Cognitive Behavioral Interventions for Adolescents with Cystic Fibrosis

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Examined the effectiveness of a cognitive behavioral intervention to help adolescents with cystic fibrosis (CF) cope with daily stressors. Five youths were referred for the therapy by medical staff because of perceived problems with anxiety or coping. Treatment impact was assessed on measures of coping, anxiety, perceptions of functional disability, and parental reports of behavior. A multiple baseline design across subjects was used. Reductions in anxiety, a decrease in maladaptive coping efforts with CF-related problems, and an increase in positive coping with CF-related problems were obtained. Youths also reported a decrease in functional disability due to CF after the initiation of the intervention. Follow-up assessment indicated that most youths maintained gains in anxiety and perceived functional disability, but not coping efforts. Results suggest that cognitive behavioral treatment is a viable intervention for anxious youths with CF.

KEY WORDS: cognitive behavioral intervention; cystic fibrosis.

Cystic fibrosis (CF) is a genetically inherited and lethal disease that affects the respiratory, gastrointestinal, and reproductive systems. Advances in medical

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treatment have delayed the onset of lung disease complications and dramatically improved the survival statistics (Czajkowski & Koocher, 1987; Drotar, 1995). In the early 1970s, few children with CF lived to adolescence, while the mean life expectancy as of 1991 is 29 years (Drotar, 1995; Matthews & Drotar, 1984). The discoveries and advances within the medical field have made CF a very different disease than it was a few years ago (Mullins, Pace, & Keller, 1994), especially within the developmental, emotional, and behavioral realm. Youths with CF and their families are now faced with such issues as dating, sexuality, personal autonomy, young adult interpersonal relationships, educational goals, and career planning. The psychological research addressing these issues has not been as forthcoming as the research with some other chronic illness populations (e.g., diabetes) (Drotar, 1995).

The psychological and behavioral research that has been conducted has investigated the impact of CF on the adjustment of youths and the extent of youth compliance with medical regimens. Studies have shown that roughly 50–60% of CF patients can be diagnosed as having adjustment or psychiatric problems, with these primarily being anxiety-based internalizing problems (Thompson, Gustafson, George, & Spock, 1994; Thompson, Gustafson, Hamlett, & Spock, 1992). Other research has found an increase in depressive symptoms in older teens and young adults (Bennett, 1994). In addition, while CF patients have been described as the most compliant of the chronic illness groups, a sizable percentage (35%) of youths have been found to be nonadherent with medical advice and procedures, and this percentage may increase in adolescence (Czajkowski & Koocher, 1987).

Adolescents with CF must cope with a variety of CF-related stressors. These include maintaining a medical regimen (performing daily chest physiotherapy, taking enzymes before meals, administering oral or aerosol antibiotic treatment), having frequent coughing attacks, and missing school because of pulmonary complications. Because of medical advances, adolescents with CF also face a number of previously unforeseen psychological tasks and problems. These tasks include coping with anxiety and depression (which may be related to coping with CF on a daily basis, encountering everyday adolescent stressors, or a combination of both factors) and facing the developmental and transition markers of this age group (Mullins et al., 1994). The latter category includes transitions from middle school to high school, school to work, high school to college, living with parents to independent living, and from pediatric to adult-based medical care. The pediatric to adult-based service transition has been described as an anxiety-provoking and threatening prospect for adolescents with CF (Eiser, 1993), and when it is combined with the other developmental transitions (which are often major stressors for all adolescents), the impact may be the high rate of internalizing disorders.

Adolescents, regardless of health status, who make cognitive and behavioral coping attempts to reduce sources of stress and anxiety seem capable of decreas-
ing the negative impact of a variety of stressful events (Compas, Malarne, & Fondacaro, 1988). The acquisition of coping strategies by adolescents seems critical to their efforts to manage stress (Compas, 1987).

Virtually no research has been conducted on the effectiveness of training packages to help adolescents with CF cope with the psychological problems and daily problems that they uniquely face. This project examined the effectiveness of a cognitive behavioral intervention taught to five youths, in a multiple baseline design across subjects, to help adolescents with CF cope with anxiety, daily stressors, and health issues. Cognitive behavioral procedures were expected to be effective because past research has shown their efficacy with adolescents as preventative interventions for stress (Hains & Ellmann, 1994), and the fact that cognitive processes play a major contributing role in the internalizing disorders of adolescents with CF (Thompson et al., 1992). Also, there have been indications from case studies that cognitive behavioral procedures may be beneficial in helping adolescents with CF cope with anxiety (Mullins et al., 1994).

The cognitive behavioral intervention in the current study, adapted from a stress inoculation program developed by Meichenbaum (1985), involved training cognitive restructuring and problem-solving skills. The success of stress inoculation training as both an intervention and prevention procedure has been well documented (Meichenbaum, 1985; Meichenbaum & Deffenbacher, 1988), but most of these efforts have been directed at adults (Johnson, 1986). Recently, stress inoculation training has been used with children and adolescents as preventative intervention with positive results (e.g., Hains & Ellmann, 1994; Kiselica, Baker, Thomas, & Reedy, 1994). However, stress inoculation training has not been applied systematically to pediatric populations.

The intervention was implemented across five youths at staggered intervals in a multiple baseline design. Treatment impact was assessed on a primary measure of trait anxiety, and secondary measures of coping and behavioral functioning in the form of functional disability. In addition, parent-reported psychological functioning was also examined.

Trait anxiety was chosen as a dependent variable in order to assess the impact of the intervention on dispositional anxiety (trait) rather than the transitory or momentary state anxiety. Spielberger (1983) indicated that state anxiety is a sensitive indicator of changes in transitory anxiety experienced by clients in therapy. Trait anxiety, on the other hand, can be used for assessing the immediate and long-term outcome of an intervention (Spielberger, 1983). Obtained changes in state anxiety may be related to its transitory nature, and may not reflect changes in disposition to perceive situations in anxious terms. However, if changes can be obtained on the dispositional trait anxiety, then the intervention appears more interesting from a clinical perspective. The use of trait anxiety in the present study is consistent with past intervention research with anxious children using both multiple baseline designs (Eisen & Silverman, 1993; Kane & Kendall, 1989) and group designs (Kiselica et al., 1994).
The intervention was hypothesized to result in reductions in anxiety, and also result in improvements in coping and functional disability.

**METHOD**

**Participants**

Five adolescents (ages 13–15) who were receiving outpatient treatment for CF at a children’s hospital in a large Midwestern city participated in the study. Two participants (Elaine, age 13, and Julie, 15) were female, and three were male (Lee, 13, Bill, 14, and Mark, 14). Members of the CF treatment team (physicians, nurses, and a social worker) referred patients whom they observed to have concerns or problems with anxiety and/or problems in coping. The anxiety and coping issues of the youths did not have to be restricted to CF concerns. Generally, the team’s perception of these youths as highly anxious came from reported problems with CF issues (e.g., adherence with regimen, impact of CF on peer relations and school performance) and family concerns (e.g., divorce, parent conflicts). The families of these youths were presented with a brief description of the study by the social worker in the CF clinic. Those families who were interested in hearing more about the project were contacted by the first author for a further description of the study. Initially, 12 families were contacted. Six youths and their parents consented to participate, but then one youth withdrew from the study before the training began because of time constraints. Of the 6 families who did not consent to participate, the parents were interested but the youth declined reportedly because of time constraints or a lack of interest.

Disease severity of participants was categorized using spirometric determination of lung function. As part of the spirometry, FEV1 was measured. FEV1 is the volume of air exhaled during the first second of forced exhalation. FEV1 is analyzed as the percentage predicted based on a youth’s height, weight, age, and gender. The normal range is 80–100% of predicted FEV1. Mild pulmonary disease is 60–80% of predicted FEV1, moderate is 40–60%, and severe is below 40%. At the time of the study, the FEV1 percentages for the five participants were 71% (Elaine), 78% (Julie), 73% (Lee), 91% (Bill), and 66% (Mark). Therefore, with the exception of Bill who was considered to have minimal disease, all of the youths were categorized as having mild chronic lung disease.

**Assessment Measures**

Youth-reported anxiety, perceived usage of coping strategies, and youth-reported functional disability were assessed during baseline conditions and
before each treatment session. Parent-reported psychological functioning was obtained at the pre, post, and follow-up (3-month) assessment.

**Anxiety**

Since anxiety-based internalizing disorders are the most common psychological problem associated with CF, (Thompson et al., 1992), a measure of anxiety was chosen to assess psychological functioning. Anxiety was measured by the State-Trait Anxiety Inventory-Trait form (STAI; Spielberger, 1983). The STAI is a 40-item instrument, 20 of which measure state anxiety and 20 of which measure trait anxiety. State anxiety indicates the presence of anxiety an individual is feeling at the time of assessment. Trait anxiety indicates the overall level of anxiety that an individual generally feels. Scores on both scales range from 20 to 80 with higher scores indicating higher levels of anxiety. Internal consistency estimates range from .86 to .95, with the stability estimates of the trait subscale ranging from .65 to .86 and the State subscale ranging from .16 to .62 (Chaplin, 1984). Validity scores, which have been estimated for the Trait scale by correlating it with other anxiety inventories (e.g., the Manifest Anxiety Scale), ranged from .52 to .80 (Chaplin, 1984).

In the present study, the effects of the intervention on trait anxiety are reported. The youths completed the state anxiety items, however, for ease of administration and to avoid any confusion since the state and trait items were on the same form.

**Perceived Use of Coping Strategies**

Self-reported, perceived usage of coping strategies was measured by means of the KIDCOPE, a brief (10 item) coping checklist designed for use with pediatric populations (Spirito, Stark, & Williams, 1988). KIDCOPE assesses the self-perceived frequency and efficacy of 10 commonly used cognitive and behavioral strategies for coping (e.g., distraction, social withdrawal, cognitive restructuring, problem solving). The youths indicate how often they respond to each coping strategy on a 0 *(not at all)* to 3 *(almost all of the time)* scale. If they report using the strategy to any degree, then they respond in terms of perceived efficacy on a 0 *(not at all)* to 4 *(very much)* scale. The reliability findings are in the range of other studies examining test–retest reliability with a process measure (Spirito et al., 1988). When examining the temporal dimension of coping, the highest reliability coefficients were obtained at 3 days apart (.56–.75), and the lowest at 10 weeks apart (.15–.43). These findings fit the assumption that coping is a process with limited stability within individuals over time and affected by other personal and situational variables at the time of assessment (Spirito et al., 1988). Concurrent validity with other measures of coping has been demonstrated (Spi-
rito et al., 1988). The utility of this measure for coping with medical as well as nonmedical problems has been recognized (Kalfus, 1990).

In the present study, the youths completed the KIDCOPE twice at each assessment. The first time was in response to a general problem or stress situation that they recently experienced, and the second time was in response to a recent CF-related problem or stress situation. The general problems reported by the youths tended to fall in the following categories: homework, grades, and school concerns (35%); peer conflicts (24%); sports issues (12%); conflicts with parents (10%); fighting with siblings (7%); dating issues (5%); and other (e.g., job issues) (7%). The CF-related problems reported by the youths tended to fall in the following categories: chronic coughing, especially in social situations (32%); wheezing during sports or activities, or at night, which interferes with sleep (27%); missing school and being behind in homework (14%); non-adherence issues (10%); stomach problems (4%); and other (e.g., doctor’s appointments, weather affecting breathing) (13%).

**Functional Disability**

The participating youths completed the Functional Disability Inventory (FDI; Walker & Greene, 1991). This instrument measures pediatric functional disability across activities and abilities relevant to children with chronic illness. The items endorsed most frequently by the youths in this study centered around physical exertion (running the length of a football field), performing in gym class, getting to sleep at night and staying asleep, eating regular meals, walking up stairs, being up all day without a rest or nap, and doing something with a friend. Functional disability, due to the physical limitations of a chronic illness, has been hypothesized to result in emotional distress, but it is also likely that maladaptive cognitions regarding one’s health and future may promote anxious or depressed affect, which could interfere with self-perceived capabilities and ultimately inhibit performance (Walker & Greene, 1991).

Responses to each of the 15 items in this instrument are scored from 0 (no trouble) to 4 (impossible), and summed to yield a total score ranging from 0 to 60. Internal consistency coefficients range from .90 to .94.

**Parental Report of Psychological Functioning**

Parental report of psychological functioning was examined through the Child Behavior Checklist (Achenbach, 1991). This instrument provides parent reports of a child’s behavioral competencies and emotional/behavioral problems. Test–retest reliability across all scales averages .89.
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Design

A multiple baseline across subjects design (Baer, Wolf, & Risley, 1968) was used to assess treatment effectiveness on the trait anxiety measure. With this design, the intervention is initiated with one youth while the others remain in baseline. Then another youth (or youths) begins training while the remainder continue in baseline. This procedure continues until all participants receive the intervention. In the current study, the baseline period ranged from 2 to 5 weeks, with the initiation of the intervention staggered for the youths. The impact of the intervention is demonstrated by showing change in one youth on trait anxiety while showing that the other participants do not change until they receive the intervention. In addition to the primary measure of trait anxiety, the secondary measures of perceived coping and functional disability were also assessed during baseline and before each session.

Procedure

Baseline

If the parents and the youths expressed interest in participating in the study, then the researcher made an appointment with the family to describe the research in detail. The meeting was held at the family’s home. If the family consented to the research, then the parents completed the Child Behavior Checklist, and the youth completed the STAI, KIDCOPE, and FDI. The instruments completed by the youths served as the first baseline assessment. The families were offered sessions in their homes as a convenience, and all five families opted to have the work done in their homes. Each youth was given a packet of assessment instruments, and told to complete one each week for as long as the baseline period lasted, and to return the completed instruments by mail each week to the researcher. For the most part, the youths were timely in their return of the completed instruments. On one occasion, the researcher had to call a youth as a reminder when the materials were late.

Cognitive Behavioral Intervention

Each youth took part in a nine-session, weekly cognitive behavioral intervention program. Each session lasted for about 1 hour. The researcher who served as therapist was a Ph.D. psychologist knowledgeable of the issues relevant to adolescents with CF. The youths were given a supply of the assessment instruments, and were asked to complete one copy of each instrument the day of, or the evening before, each session. Most instruments were completed by the
time the researcher arrived. On three occasions, a youth was completing the instruments when the researcher arrived. In those cases the researcher waited for youths to complete the measures before beginning the session. Upon finishing the program, the youths were given a $10 gift certificate for a local movie theater chain.

The intervention procedure paralleled a three-phase, cognitive behavioral, stress inoculation training program: the conceptualization phase, the skill acquisition and rehearsal phase, and the application phase (Meichenbaum, 1985). The two cognitive behavioral skills of cognitive restructuring and problem solving were trained.

**Conceptualization Phase (Session 1).** During this phase, the theoretical basis for cognitive restructuring and problem solving were described. The discussion initially focused on identifying stress events and reconceptualizing stress in terms of recognized physiological reactions, behaviors, emotions, and cognitions. Youths were then taught how to identify negative, self-defeating cognitions. The effect that cognitions have on behavior and emotions (e.g., feeling stressed, anxious, experiencing pain) were discussed. Examples provided by the researcher and by the youths highlighted this connection between cognitions and emotional reactions. The youths were given self-monitoring sheets for logging the occurrence of stressful situations and accompanying cognitions between sessions.

**Skill Acquisition and Rehearsal Phase (Sessions 2–6).** This phase involved the training of cognitive restructuring and problem-solving skills. During Sessions 2–4, youths were taught how to challenge and restructure their negative cognitions which they learned to identify in the previous phase. Adapted from the procedures of Beck, Rush, Shaw, and Emery (1979), youths were trained to question their self-defeating thoughts by examining the evidence for and against their thoughts and by looking for alternative explanations for stress events. Practice involved the youths recalling and discussing recent stressors and identifying self-defeating thoughts. The recent stressors tended to cover both general adolescent issues and CF-specific issues. The stressors were similar in tone and content to the stressors described by the youths when completing the KIDCOPE instrument (e.g., school concerns, peer and parent conflicts, dating, medical nonadherence, feeling awkward about coping with CF in social situations). The youths and researcher together examined the accuracy of these thoughts and then developed more realistic thinking for the situation. In some cases, youths were given further opportunity to practice cognitive restructuring by “substituting” the more realistic thoughts while imagining their recent stressors within the session. Cognitive restructuring attempts between sessions were recorded on the self-monitoring sheets. Problem-solving training (e.g., D'Zurilla & Goldfried, 1971; Spivack, Platt, & Shure, 1976) occurred in Sessions 5–6. Youths were taught a four-step problem-solving strategy which in-
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volved defining the problem, considering solutions to solve the problem, generating consequences, and making a decision based on this process. During the sessions focused on problem solving, youths practiced the skill by applying this strategy to reported stress problems and discussed the process with the researcher. Cognitive restructuring and problem solving attempts between sessions were recorded on self-monitoring sheets.

Application Phase (Sessions 7–9). This phase involved further practice of skills in anticipation of a future or potential stressor. The youths disclosed a likely stressful event that could occur before the next session. The researcher and the youth discussed which acquired skill or combination of skills would be appropriate for this stressor. If cognitive restructuring was chosen, the acquired cognitive restructuring skills were rehearsed by means of imagery, behavioral rehearsal, and in vivo application. If problem solving was chosen, then the youth and the researcher dealt with the issue using the problem-solving strategy and developed a course of action for the problem. For some youths both skills were selected to apply to the upcoming stress event. Each successive session was used to discuss if the youth had the opportunity to use the skills and how well the application helped the youth.

Three months after the completion of training, families were contacted by phone to remind them of the follow-up assessment. Families were mailed the instruments to be completed at home, and then they mailed these back to the researcher.

RESULTS

Each youth completed all nine of the intervention sessions except Elaine. This youth and her family were leaving town for an extended summer vacation, and the intervention was shortened to eight sessions to meet the family's schedule.

Anxiety

Figure 1 displays the youths' self-report of trait anxiety from the STAI. Elaine and Julie demonstrated low but increasing levels of anxiety across the 2 to 3 weeks of baseline. Lee demonstrated a moderate to high level of anxiety across 4 weeks of baseline. Bill displayed a low but stable level of anxiety and Mark showed an initially high level of anxiety, but stabilized at a more moderate level of anxiety across 5 weeks of baseline. Upon introduction of the intervention, Elaine displayed an immediate and steady decrease in trait anxiety across treatment sessions from a baseline mean of 36 to a treatment level mean of 28. She
Fig. 1. Trait anxiety scores across baseline and treatment sessions for each youth.
maintained her gain at follow-up with a score of 27. Julie showed a decreasing trend in anxiety after treatment was introduced, in direct contrast to her increasing trend during baseline, despite the fact that her average baseline and treatment anxiety scores (along with her follow-up score) were 32. With the advent of treatment, Lee demonstrated immediate improvement in trait anxiety (although there were fluctuations in his scores) from a baseline mean of 47 to a treatment mean of 35. His follow-up score was 31 which suggested maintenance of treatment gains. Bill continued to display low but stable levels of anxiety after the introduction of treatment, with a baseline average of 28, a treatment average of 26, and a follow-up score of 25. Finally, Mark displayed a gradual but steady decrease in anxiety across treatment sessions from a baseline mean of 40 to a treatment level mean of 36. His follow-up score of 24 suggested continued improvement after treatment.

Coping Strategies

For ease of presentation, the 10 coping strategies from the KIDCOPE were collapsed into three categories. The two items representing cognitive restructuring and problem solving were combined to yield a positive coping score. The items representing distraction, social withdrawal, self-criticism, blaming others, venting, wishful thinking, and resignation were combined to yield a negative coping score. Similar composite maladaptive coping scores have been calculated from coping measures in past research with chronically ill children and adolescents (Boardway, Delamater, Tomakowsky, & Gutai, 1993; Delamater, 1992). Finally, items representing emotional regulation and social support were combined to yield a behavioral coping score.

The youths presented a variety of different stressors when completing the KIDCOPE. Some of these were serious, while others were relatively minor. In addition, Elaine reported not having an illness or general problem on a few occasions. To control for this variability, a mean score for the data collected during the baseline and treatment phases is presented for the negative coping score, the positive coping score, and the behavioral coping score.

Figure 2 presents the data for both the illness-specific problems and the general problems from the KIDCOPE for each youth. A clear pattern emerges only from the illness-specific problems; when the youths described their coping efforts with CF problems, they each showed a mean decrease in the use of negative coping and an increase in positive coping during treatment in comparison to the baseline means. In terms of general problems, the youths reported very slight or no reductions in negative coping. Three youths actually displayed a reduction in positive coping for general problems. Finally, a similar pattern
emerged on behavioral coping across both the illness-specific and general problems. Two youths reported an increase and two reported a decrease in the use of behavioral coping.

The follow-up score from the KIDCOPE reflects one data point, not a mean of multiple data points like the baseline and treatment scores. Therefore, youth responses could be more a function of the nature and intensity of the isolated problem, rather than typical coping. The improvements in positive and negative coping were not maintained on the single CF problem reported by Julie and Mark. Elaine and Bill maintained their improvements in negative coping, but only Bill maintained his improvement in positive coping for the CF problem. In addition, Julie and Bill showed an increase, while Elaine and Mark showed a decrease, in positive coping to their general problems. Lee’s responses to the CF
problem indicate extensive increases across negative, positive, and behavioral coping efforts.

Functional Disability

On the Functional Disability Inventory, 5 of the 15 items were never endorsed by the youths. As a result, these 5 items were not included when considering the possible range of scores for the youths in this study. Instead of a possible range of 0 to 60, the range was 0 to 40. A mean functional disability score for the data collected during the baseline and treatment phases is presented in Figure 3. Similar to the coping data, the follow-up data reflect one data point, not a mean of multiple data points as in the baseline and treatment scores. All five youths reported a decrease in functional disability as a consequence of treatment. Follow-up indicated that Elaine, Julie, and Mark maintained their gains, whereas Lee and Bill reported increases in perceived functional disability.

Parent CBCL Reports

On the parent-completed CBCL, only Elaine and Mark had prescores that were at or above the clinical level (Table I). Mark showed decreases pre- to
Table 1. Parent Child Behavior Checklist (CBCL) Scales (T-Scores)

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*Scales are identified as follow: With = Withdrawn; Som = Somatic Complaints; A/D = Anxious/Depressed; Soc P = Social Problems; Thl P = Thought Problems; Att P = Attention Problems; Del Beh = Delinquent Behavior; Agg Beh = Aggressive Behavior; Int T = Internal T score; Ext T = External T score; Tot T = Total T score.*
posttraining on somatic complaints, thought problems, and attention problems to bring them within normal limits ($T$ score < 70). Decreases from borderline clinical levels were also noted on the total internalizing and delinquent behavior scales. Little pre- to posttraining changes were noted for Elaine who was elevated on the anxious/depressed and the total internalizing scales.

In terms of follow-up, Mark’s somatic complaints returned to pretraining levels. However, improvements were maintained on thought problems, attention problems, total internalizing, and delinquent behavior scales. Elaine displayed some improvement on the anxious/depressed and total internalizing scales. Also, Julie showed improvement at follow-up in comparison to her pre- and posttraining borderline somatic complaints and total externalizing scales.

**DISCUSSION**

Overall, the cognitive behavioral intervention appears to have an impact on the participating youths. Four of the five participants showed decreases in anxiety with treatment, all of them reported an increase in the use of positive coping techniques and a decrease in negative coping techniques on problems related to cystic fibrosis, and all of them showed a decrease in perceived functional disability. The improvements seen on trait anxiety were maintained at follow-up, and three youths maintained improvements on perceived functional disability at follow-up. The training gains on coping with CF-related problems generally were not maintained. Parental reports of improvement were also obtained on some scales for youths whose pretreatment parental ratings were at clinical levels.

The cognitive behavioral intervention used in this study appears to be appropriate for the diverse concerns brought up by the youths. Although few of the concerns related directly to CF daily care, the youths commonly reported problems with how their symptoms impacted other areas of their life (e.g., coughing in public, using an inhaler while playing basketball). Various developmentally typical adolescent problems were also frequently addressed. Recognition of both CF-specific and non-CF-specific issues in this population is consistent with other recent work (Quittner et al., 1996).

The lack of improvement in self-reported coping of general problems on the KIDCOPE was not expected. As indicated above, youths worked on a variety of concerns, CF- and non-CF-related, during the sessions. The CF issues may have been more salient than general issues for the implementation of learned coping strategies. Likewise, in terms of positive coping, the baseline levels of youths who decreased with treatment were already fairly high.

One youth (Lee) displayed extensive increases across negative, positive, and behavioral coping efforts, and a significant increase in reported functional disability at follow-up. The week prior to collecting the follow-up data, Lee had
surgery on his sinuses. Some complications resulted, and he was feeling very uncomfortable. Thus, the significant changes are likely to be secondary to his surgery and related complications.

Cautions and limitations for this study should be noted. The procedures could have resulted in some bias in the youths' self-reports. During baseline, the instruments were completed and mailed to the researcher. With the initiation of training, the instruments were completed before the researcher arrived and then handed in at the beginning of the session. The content of the sessions was related to the content of the instruments, and this may have influenced responses of the youths. In addition, the instruments served occasionally as a stimulus for discussion. For instance, some youths frequently endorsed wishful thinking as a coping strategy on the KIDCOPE. During the rare sessions when youths reported that they had little to talk about, the researcher would ask the youths how they could restructure these thoughts or solve the problem differently instead of relying on wishful thinking.

All of the families chose to have the intervention conducted in their homes. The convenience of completing the intervention at home may have played a role in obtaining volunteers to participate. Depending on the needs and motivation of youths and their families, modifications in terms of session length or number, or therapist contact may be necessary for application in a clinic setting. Such modifications are easily accomplished within this therapeutic framework.

We were aware that the home environment may have felt awkward for the youths because of privacy concerns. In all cases, however, the families did work at providing privacy, and youths did not seem unduly concerned about parents or siblings overhearing anything.

The generalizability of the intervention as conducted in the home to a pediatric setting is an important issue. Whether similar results would be obtained in a clinic setting or whether one environment would be more likely to facilitate treatment gains over others is an empirical question. There appears to be no evidence to suggest that the home setting would be more effective than a clinic setting. In fact, the clinic setting could facilitate treatment gains by eliciting more CF-related anxieties given the large number of salient cues. It should be noted that stress inoculation training programs have been conducted successfully in a variety of settings such as schools and psychiatric hospitals (Feindler, Ecton, Kingsley, & Dubey, 1986; Hains & Ellmann, 1994).

The participant selection process may have been flawed. The CF team rated adolescents as mild, moderate, and high in terms of anxiety. Those with moderate to high ratings were initially contacted about participating. As it turned out, the CF team’s ratings were not consistent with youth or parent report. Only Lee and Mark had relatively elevated trait anxiety scores (although Elaine and Julie had increasing scores during baseline), and only the parents of Elaine and Mark rated their teenagers as having elevated internalizing behaviors. Even though Bill
appeared moderately anxious to the CF team, in hindsight his behavior was probably misinterpreted by the team and he was not appropriate for referral. Anecdotally, anger and conduct problems were a frequent concern, and the measures did not tap these issues. These problems may have been observed by the CF team over time and influenced their ratings of prospective participants. Future research needs to refine the selection process, and possibly broaden the selection criteria and outcome measures to include anger control and conduct issues. For instance, the selection process could involve a screening of potential youths using assessments of anxiety and anger after the initial identification by the CF team.

Self-reports were the predominant method of assessment used within this multiple baseline design. Arguments could be made that multimethod assessments, a group design, or both would enhance the examination of training effectiveness.

Although the multiple baseline design has limitations, there are a number of reasons for using it with intervention research with pediatric populations. First, pediatric conditions have low base rates, which makes obtaining large samples challenging (La Greca & Varni, 1993). Consequently, statistical power becomes a concern. Multiple baseline designs enable interventions to be tested with small numbers of subjects (Hilliard, 1993). Second, the averaging of results in group designs often obscures individual differences and clinical outcomes of participants (Barlow & Hersen, 1984). Given that virtually no intervention research has been done with adolescents with CF, the clouding of individual responses may have implications for our understanding of youth responsiveness to the interventions. Finally, the single-case design provides a promising first step for developing the empirical base for pediatric interventions, and is well suited to examining treatment process issues (Hilliard, 1993; La Greca & Varni, 1993).

The implementation of a stress inoculation training program within a multiple baseline design can readily be used by pediatric psychologists to teach youths coping skills, to evaluate interventions, and to allow efficient integration of clinical demands and scientific activity. Adoption of structured intervention programs like stress inoculation training also creates opportunities for psychologists who are working in different locations to conduct similar interventions and compare results.

Despite the described limitations of this research, the results of this project indicate that cognitive behavior interventions such as stress inoculation training may be useful for adolescents with cystic fibrosis in helping them cope with personal problems and stressors. The skill acquisition phase of stress inoculation can be tailored to meet the specific needs of youths with chronic illness, drawing on a variety of cognitive and behavioral techniques, and applied within the constraints of the clinic setting. In terms of youths with CF, future research could examine the impact of stress inoculation training on dealing with specific life
transition issues (such as transitions from middle school to high school, or transitions from pediatric to adult-based medical care) and expand to other areas of psychological symptomatology such as anger control and conduct problems.

REFERENCES


