> about your child whom the physician is examining <u>today</u>.
PART D: YOUR CHILD'S EDUCATIONAL AND RECREATIONAL ACTIVITIES

52. Can your child participate in recreational outdoor activities with other children the same age?

(For example: bicycling, skating, hiking, jogging)

        O Yes, easily   O Yes, but a little hard   O Yes, but very hard   O No

If you answered "no", was your child's activity limited by: (check all that apply)

        O Pain?

        O General Health?

        O Doctor or parent instructions?

        O Fear the other kids won't like him/her?

        O Dislike of outdoor recreational activities?

        O Activity not in season?

53. Can your child participate in pickup games or sports with other children the same age?

        (For example: tag, dodge ball, basketball, soccer, catch, jump rope, touch football)

        O Yes, easily   O Yes, but a little hard   O Yes, but very hard   O No

If you answered "no", was your child's activity limited by: (check all that apply)

        O Pain?

        O General Health?

        O Doctor or parent instructions?

        O Fear the other kids won't like him/her?

        O Dislike of outdoor recreational activities?

        O Activity not in season?

54. Can your child participate in competitive level sports with other children the same age? (For example:

hockey, basketball, soccer, football, baseball, swimming, running track or cross country, gymnastics, or dance)

        O Yes, easily   O Yes, but a little hard   O Yes, but very hard   O No

If you answered "no", was your child's activity limited by: (check all that apply)

        O Pain?

        O General Health?

        O Doctor or parent instructions?

        O Fear the other kids won't like him/her?

        O Dislike of outdoor recreational activities?

        O Activity not in season?

Please answer the questions <u>only</u> about your child whom the physician is examining <u>today</u>.

55. During the last year, which type of school has your child attended?

     O Public school   O Private school   O Home school   O Other _____

56. What grade is your child in? (if the child is between grades, which one will he/she be in) _____

57. Does your child receive extra assistance (or special services) in the classroom?

     O All of the time   O Some of the time   O None of the time

58. How many school days has your child missed **in the past 6 months** due to his or her health problems?

     O None   O 1-5 days   O 6-10 days

     O 11-20 days   O 21-30 days   O 31-40 days   O more than 40 days

PART E: STRESS AND COPING

59. Please rate the level of stress you are currently experiencing related to

		no stress					some stress			extreme stress
a.	Finances	0	1	2	3	4	5	6		
b.	This child's health	0	1	2	3	4	5	6		
c.	Other children's health	0	1	2	3	4	5	6		
d.	Other adult's health	0	1	2	3	4	5	6		
e.	Marital issue(s)	0	1	2	3	4	5	6		
f.	Health insurance	0	1	2	3	4	5	6		
g.	Obtaining medical referrals	0	1	2	3	4	5	6		
h.	Your employment	0	1	2	3	4	5	6		

60. **Please indicate to what degree each of the following statements is true or false about you.**

a. I feel that there is no one I can share my most private worries and fears with.

     O definitely false   O probably false   O probably true   O definitely true

b. There is someone I can turn to for advice about handling problems with my family.

     O definitely false   O probably false   O probably true   O definitely true

c. When I need suggestions on how to deal with a personal problem, I know someone I can turn to.

O definitely false   O probably false   O probably true   O definitely true

Please answer the questions only about your child whom the physician is examining today.
d. If a family crisis arose, it would be difficult to find someone who could give me good advice

about how to handle it.

O definitely false   O probably false   O probably true   O definitely true

61. When I share my most private worries and fears about my child's health problems, I prefer to talk to

   (Check one only)

   O Spouse/Partner   O Medical professional   O Support group

   O Family member   O Mental health professional   O Support group member

   O Friend   O Spiritual advisor   O Other

62. How open with this person are you about your thoughts, feelings, and emotions when talking

about your child's health problems?

0	1	2	3	4	5	6
O	O	O	O	O	O	O

Stick to the Facts   Somewhat Open   Very Open

63. How satisfied have you been with the person's response at the time?

0	1	2	3	4	5	6
O	O	O	O	O	O	O

Very unsatisfied   Unsatisfied   Neutral   Satisfied   Very Satisfied

64. Is religion a significant source of support for you?   O YES   O NO

   What religion do you identify with?_____

Appendix C

Disease-Related Stressors

Stress can be defined as the thoughts and feelings you experience (often negative) when you do not feel as though you can cope with a change. Adolescents may experience stress due to treatment of idiopathic scoliosis (e.g., physical discomfort of brace, worries about spinal fusion surgery). Please list any stressors *you* experience due to your idiopathic scoliosis and its treatment.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

Appendix D

Adolescent Coping Orientation with Problem Experiences Questionnaire

Directions:

Read each of the statements below which describes a behavior for coping with problems.

COPING is defined as individual or group behavior used to manage the hardships and relieve the discomfort associated with life change or difficult life events.

Decide *how often* you do each of the described behaviors when you face difficulties or feel tense in relation to your idiopathic scoliosis. Even though you may do some of these things just for fun, please indicate ONLY how often you do each behavior as a way to cope with problems associated with your idiopathic scoliosis.

Circle one of the following responses for each statement:

1 = Never 2 = Hardly ever 3 = Sometimes 4 = Often 5 = Most of the time

1. Go along with parents' requests and rules:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

2. Read:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

3. Try to be funny and make light of it:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

4. Apologize to people:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

5. Listen to music-stereo, radio, etc.:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

6. Talk to a teacher or counselor at your school about what bothers you:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

7. Eat food:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

8. Try to stay away from home as much as possible:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

9. Use drugs prescribed by your doctor:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

10. Get more involved in activities at school:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

11. Go shopping; buy things you like:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

12. Try to reason with your parents; compromise:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

13. Try to improve yourself (get body into shape, get better grades, etc.):

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

14. Cry:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

15. Try to think of the good things in your life:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

16. Try to be with a boyfriend or girlfriend:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

17. Ride around in my car:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

18. Say nice things to others:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

19. Get angry and yell at people:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

20. Joke and keep a good sense of humor:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

21. Talk to a minister/priest/rabbi:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

22. Let off steam by complaining to family members:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

23. Go to church:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

24. Use drugs (not prescribed by a doctor):

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

25. Organize your life and what you have to do:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

26. Swear:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

27. Work hard on schoolwork or other school projects:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

28. Blame others for what's going wrong:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

29. Be close with someone you care about:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

30. Try to help other people solve their problems:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

31. Talk to your mother about what bothers you:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

32. Try, by yourself, to figure out how to deal with your problems or tension:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

33. Work on a hobby you have (sewing, model building, etc.):

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

34. Get professional counseling (not from a school teacher or a school counselor):

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

35. Try to keep up friendships or make new friends:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

36. Tell yourself the problem is not important:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

37. Go to a movie:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

38. Daydream about how you would like things to be:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

39. Talk to a brother or sister about how you feel:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

40. Get a job or work harder at one:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

41. Do things with your family:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

42. Smoke:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

43. Watch TV:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

44. Pray:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

45. Try to see the good things in a difficult situation:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

46. Drink beer, wine, and/or liquor:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

47. Try to make your own decisions:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

48. Sleep:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

49. Say mean things to people; be sarcastic:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

50. Talk to your father about what bothers you:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

51. Let off steam by complaining to your friends:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

52. Talk to a friend about how you feel:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

53. Play video games (i.e., Space Invaders, Pac-Man), pool, pinball, etc.:

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

54. Do strenuous physical activity (jogging, biking, etc.):

1	2	3	4	5
Never	Hardly Ever	Sometimes	Often	Most of the Time

Appendix E

2-Factor-solution for the A-COPE proposed by Hanson et al. (1989)

Factor 1: Utilizing personal and interpersonal resources (relabeled as Approach Coping)

Coping Pattern Subscale   Coping Behaviors (Question number)

   Seeking Diversions

Sleep (19)

Go to a movie (37)

Go shopping; buy things you like (11)

Read (2)

Work on a hobby you have (33)

Watch T.V. (43)

Use drugs prescribed by doctor (9)

Play video games (53)

Try, on own, to figure out how to deal with problem/tension (32)

Organize your life and what you have to do (25)

Try to think of the good things in your life (15)

Try to make your own decisions (47)

Try to see the good things in a difficult situation (45)

Get a job or work harder at one (40)

   Developing social support

Try to help other people solve their problems (30)

Talk to a friend about how you feel (52)

Cry (14)

Try to keep up friendships or make new friends (35)

Say nice things to others (18)

Apologize to people (4)

Solving family problems

Talk to your father about what bothers you (50)

Talk to your mother about what bothers you (31)

Do things with your family (41)

Talk to a brother or sister about how you feel (39)

Try to reason with parents and talk things out/compromise (12)

Go along with parents' requests and rules (1)

Seeking spiritual support

Go to church (23)

Pray (44)

Talk to a minister/priest/rabbi (21)

Investing in close friends

Be close with someone you care about (29)

Be with a boyfriend or girlfriend (16)

Engaging in demanding activity

Do a strenuous physical activity (54)

Get more involved in activities at school (10)

Try to improve yourself (13)

Work hard on schoolwork or school projects (27)

Being humorous

Joke and keep a sense of humor (20)

Try to be funny and make light of it all (3)

Developing Self-Reliance

Try, on your own, to figure out how to deal with your problems or tension (32)

Organize your life and what you think you have to do (25)

Try to think of the good things in your life (15)

Try to make your own decisions (47)

Try to see the good things in a difficult situation (45)

Get a job or work harder at one (40)

Factor 2: Ventilation and avoidance (relabeled as Avoidant Coping)

Coping Pattern Subscale   Coping Behaviors (Question number)

Ventilating feelings

Get angry and yell at people (19)

Blame others for what is going wrong (28)

Say mean things to people/be sarcastic (49)

Swear (26)

Let off steam by complaining to your friends (51)

Let off steam by complaining to family members (22)

Avoiding problems

Use drugs that are not prescribed by a doctor (24)

Drink beer, wine, and liquor (46)

Smoke (42)

Try to stay away from home as much as possible (8)

Tell yourself the problem(s) is not important (36)

Appendix F

Scoliosis Research Society-22r Patient Questionnaire

Instructions: We are carefully evaluating the condition of your back and it is IMPORTANT THAT YOU ANSWER EACH OF THESE QUESTIONS YOURSELF. Please CIRCLE THE **ONE BEST ANSWER** to each question.

1. Which of the following best describes the amount of pain you have experienced during the past 6 months.

    __None
    __Mild
    __Moderate
    __Moderate to Severe
    __Severe

2. Which of the following best describes the amount of pain you have experienced over the last month.

    __None
    __Mild
    __Moderate
    __Moderate to Severe
    __Severe

3. During the past 6 months, have you been a nervous person.?

    __None of the time
    __A little of the time
    __Some of the time
    __Most of the time
    __All of the time

4. If you had to spend the rest of your life with your back <u>shape</u> as it is right now, how would you feel about it?

    __Very happy
    __Somewhat happy
    __Neither happy nor unhappy
    __Somewhat unhappy
    __Very unhappy

5. What is your current level of activity?

　　__Bedridden
　　__Primarily no activity
　　__Light labor, and light sports
　　__Moderate labor and moderate sports
　　__Full activities without restriction

6. How do you look in clothes?

　　__Very good
　　__Good
　　__Fair
　　__Bad
　　__Very bad

7. In the past 6 months, have you felt so down in the dumps that nothing could cheer you up?

　　__Very often
　　__Often
　　__Sometimes
　　__Rarely
　　__Never

8. Do you experience back pain when at rest?

　　__Very often
　　__Often
　　__Sometimes
　　__Rarely
　　__Never

9. What is your current level of work/school activity?

　　__100% normal
　　__75% normal
　　__50% normal
　　__25% normal
　　__0% normal

10. Which of the following best describes the appearance of your trunk; defined as the human body except for the head and extremities?

    __Very good
    __Good
    __Fair
    __Poor
    __Very poor

11. Which one of the following best describes your pain medication use for back pain?

    __None
    __Non-narcotics weekly or less (e.g., aspirin, Tylenol, Ibuprofen)
    __Non-narcotics daily
    __Narcotics weekly or less (e.g., Tylenol III, Lorocet, Percocet)
    __Narcotics daily

12. Does your back limit your ability to do things around the house?

    __Never
    __Rarely
    __Sometimes
    __Often
    __Very Often

13. Have you felt calm and peaceful during the past 6 months?

    __All of the time
    __Most of the time
    __Some of the time
    __A little of the time
    __None of the time

14. Do you feel your back condition affects your personal relationships?

    __None
    __Slightly
    __Mildly
    __Moderately
    __Severely

15. Are you and/or your family experiencing financial difficulties because of your back?

    __Severely
    __Moderately
    __Mildly
    __Slightly
    __None

16. In the past 6 months, have you felt down hearted and blue?

    __Never
    __Rarely
    __Sometimes
    __Often
    __Very often

17. In the last 3 months, have you taken any sick days from work/school due to back pain and if so, how many?

    __0
    __1
    __2
    __3
    __4 or more

18. Does your back condition limit your going out with friends/family?

    __Never
    __Rarely
    __Sometimes
    __Often
    __Very often

19. Do you feel attractive with your current back condition?

    __Yes, very
    __Yes, somewhat
    __Neither attractive or unattractive
    __No, not very much
    __No, not at all

20. Have you been a happy person during the past 6 months?

    __None of the time
    __A little of the time
    __Some of the time
    __Most of the time
    __All of the time

21. Are you satisfied with the results of your back management?

    __Very satisfied
    __Satisfied
    __Neither satisfied nor unsatisfied
    __Unsatisfied
    __Very unsatisfied

22. Would you have the same management again if you had the same condition?

    __Definitely yes
    __Probably yes
    __Not sure
    __Probably not
    __Definitely not

Thank you for completing this questionnaire. Please comment if you wish.

Appendix G

Pediatric Quality of Life Inventory^{TM} 4.0

DIRECTIONS: On the following page is a list of items that might be a problem for you. Please tell us **how much of a problem** each one has been for you during the **past ONE month** by circling:

0 if it is **never** a problem
1 if it is **almost never** a problem
2 if it is **sometimes** a problem
3 if it is **often** a problem
4 if it is **almost always** a problem

There are no right or wrong answers.
If you do not understand a question, please ask for help.

*In the past **ONE MONTH,** how much of a **problem** has this been for you...*

About my Health and Activities (problems with…)	Never	Almost Never	Sometimes	Often	Almost Always
1. It is hard for me to walk more than one block.	0	1	2	3	4
2. It is hard for me to run.	0	1	2	3	4
3. It is hard for me to do sports activity or exercise.	0	1	2	3	4
4. It is hard for me to lift something heavy.	0	1	2	3	4
5. It is hard for me to take a bath or shower by myself.	0	1	2	3	4
6. It is hard for me to do chores around the house.	0	1	2	3	4
7. I hurt or ache.	0	1	2	3	4
8. I have low energy.	0	1	2	3	4
About my Feelings (problems with…)	0	1	2	3	4

About my Feelings (problems with…)	**Never**	**Almost Never**	**Sometimes**	**Often**	**Almost Always**
1. I feel afraid or scared.	0	1	2	3	4
2. I feel sad or blue.	0	1	2	3	4
3. I feel angry.	0	1	2	3	4
4. I have trouble sleeping.	0	1	2	3	4
5. I worry about what will happen to me.	0	1	2	3	4

How I Get Along with Others (problems with…)

	Never	Almost Never	Sometimes	Often	Almost Always
1. I have trouble getting along with other teens.	0	1	2	3	4
2. Other teens do not want to be my friend.	0	1	2	3	4
3. Other teens tease me.	0	1	2	3	4
4. I cannot do things that other teens my age do.	0	1	2	3	4
5. It is hard to keep up with my peers.	0	1	2	3	4

About School (problems with…)

	Never	Almost Never	Sometimes	Often	Almost Always
1. It is hard to pay attention in class.	0	1	2	3	4
2. I forget things.	0	1	2	3	4
3. I have trouble keeping up with my school work.	0	1	2	3	4
4. I miss school because of not feeling well.	0	1	2	3	4
5. I miss school to go to the doctor or hospital.	0	1	2	3	4

Appendix H

Frequency (percent) of self-reported AIS treatment-related stressors for the whole
sample and by treatment group

Stressor	Whole (N = 48)	Watched (n = 11)	Braced (n = 24)	Post-surgical (n = 13)
Brace				
Brace	5 (12)	1 (14)	2 (9)	2 (17)
Discomfort	6 (13)	0	5 (21)	1 (8)
Appearance of clothing due to the brace	5 (12)	0	3 (14)	2 (17)
Appearance of the brace	2 (5)	0	2 (9)	0
Discomfort at night	2 (5)	0	2 (9)	0
Worry about whether the brace is working	2 (5)	0	2 (9)	0
Others knowing about/seeing the brace	2 (5)	0	2 (9)	0
Made me feel uncomfortable at school	2 (5)	0	2 (9)	0
Guilt of not wearing the brace enough	1 (2)	0	1 (4)	0
Constant reminders to wear the brace	1 (2)	0	1 (4)	1 (8)
Unwanted attention due to the brace	1 (2)	1 (14)	1 (4)	1 (8)

Stressor	Whole (N = 48)	Watched (n = 11)	Braced (n = 24)	Post-surgical (n = 13)
Brace (continued)				
Hard to sit in chairs	1 (2)	0	1 (4)	0
Hard to put clothes on	1 (2)	0	0	1 (8)
Smell of the brace	1 (2)	0	0	1 (8)
Subtotal	32			
Pain	6 (13)	3 (27)	2 (9)	1 (8)
Surgery				
Worry/fear of having to have surgery	7 (15)	2 (18)	5 (21)	0
Scar	4 (8)	0	0	4 (31)
Worry about what will happen after surgery (i.e., limitations, healing)	2 (5)	0	1 (4)	1 (8)
Having to redo surgery	1 (2)	0	0	1 (8)
Infections	1 (2)	0	0	1 (8)
Upset that surgery isn't recommended	1 (2)	1 (14)	0	0
Life without having the surgery	1 (2)	0	1 (4)	0
Not able to ride the rides at Cedar Point*	1 (2)	0	0	1 (8)
Subtotal	18			

Stressor	Whole (N = 48)	Watched (n = 11)	Braced (n = 24)	Post-surgical (n = 13)
Social				
Not being able to do things anymore	3 (6)	0	0	3 (23)
Made me feel uncomfortable at school*	2 (4)	0	2 (8)	0
Others knowing about/seeing the brace*	2 (4)	0	2 (8)	0
Losing my boyfriend	1 (2)	0	0	1 (8)
I cannot do the things my friends do	1 (2)	0	0	1 (8)
Not being able to ride certain rides at Cedar Point*	1 (2)	0	0	1 (8)
Friends	1 (2)	0	1 (4)	0
Subtotal	11			
Medical				
Medicine	2 (5)	0	0	0
Frequency of appointments	1 (2)	0	1 (4)	0
Fear of bad news at doctors appointments	1 (2)	0	1 (4)	0
Doctors	1 (2)	0	0	1 (8)
Can't go to chiropractor	1 (2)	1 (14)	0	0
Family	2 (5)	0	1 (4)	1 (8)
None	15 (31)	4 (36)	8 (33)	3 (23)

*Stressors have been placed under two categories.

Appendix I

Intercorrelations between items (actual question number) of the SRS-22r and the PedsQL

SRS-22r	PedsQL	Intercorrelation
1. Which of the following best describes the amount of pain you have experienced during the past 6 months.	7. I hurt or ache.	.66**
2. Which one of the following best describes the amount of pain you have experienced over the last month.	7. I hurt or ache.	.57**
3. During the past 6 months have you been a very nervous person	13. I worry about what will happen to me.	.34*
4. If you had to spend the rest of your life with your back shape as it is right now, how would you feel about it.		
5. What is your current level of activity.	1. It is hard for me to walk more than one block.	.28
	2. It is hard for me to run.	.48**
	3. It is hard for me to do sports activity or exercise.	.48**
	4. It is hard for me to lift something heavy.	.43**

	8. I have low energy	.35*
	17. I cannot do things other teens my age do.	.43**
		.22
	18. It is hard for me to keep up with my peers.	
6. How do you look in clothes.		
7. In the past 6 months have you felt so down in the dumps that nothing could cheer you up.	10. I feel sad or blue.	.57**
8. Do you experience back pain when at rest.	7. I hurt or ache.	.59**
9. What is your current level of work/school activity.	22. I miss school because of not feeling well.	.26
		-.04
	23. I miss school to go to the doctor or hospital.	
10. Which of the following best describes the appearance of your trunk; defined as the human body except for the head and extremities		

1.   11. Which of the
2.   following best
3.   describes your

4.   medication
           usage for

5.   your back

11. Does your back limit your ability to do things around the house	6. It is hard for me to do chores around the house.	.29
12. Have you felt calm and peaceful during the past 6 months		
13. Do you feel that your back condition affects your personal relationships.	14. I have trouble getting along with other teens.	.16
	15. Other teens do not want to be my friend.	.10
		.15
	16. Other teens tease me.	.13
	17. It is hard for me to keep up with my peers.	
15. Are you and/or your family experiencing financial difficulties because of your back.		
16. In the past 6 months have you felt down hearted and blue.	10. I feel sad or blue.	.54**

17. In the last 3 months have you taken any sick days from work/school due to back pain and if so how many

18. Does your back condition limit your going out with friends/family.

19. Do you feel attractive with your current back condition.

20. Have you been a happy person during the past 6 months.

21. Are you satisfied with your back management

22. Would you have the same management again if you had the same condition.

22. I miss school because of not feeling well.   .27

23. I miss school to go to the doctor or hospital.   -.09

15. Other teens do not want to be my friend.   .34*

18. I cannot do things that other teens my age can do.   .24

19. It is hard for me to keep up with my peers.   .26

Note. Numbers correspond to actual question number on each measure respectively. Items were matched based upon similarity in question content.

* $p \le .05$
** $p \le .01$