Behavioral Interventions in the Diagnosis, Treatment and Rehabilitation of Children with Cancer

Katherine N. DuHamel, William H. Redd and Suzanne M. Johnson Vickberg

From the Mount Sinai School of Medicine, New York, USA

Correspondence to: William H. Redd, PhD, Mount Sinai School of Medicine, One Gustave L. Levy Place, Box 1130, New York, NY 10029, USA

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Behavioral interventions used to reduce distress and increase cooperation in children undergoing cancer treatment incorporate: contingency management, cognitive/attentional distraction, hypnosis, systematic desensitization, modeling and behavioral rehearsal. In most cases clinical interventions integrate these procedures into a multimodal intervention package. Although in most behavioral interventions the 'therapist' is a nurse, social worker or child psychologist; parents often take an active role in behavioral intervention. Early return to school can 'normalize' the child's life in the midst of coping with cancer and can promote optimal rehabilitation. More research is needed on the integration of behavioral methods with other therapeutic methods (e.g., pharmacologic). Indeed, research in this area of pediatric oncology must be continuously updated as advances in other areas may affect clinical decisions regarding preferred psychosocial intervention methods.

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In the past 25 years there has been a radical change in the plight of the child diagnosed with cancer. In the 1960s few pediatric patients could be expected to live more than a few months, whereas today the majority survive and go on to lead happy and productive lives. These improvements in childhood cancer prognosis are directly related to advances in diagnosis and treatment technology. Unfortunately, these advances have been associated with an increase in both the number and the aversiveness of side effects. Indeed, almost every aspect of diagnostic work-up, treatment and rehabilitation causes significant pain and distress. The side effects can be short lived or long term and not only do they affect quality of life for the patient, they also affect treatment compliance.

Fortunately, advances in medical technology have been running in parallel with advances in behavioral methods used to treat medical disorders. Through the careful application of relatively simple principles of behavior, the pain and suffering of both the patient and his/her parents can be reduced. Clinical researchers have developed specific procedures for most phases of diagnosis, treatment and rehabilitation. These methods have been so fully endorsed by front-line medical personnel (i.e., physicians and nurses) that they have become almost a routine part of comprehensive care of pediatric cancer patients.

In 1988 a World Health Organization Consensus Conference was convened to establish guidelines for the management of pain in childhood cancer. Participants at this conference endorsed the use of behavioral procedures in pediatric cancer treatment. Their recommendation was that for children over the age of five undergoing repeated diagnostic and treatment procedures, psychological preparation and behavioral intervention, in addition to or without pharmacological intervention, should be the treatment of choice (1). This statement still applies 12 years later. However, at the outset it is important to point out that behavioral methods are best viewed as but one of a number of tools available to reduce the distress of pediatric cancer and its treatment. They should be used, whenever possible, in conjunction with other methods.

The purpose of this discussion is to review this use of behavioral methods in the care of children with cancer, beginning with an overview of behavioral procedures used with children. The focus then shifts to a review of the major treatment difficulties (i.e. invasive medical treatments and post-treatment psychosocial and cognitive readjustment) and an assessment of the efficacy of behavioral interventions for specific aspects of treatment and rehabilitation. Through the discussion special consideration is given to the integration of behavioral methods with other intervention strategies. The chapter ends with a discussion of future directions. The discussion that follows is based on the authors' empirical research, clinical work and their prior literature reviews (2). Although one of the basic

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tenets of a behavioral approach to clinical research and intervention is that procedures should be based on empirical clinical trials research, in reality our knowledge comes from many sources: empirical research, clinical experience and theoretical writings.

OVERVIEW OF BEHAVIORAL INTERVENTIONS

Behavioral interventions that are used to reduce distress and increase cooperation are based on behavior theory. The principal components of such interventions include: (i) contingency management; (ii) cognitive/attentional distraction; (iii) hypnosis; (iv) systematic desensitization; (v) modeling; (vi) behavioral rehearsal; and (vii) multimodal intervention packages.

Contingency management is derived from Thordike's (3) Law of Effect and essentially involves structuring facets of the patient's social environment (i.e. the patient's interaction with family and staff) so as to provide concrete reinforcers (i.e. social and material rewards) contingent on the child's positive behavior (e.g., holding still during medical procedures, cooperating with routine mouth care). The strategy forms the basis of most behavior modification programs for children in which a simple reward system is put into place. In many cases contingency management programs are developed such that the child earns points, stars or special privileges for cooperation (4, 5).

Cognitive/attentional distraction procedures seek to involve the child's attention in a pleasurable or challenging task in order to block his/her attention to the stressful procedure. It is often used to reduce distress and promote cooperation. We hypothesized (6) that cognitive or attentional distraction involves blocking the patient's perception of pain or nausea by refocusing the child's attention. A commonly used distraction task is playing video games. For example, in our clinical research we used video games to reduce nausea associated with chemotherapy (6). Children's ratings of nausea were at least 50% lower when they were playing video games than when they were passively sitting and focusing on the intravenous transfusion. Another method of cognitive or attentional distraction is storytelling or fantasy in which the child is 'cognitively engaged'. When the strategy involves storytelling it is quite similar to hypnosis and relies on the child's ability to engage in fantasy. The goal is to engage the child in an activity that distracts his/her attention and/or physically blocks the actual distress behavior. Manne and colleagues (7, 8) found that giving a child a simple party-blower (a paper whistle-like toy that expands like the trunk of an elephant and makes a noise when you blow it) reduced both child and parent distress. The premise was that the party-blower serves to distract the child and the parent from the invasive procedure. Using the blower makes crying and resistance less likely and, at the same time, promotes relaxation through paced breathing.

A related technique is hypnosis. There are theoretical controversies about what constitutes hypnosis, and interventions employing 'hypnosis' vary in their treatment strategies (2, 9–11). For the purposes of this review, hypnosis is defined as a relatively simple process in which patients learn to focus their attention on thoughts or images that are unrelated to the source of distress. With children, imaginative involvement is often gained though storytelling and relaxation, and is similar to distraction. Hypnosis and distraction rely on many of the same skills. For example, hypnosis involves the ability to become highly absorbed. Hypnosis may be particularly useful for children, as research has shown that children are more receptive to hypnosis, are more hypnotizable, compared to adults (12). Hypnosis (a combination of imagery and relaxation) or imagery alone is often used to distract children while they are undergoing diagnostic procedures, (13, 14) or receiving chemotherapy treatment (15–19).

In the case of extreme phobic-like anxiety, a structured systematic desensitization intervention is often required. The goal of systematic desensitization is the gradual introduction of the individual to a feared stimulus (i.e., in the case of cancer treatment, a procedure or diagnostic instrument) in the context of low levels of anxiety, According to behavioral theory, fear is gradually diminished with repeated exposure to the feared stimulus. One method of desensitization used with children is emotive imagery (5). Similar to distraction and hypnosis, emotive imagery takes advantages of the child's openness to fantasy. After establishing rapport with the child, the therapist determines the child's favorite storybook hero and tells the child a series of stories involving the child and his/her hero. Each subsequent story brings the child closer to the feared setting, while the hero helps the child to master the situation. This procedure is similar to systematic desensitization procedures used to treat phobias in adults. The rationale is that the elicitation of strong anxiety-inhibiting emotive images in the context of the feared stimuli will reduce the anxiety reactions to those stimuli. By hearing a story that involves favorite storybook heroes interacting with the phobic or distressing stimuli, the child comes to associate these stimuli with positive feelings of self-assertion and pride. Emotive imagery has been effectively used to reduce cancer-related distress in children (5, 20, 21).

Behavioral rehearsal is another procedure that is often employed. It involves taking the child through all phases of the diagnostic procedure or treatment during training sessions. For the child, this reduces the fear of the unknown. During these sessions the child assumes each role: the doctor, nurse, and patient. The child carries out each aspect of the treatment with a doll and may also practice performing a procedure, for example a bone marrow aspiration, on a doll and then on the therapist. While carrying out the diagnostic procedure or treatment, the child practices giving proper instructions, such as breathing exercises

or emotive imagery. Often, a component of interventions is deep breathing and/or progressive muscle relaxation. These techniques are used to help reduce the anxiety of the child, reduce physiological arousal, and increase relaxation.

Filmed modeling is also employed in the management of distress during pediatric cancer treatment. Unlike behavioral rehearsal, in filmed modeling the patient does not practice the procedure, but instead watches a film of another child going through the procedure. For example, the child is shown a film of another child of similar age undergoing bone marrow aspiration and describing his/her thoughts and feelings while using different behavioral techniques (such as breathing exercises) in order to cope (5). In the studies reviewed, filmed modeling was also used to help the parents of patients cope. For example, an intervention for parents was having them watch a video which portrayed a mother successfully coping as she witnessed her child receiving bone marrow aspiration and lumbar puncture (22).

The behavioral techniques outlined above are often employed in combination to create what is called a multimodal behavioral intervention. Multimodal interventions integrate specific behavioral procedures such as hypnosis, distraction, and positive reinforcement with the aim of reducing distress in children who may benefit differently from each of the various procedures. For example, younger children undergoing bone marrow aspiration may derive greater benefit from hypnosis than they do from distraction and older children may benefit from both (13). Multimodal intervention packages can also incorporate cognitive methods (i.e., helping the child see the situation as less frustrating). Cognitive therapy techniques, such as making positive self-statements, are based on the theory that changing the internal dialogue that people have with themselves can change their emotional responses (23). Multimodal intervention packages have been found to reduce distress in pediatric cancer patients (5, 20, 21).

Although in most behavioral interventions the 'therapist' is a nurse, social worker or child psychologist, parents often take an active role in behavioral intervention. Enlisting the parents has a number of advantages. First, they know their child and want to be able to do something to ease the child's distress. Second, by being active they are distracted from their own anxiety. Third, their participation is free. Finally, parents report less personal distress when they are actively involved in their own child's treatment.

FACTORS INFLUENCING CHILDREN'S REACTIONS

Children react in various ways to cancer diagnosis, treatment and post-treatment challenges. Unfortunately, the factors that affect the nature and intensity of children's reactions are not well understood. Recent research has found that the child's age (24), anxiety level (25), prior experience with the procedure (26), procedural invasiveness (27), and parental distress (28), are all relevant.

Younger children report greater distress with medical procedures (27–29). The younger child often thinks the doctor and nurse are punishing him/her for some wrongdoing (26). Moreover, many children believe that they may die from such procedures (27, 30). Misconceptions about the purpose of treatment and cause of illness appear to be related to the child's level of cognitive development. For example, research has shown that children's casual attributions regarding health and illness are consistent with predication based on Piaget's theory of cognitive development (31). Interestingly, concerning treatment side effects, adolescents have been found to report more severe nausea than younger children (25), but this result has not been consistently documented (16), making conclusions difficult.

The child's level of anxiety can be the result of both painful medical procedures and treatment side effects, as well as being a cause of these difficulties. Research has indicated that anxiety is associated with pain, such that pain tends to increase as the individual's anxiety increases (23). In addition, the level of anxiety has been associated with treatment side effects. For example, children receiving chemotherapy who demonstrate greater anxiety than other children are at greater risk for nausea and emesis (25).

The child's previous experience with a procedure also influences his/her procedural distress. Children's distress levels have been found to increase as their exposure to a medical procedure increases (32, 33), but the results have been inconsistent (4). Furthermore, when an intervention is not provided, the number of children developing treatment side effects (anticipatory nausea and vomiting) increases as the number of treatments increases (16). The invasiveness of a procedure is also a contributory factor to children's distress levels, as bone marrow aspirations have been reported to be more distressing than venipuncture (27).

Parental distress can influence children's distress (27, 28). In the face of threat and uncertainty, the young child often looks to his/her parents for emotional support and for guidance in understanding what is happening. The child is keenly aware of the parents' reactions and quickly responds to any sign of anxiety on the parents' part. Parental tone of voice, posture, and eye gaze are subtle but powerful cues for the child during stressful events (34). For example, during an invasive procedure, if the parent is calm and relaxed, the child is more likely to believe that the situation is safe. If, on the other hand, the parent is clearly anxious, the child's anxiety is fueled. Research suggests that a complex feedback loop exists between the parent and child, with each being acutely sensitive to the other's emotional reaction (35). Parents' own level of distress may also influence how they understand or view

their child's anxiety. For example, in a study of pediatric cancer patients' distress during bone marrow aspiration, Manne and colleagues (29) found that parents who were more anxious reported their child as having experienced greater pain and distress. Because of the effect that parent's own anxiety can have on the child's anxiety, providing parent-specific training in behavioral management procedures can help reduce child distress. That is, if the parent receives training in behavioral manner, the child's anxiety will not be exacerbated by the parent. In fact, the parent's behavior may help calm the child.

The child's coping style may also affect his/her pain and distress as well as the effectiveness of the behavioral intervention (36–39). To date, however, the results regarding the influence of a child's coping style on his/her psychological reactions have been mixed, leading to a lack of clear conclusions (see (2, 10) for review).

All of these factors, described above, can influence a child's reaction to cancer-related events. Furthermore, different types of cancer-related events elicit different reactions from children. There are three major areas related to cancer and its treatment which challenge the resources of pediatric patients: the experience of invasive diagnostic and treatment procedures, treatment side effects, and social and academic reintegration.

STRESSFUL DIAGNOSTIC AND TREATMENT PROCEDURES AND BEHAVIORAL INTERVENTIONS

The diagnosis and treatment of cancer in children involves a series of medical procedures that may be painful and, in the case of chemotherapy, may be debilitating. Depending upon the disease, the children may have to undergo repeated bone marrow aspiration, lumbar puncture, and chemotherapy. Bone marrow aspirations are reported by patients and parents to be the most traumatic and painful events in the therapeutic regimen, followed by lumbar puncture and then venipuncture (2, 27).

Bone marrow aspiration and lumbar puncture

Bone marrow aspiration is a diagnostic procedure in which a needle is inserted into a bone, usually in the lower back, in order to extract marrow. Bone marrow aspiration is used to diagnose leukemia and other cancers, to determine whether the cancer has metastasized, and to evaluate chemotherapy effectiveness (40). Bone marrow aspiration is extremely painful and often requires physical restraint of the child in order to complete the procedure if inadequate local anesthesia or sedation is used. Lumbar puncture involves the insertion of a needle into the spinal canal and the removal of spinal fluid. It is used to diagnose infections, brain hemorrhage, tumors, or other obstructions (40). Like bone marrow aspiration, many children become anxious and uncooperative during lumbar puncture.

Unfortunately, in many cases both of these procedures must be administered repeatedly, creating for some children, near phobic reactions. Depending on the child's age and cognitive understanding of the procedure, bone marrow aspiration sometimes resembles torture to the child (26). Because of the anxiety and pain caused by such invasive treatments and many children's limited understanding of why treatment is necessary, young patients often become non-compliant and actively resist these procedures, Indeed, from 38% to 84% of children do not cope well during bone marrow aspiration and lumbar puncture (2).

Pharmacological interventions can reduce pain and anxiety during bone marrow aspiration and lumbar puncture, but until relatively recently many clinicians have tried to limit their use because of fear of long-term neurological side effects. In addition, some children report that sedation makes them feel out of control (2), further supporting the use of behavioral interventions in lieu of, or in addition to pharmacological intervention. However, recent advances in short-acting, general anesthesia have prompted renewed debate over the benefits of pharmacologic (as opposed to behavioral) intervention. Current thinking is that for an unprepared, very young (under 6) or phobic child, general anesthesia may be preferable (41). For older children or when preparation is possible, behavioral intervention (described below) is the treatment of choice.

Hypnosis imagery and/or distraction strategies with bone marrow aspiration and lumbar puncture

Although hypnosis has been used for over a century, most of the research regarding its effectiveness is anecdotal or based on case reports (2, 10, 11, 42, 43). Despite imprecision in definitions, a general lack of standardized interventions, and few controlled studies, hypnosis has been found to be effective in alleviating distress associated with a number of cancer treatment procedures. (Systematic studies of behavioral interventions with pediatric oncology patients undergoing bone marrow aspiration and lumbar puncture are reviewed in Table 1.)

In a pioneer study, Hilgard & LeBaron (12) found that hypnosis reduced distress during bone marrow aspiration in a group of 6–19 year old patients. After one hypnosis treatment session, patient's experienced a 30% reduction in self-reported pain. Treatment effects were found to vary according to patients' level of hypnotizability, with more hypnotizable patients experiencing greater reductions in pain and anxiety.

In a more methodologically rigorous, randomized controlled study, Kuttner, Bowman & Teasdale (13) investigated the relative efficacy of imaginative involvement/hypnosis as compared to both distraction and standard care. Participants were 3–10 year old children identified by medical staff as having difficulty tolerating bone marrow aspirations. After one intervention session imaginative in-

volvement/hypnosis was determined to be better (in terms of reduction in distress) than standard care.

In summary, hypnosis can be an effective, practical, transportable intervention for reducing procedural distress in children with cancer. Although results clearly indicate that hypnosis is more effective than standard care, research to date does not permit us to draw firm conclusions regarding the relative effectiveness of hypnosis compared with other behavioral interventions. Future research needs to include two intervention groups (hypnosis and an alternative behavioral intervention) and a standard care treatment group.

Multimodal strategies with bone marrow aspiration and lumbar puncture

Jay and her colleagues have developed a comprehensive intervention package which employs a range of techniques to reduce the pain and suffering of pediatric oncology patients during medical procedures (5, 20, 21). Their intervention package includes various strategies such as breathing exercises, reinforcement in the form of a trophy (a prize) for lying still and doing the breathing exercises, emotive imagery, behavioral rehearsal, and modeling. Although there have been other multimodal intervention packages for reducing distress associated with lumbar puncture, (e.g. (32)), the intervention developed by Jay and colleagues has been the most thoroughly evaluated. In a series of studies Jay and colleagues found their intervention to be effective in reducing procedural stress for children with cancer and their parents (5, 20, 22).

With 3–13 year old children with cancer, Jay and colleagues (5) compared their multimodal intervention with a low-risk pharmacological intervention (oral diazepam), and with a minimal treatment condition in which support and reassurance were provided. The results indicated that diazepam was helpful in lowering anticipatory distress, but the multimodal intervention was the most helpful during the procedure and the most helpful overall. The authors noted the clinical significance of these results such that with their multimodal intervention, procedure pain scores were 25% less than those obtained during attention control. Although interventions by Jay and colleagues have been found to be effective, the underlying processes associated with reduced distress were not explored. In a more recent study by Redd & Bush (44) the processes associated with the therapeutic outcome of the Jay and colleagues intervention were investigated. Redd & Bush (44) examined the role of self-efficacy and emotional imagery during multimodal intervention for children aged 4–14 years undergoing lumbar puncture. They found that self-efficacy was the best predictor of decreased behavioral distress after intervention. In addition to less distress, there was also evidence of habituation (decreases in emotional imagery) for the intervention group.

Medical procedures are not only potentially distressing for the children who experience them, but may also cause distress for the parents who have to watch their children undergo these invasive procedures. Because some parents become distressed when their children undergo medical procedures and parents influence the distress experienced by their children (27), Jay & Elliot (22) designed and evaluated the efficacy of a multimodal intervention for parents. Parents were assigned either to accompany their child as he/she received one of two child-focused interventions or to receive stress inoculation training themselves. The stress inoculation program employed by Jay & Elliot (22) included three components: modeling and education; positive self-statements; and relaxation training combined with suggestions for coping. As compared with parents in the child-focused conditions, parents in the stress inoculation group reported lower state and trait anxiety and higher positive self-statements.

The work of Jay and her colleagues indicated that a multimodal intervention is effective in reducing children's distress during bone marrow aspiration and lumbar puncture (5, 20, 21). In addition, their multimodal intervention was found to be more effective than a pharmacological intervention or an attention control condition in reducing the children's bone marrow aspiration behavioral distress and pain (5). Adding a pharmacological treatment to the psychological intervention did not enhance the effect of the psychological intervention in reducing children's bone marrow aspiration and lumbar puncture distress (20). Finally, an intervention for parents based on a stress inoculation training model was found to reduce parents' distress associated with their children's medical procedure (22). It is important to point out that these studies did not address which aspects of the multimodal intervention package were the most effective or which components were effective for which children. The question, 'Which intervention, and for whom?', needs to be addressed.

Venipuncture

Venipuncture is a common medical procedure required for diagnostic blood tests, transfusions, bone marrow aspiration, lumbar puncture, and chemotherapy. Up to 77% of children find venipuncture distressing (28). Children's apprehension concerning venipuncture can lead to muscle rigidity, making the procedure more difficult (and painful) to perform. The recent development of a local anesthetic (EMLA) may make the entire procedure less painful, thereby diminishing the need for behavioral intervention with venipuncture. However, the use of EMLA requires at least one hour (as it must be applied at least one hour before the procedure) and, therefore, may be less useful for children who can be trained in hypnosis and methods of cognitive distraction. (Systematic studies of behavioral interventions with pediatric oncology patients undergoing venipuncture are reviewed in Table 1.)

Multimodal strategies with venipuncture

Building on the work of Dahlquist and colleagues (46), Manne and colleagues (7, 8) have obtained strong support for the efficacy of behavioral interventions in reducing distress associated with venipuncture. Their three-session intervention package involves both the child and the parent and includes a combination of distraction, paced breathing, and reinforcement for the children, and instructions in behavioral coaching for the parents. During venipuncture, the child is distracted by using a party-blower while the parent coaches. The parent counts out loud to pace the child's breathing into the blower and encourages him/her to use it. Positive reinforcement consists of the child 'winning' stickers for holding their hand still while the venipuncture is performed and for using the party-blower. In randomized controlled studies, Manne and her colleagues found that these behavioral interventions effectively reduce distress during venipuncture (7, 8). Particularly important for clinicians is that they demonstrated that this cost-effective (e.g., use of a party-blower and parent coaching) intervention reduced both children's and parents' distress. There are, however, several remaining questions, including which behavioral strategy is the most effective in reducing venipuncture distress, an intervention package such as that developed by Manne and colleagues or an intervention such as those used with bone marrow aspiration and lumbar puncture which also included hypnosis.

TREATMENT SIDE EFFECTS AND BEHAVIORAL INTERVENTIONS

Nausea and vomiting

In addition to pain and anxiety associated with medical procedures, patients often have problems related to treatment side effects. Aggressive treatments using multimodal therapy such as surgery, radiation and chemotherapy can lead to a variety of aversive side effects. With several chemotherapeutic agents and radiation, patients often experience fatigue, diarrhea, hair loss, and post-treatment nausea. The most common side effects associated with cancer chemotherapy are nausea, vomiting and dysphoria. After repeated chemotherapy treatments some patients develop anticipatory nausea, that is they become nauseated in anticipation of treatment. Like the conditioned reflex of Pavlov's dogs (46), the patient's nausea in response to conditioned stimuli such as the site of the clinic, can be as intense as unconditioned responses elicited by actual treatment (47). Although the prevalence of nausea and vomiting reported in the literature varies, up to 71.2% of children receiving chemotherapy have been reported to have nausea during chemotherapy, and up to 76% of children have been reported to have anticipatory nausea (15, 16, 48, 49). In addition, up to 43% of children have been reported to have anticipatory vomiting (16). Although antiemetic medications have been fairly successful in treating nausea and vomiting during chemotherapy, they are not effective for anticipatory symptoms. Furthermore, antiemetic use can result in multiple side effects such as headache and extrapyramidal reactions (15). In young children, severe nausea and vomiting can also lead to dehydration, electrolyte imbalance, and weight loss (48). Compounding the issues surrounding side effects and quality of life, some patients' treatment can be so aversive that they become non-compliant with treatment regimes, leading to increased morbidity and mortality (50).

Hypnosis and/or distraction strategies for nausea and vomiting

There have been many studies published on the use of behavioral interventions such as hypnosis, progressive muscle relaxation training, systematic desensitization, and distraction for reducing nausea and vomiting during and in anticipation of chemotherapy treatment. Most studies have focused on adult cancer patients, while studies with children are few. In addition, the behavioral methods studies with children have been generally limited to hypnosis and/or distraction and most involve a single participant, not comparisons of intervention groups (42). (Systematic studies of behavioral interventions for treatment side effects with pediatric oncology patients are reviewed in Table 1).

In a group of 10–17 year old patients, Hilgard & LeBaron (12) assessed the efficacy of a behavioral intervention for reducing nausea and vomiting during chemotherapy. The behavioral intervention package included directing the child's attention away from thoughts about the chemotherapy by playing games, focusing on an object in the room, telling stories, and using muscle relaxation. Reassurance and information were also given. The results indicated that after the intervention, there were reductions in the children's disruption of activities, nausea, vomiting, and the bother these symptoms caused. However, the lack of a control group makes the benefits of the behavioral strategies over non-specific factors, such as reassurance or simply the passage of time, difficult to evaluate. Despite this limitation, this classic study provided preliminary results suggesting that a behavioral intervention package was effective in reducing treatment side effects.

Cognitive/attentional distraction through video game playing to control anticipatory nausea in a group of 9–20 year old cancer patients was assessed in two studies conducted by Redd and colleagues (6). In both studies there was a marked (up to 69%) reduction in nausea for those children who received the intervention (see also (51)). In a subsequent study Zeltzer et al. (16) investigated the relative efficacy of a hypnosis intervention compared with a non-hypnotic distraction/relaxation intervention, and a standard control group in children 5–17 years of age. Their

results suggested that hypnosis was superior to the non-hypnotic distraction/relaxation intervention in reducing chemotherapy side effects.

A recent study by Jacknow and colleagues (15) evaluated the efficacy of hypnosis to control nausea and antiemetics in a group of 6–18 year old newly diagnosed cancer patients. Not only did the children in the hypnosis group experience less anticipatory nausea than those in the standard care comparison group, they also used less antiemetic medication prescribed to be taken as they felt it was needed. The results also indicated the need to maintain active patient intervention throughout the child's treatment course. Beneficial effects were observed at 1 and 2 months post-hypnotic intervention, but not at 6 months.

It is difficult to draw clear conclusions regarding the relative efficacy of hypnosis versus distraction in the control of chemotherapy side effects in children. The problem is that the procedures (i.e. counting the dots on their father's tie and completing arithmetic problems) used by Zelter and colleagues (16) may be considerably less effective for distracting children than the video games procedures used by Redd and colleagues (6). Further research is needed to define the parameters of hypnosis, cognitive/attention distraction, and relaxation training in the control of treatment side effects.

POST-TREATMENT READJUSTMENT AND BEHAVIORAL INTERVENTIONS

In addition to coping with the distress associated with medical procedures and treatment side effects, children with cancer must confront other challenges such as re-entering the school environment after diagnosis. Returning to school and resuming normal interactions with peers is an important process for the child who has been diagnosed with cancer. Based on the notion that an early return to school can 'normalize' the child's life in the midst of coping with cancer, thus promoting optimal rehabilitation, several authors have recommended re-entry into the school environment as soon as possible for pediatric cancer patients (33, 52, 53). In addition to normalizing life and encouraging rehabilitation, a prompt return to school can present opportunities for social support (from peers and teachers) and exposure to socialization processes typically experienced by school-aged children. Such access to social support and socialization experiences may be crucial for proper adjustment. Indeed, positive peer relationships and perceived social support are associated with several positive corollaries such as increased stress resistance, improved academic achievement, decreased levels of behavioral problems, and pro-social behaviors in general (54, 55).

Clinical researchers have only recently begun to explore the use of multimodal interventions to promote post-treatment adjustment. Varni and his colleagues (55) assessed the relative efficacy of a social skills training intervention as compared with a standard school reintegration program with 5–13 year old children with cancer. Both groups received the standard intervention which included: (i) education for patients, parents, school and medical staff emphasizing the importance of an early return to school; (ii) school conferences and classroom presentations intended to demystify the cancer experience for both teachers and classmates; (iii) regular follow-ups with patients, parents, teachers, classmates, and medical staff. The behavioral intervention group also received the multimodal social skills training (e.g., modeling and cue-controlled relaxation) while the standard care intervention group spent equal time in individual play interaction with the research assistant. Results indicate that nine months after completing the intervention, pediatric cancer patients in the behavioral intervention condition experienced fewer behavioral problems and increased school competence (as reported by their parents). In addition, these children reported experiencing greater emotional and social support from their classmates and teachers after completing the multimodal intervention. Children receiving standard care did not experience these positive changes. The results of this initial study are quite important because they indicate that behavioral techniques are useful tools for teaching social skills and that the acquisition of such skills has a positive effect on pediatric adjustment.

FUTURE DIRECTIONS

The clinical research reviewed in this chapter clearly indicates the utility of behavioral interventions to reduce the pain and suffering of children with cancer. Hypnosis, distraction and multimodal interventions have been found effectively to reduce distress associated with medical procedures, and hypnosis and distraction were found to reduce treatment side-effects. In addition, a multimodal behavioral intervention has been effectively used to improve adjustment of pediatric cancer patients returning to school. More research is needed on the integration of behavioral methods with other methods (e.g., pharmacologic). Moreover, all research in this area of pediatric oncology must be continuously updated as advances in other areas may affect clinical decisions regarding preferred methods and how to integrate different intervention strategies.

It is difficult to predict future advances in behavioral intervention in pediatric oncology, but there are a number of important new trends. The first is the shift towards greater sophistication in research methodology. For example, the earlier studies generally lacked appropriate comparison groups, making the effect of the specific intervention compared with non-specific factors or time difficult to assess. More recent studies have included standard care comparison groups in addition to two treatment groups, making examination of the mechanisms underlying

Table 1

Behavioral interventions for pediatric oncology patients

Medical procedure/ authors	Sample	Research design	Intervention	Variables	Major results/significant findings
BMA (58)	N = 24, 6–19 years old 'chiefly forms of leukemia', 24 had 1 intervention session, 19 had 2 or more	Baseline post-test	Hypnosis (e.g., imaginative involvement through story telling)	Self-reported pain (scale of 0–10; FACES). Observer-rated pain and anxiety (scale of 0–10). Hypnotizability (SHCSC).	1. After 1 session reduction in: self-report pain, observer-rated pain, and observer-rated anxiety. 2. High hypnotizability associated with greater decreases in pain and anxiety. 3. Additive effects of session 2 not sig. 4. Overall, the higher initial distress (pain and anxiety), the greater the likelihood of patients to participate in the intervention.
BMA & LP (14)	N = 33, 6–17 years old; 28 L, 3 NHL, 2 Neural Tumors	Repeated measures factorial	Hypnosis (e.g., imagery, fantasy and deep breathing) vs. non-hypnotic behavioral techniques (e.g., distraction and deep breathing)	Self-reported pain and anxiety (scale of 1–5). Observer-rated pain and anxiety (scale of 1–5).	1. BMA pain decreased in both groups, greater reductions in hypnosis group. 2. BMA anxiety reduced in hypnosis group. 3. LP pain decreased in hypnosis group. 4. LP anxiety reduced in both groups.
BMA & LP & Chemotherapy Injection (59)	N = 16, mean age 14.0 years, SD $\pm$ 1.6, 8 ALL, 3 AML, 2 HD & Ewing's sarcoma, 1 NHL, 1 Neurobl, 1 Osteogenic sarcoma	Baseline post-test	Hypnosis (e.g., fantasy and relaxation)	Self-reported anxiety and discomfort (scale of 1–5). Trait anxiety (STAI). Self-Esteem (RSES). Health Locus of Control (HLOC). Illness Impact (II).	1. Reductions in anxiety and discomfort. 2. Reduction in trait anxiety.
BMA (60)	N = 36, 6–12 years old; 36 ALL	Repeated measures factorial	Hypnosis (e.g., imagery, muscle relaxation, suggestion for mastery, and re-entering hypnosis) vs. non-directed play	Observer-rated procedural distress (PARS-r). Nurses' rating of child's anxiety (scale 1–5). Self-reported fear (FACES 1–7) and pain (scale 0–100). Therapist rating of rapport and responsiveness to hypnosis (scale 1–5).	1. Self-rated pain and fear decreased after intervention in both groups. 2. Children who were rated as responding to the hypnosis training tended to report less fear and pain during procedure.
BMT (13)	N = 48, 3–10 years old; 48 had ALL or AML 48 had 1 intervention session, 30 had 2nd session	Repeated measures factorial	Hypnosis/Imaginative Involvement (e.g., imagery & direct suggestions for analgesia) vs. distraction (e.g., younger children instructed in bubble blowing and older children in deep breathing) vs. standard medical practice (control group)	Observer-rated Procedural Distress (PARS-r). Observer-rated anxiety (1–5). Observer rated pain (1–5). Self-reported pain and anxiety (FACES 1–5)	1. At 1st intervention session, younger children (3–6 years old), who received hypnosis treatment had lower observer-rated distress compared with the other two groups. 2. For older children (7–10 years old) both interventions resulted in less observer-rated pain and anxiety vs. the control group. 3. At second intervention session, all three groups showed reductions in distress, pain, and anxiety, and medical staff were observed using distraction with the control group.

Table 1 *(Continued)*

Medical procedure/ authors	Sample	Research design	Intervention	Variables	Major results/significant findings
BMA & LP (61)	N = 20, 5–18 years old; no information on cancer diagnosis	Repeated measures factorial	Hypnosis (e.g. imagery and relaxation) and procedural information vs. active cognitive strategy (e.g. distraction techniques) and procedural information	Self-reported anticipatory anxiety, procedural anxiety, and procedural pain (scale 1–20). State Anxiety (STAI). (MPQ) for 12+ year-old patients. Hypnotizability (SHCSC). Level of imaginative involvement (scale 1–4). Observer-rated procedural pain and anxiety (scale 1–20) Heart rate. Peripheral temp. (in finger).	1. Reductions in self-reported and observer-rated pain in both groups. 2. Observer-rated anxiety decreased in both groups.
LP (32)	N = 14, 3–11 years old; AML or ALL	Baseline post-test	Information distraction, 'hypnotic-like' suggestions for analgesia, imagery, relaxation, and modification of children's expectations of fear, anxiety, or pain	Parent and nurses rated anxiety (not at all anxious to extremely anxious), pain (no pain to intense pain), behavioral distress (e.g., crying), and relaxed behaviors (e.g., playing, remaining calm). Self-reported pain, and strength and unpleasantness of pain (FACES). Children were interviewed extensively about the procedure (e.g., about their perceived ability to control their pain and about their pain coping strategies).	1. Reductions in anxiety, pain, and distress behaviors. 2. Reductions in anxiety and pain at 3-month, and 6-month follow-ups.
BMA (5)	N = 56, 3–13 years old; 56 L	Repeated measures counterbalanced	Multimodal, see Jay et al. (21) vs. diazepam vs. minimal treatment-attention control	OSBD. Self-reported Pain (scale 0–100). Pulse Rate. Blood Pressure.	1. Reductions in observer-rated distress, self-report of pain, and pulse rates in the behavior therapy condition as compared to the attention control condition. 2. Reductions represent 18% less behavioral distress, and 25% less self-reported pain in the behavioral treatment as compared to the attention control condition. 3. Reductions in diastolic blood pressure in the diazepam condition as compared to the attention control condition.

Table 1 *(Continued)*

Medical procedure/ authors	Sample	Research design	Intervention	Variables	Major results/significant findings
BMT & LP (22)	N = 72 parents of L or Lymph patients 3–12 years old	Repeated measures factorial	Stress inoculation (e.g., filmed modeling and education, self-statement training, muscle relaxation and imagery) vs. child focused intervention (accompanying child in a multimodal condition or multimodal and diazepam condition)	Observer-rated Parent Behavior (Parent Behavior Scale; PBS). State & Trait Anxiety (STAI). Pulse Rate. Blood Pressure. Self-reported Anxiety & Coping Difficulty. Self-statements (Self-Statement Inventory for Medical Procedures; SSIMP).	1. Lower state & trait anxiety, & higher positive self-statement scores were found for parents in the stress inoculation condition as compared to parents in the child-focused condition.
BMA & LP (20)	N = 83, 3.5–12 years old; 83 L or Lymph	Repeated measures factorial	Multimodal, see Jay et al. (21) vs. multimodal and diazepam	OSBD. Self-rated Pain and Fear (FACES 1–5). Pulse Rate.	1. Reductions in behavioral distress, pain ratings, and heart rate found for both groups. 2. Although not sig., reduction in behavioral distress was greater in the multimodal intervention vs. multimodal and diazepam.
LP (44)	N = 18, 4.9–14.1 years old; AL	Repeated measures factorial	Multimodal (adapted from Jay et al. (1987) e.g., relaxation training, and filmed modeling) vs. minimal treatment-attention control	OSBD. Self-reported Distress (FACES 1–5). Heart Rate. Self-rated Self-efficacy. Imagery Vividness (ICS).	1. Reductions in behavioral distress and heart rate significantly greater in the intervention group. 2. Increase in self-efficacy for the intervention group. Self-efficacy was the best predictor of therapeutic outcome. 3. The intervention group exhibited a higher level of arousal (e.g., self-reported distress) during preparation and greater corrective changes (decreases in reactivity) to emotional imagery.
VP (45)	N = 3, 11–13 years old; 3 Lymph or Osteosarcoma	Baseline post-test	Multimodal (e.g., muscle relaxation, positive coping statements and positive re-enforcement)	OSBD. Parent-rated child's distress. Medical personnel-rated child's distress. Self-reported distress (scale 1–7).	1. 46%–68% reduction in observer rated distress. 2. 9%–22% reduction in medical personnel rated distress. 3. 0%–67% reduction in self-rated distress.
VP (8)	N = 23, 3–9 years old; 1 Neurobl, 13 L, 5 Embryonic rhabdomyosarcoma 1 Wilm's tumor, 1 Congenital immune disorder, 1 Eosinogranuloma	Repeated measures factorial	Multimodal involves both the child and the parent (e.g. distraction, paced breathing, and reinforcement for the child, and instruction in behavioral coaching for the parents) vs. attention control	Observer-rated procedural distress (Modified PBRS). Self-reported pain and fear (FACES). Parents' self-report of their anxiety and their child's pain. Nurses report of needle insertion difficulty, his/her own distress, and the child's distress (5-point scales).	1. Decreased observed child's distress, parents' rating of child's pain, and parents' own anxiety only in the intervention group. 2. Intervention was associated with reductions of physical restraint.

Table 1 *(Continued)*

Medical procedure/ authors	Sample	Research design	Intervention	Variables	Major results/significant findings
VP (7)	N = 35, 3–8 years old; 19 AL, 5 Neurobl, 2 Wilm's tumor, 2 Glioma, 2 Kostman's syndrome, 1 Embryonic Rhabdomyosarcoma, 1 HD, 2 Wiscott Aldrich syndrome, 1 Hepatoblastoma	Repeated measures factorial	Multimodal, see Manne, et al. (8) and IV nurses coaching of parents to coach the child vs. multimodal without nurses coaching	Observer-rated child's distress (e.g., pain or fear, procedure noncompliance), child's coping (e.g., nonprocedure-related activity), and parents' coping (scale developed by authors based in part on CAMPIS). Child's use of intervention procedure. Parents' coaching behaviors and parents' praise. Nurses coaching of parent, coaching of child, and praise.	1. Most parents and children used the intervention, and intervention use was associated with less child crying. 2. Specific directions by parents predicted the child's use of the intervention more strongly than global encouragement. 3. Nurses in the no coach condition were instructed to not coach parents, but parents in the no nurse coaching condition were coached by the nurses. 4. Nurses in both conditions were instructed not to coach children directly, but most did. 5. Children who were older and less distressed during procedure preparation were more likely to accept the intervention.
Chemotherapy (17)	N = 8 (three additional participants rejected hypnosis and one participant did not display chemotherapy-related symptoms), 10–20 years old; 4 HD, 2 ANLL, 1 Neurobl, 1 Ependymoma, 1 Astrocytoma, 1 Ovarian carcinoma, 1 Brain stem astrocytoma, and 1 Osteogenic sarcoma	Baseline post-test	Hypnosis (e.g., symptom-specific suggestions during imagery for 'notice the cool, clean air and taste the snow', and post-hypnotic suggestions for relaxation and reentering a hypnotic state)	Self-reported frequency, duration, and intensity of emesis episode (scale 1–10). Trait anxiety (STAI). Self-esteem (RSES). HLOC, II. Observer-rated (parents and nurses) frequency, duration, and intensity of emesis episode (scale 1–10).	1. Reductions in self-reported frequency on emesis ranging from 19% to 100%. 2. Duration of emesis was reduced in six of the eight participants. 3. Reduction in trait anxiety six months post-intervention. 4. Four of the five participants who had taken an antiemetic (chlorpromazine) discontinued its use.
Chemotherapy (62)	N = 19, 6–17 years old; 11 L, 3 Lymph, 5 Bone Tumors	Repeated Measures Factorial	Hypnosis (e.g., imagery, and post-hypnotic suggestion to have a good appetite) vs. supportive counseling (e.g., distraction, deep breathing, and instruction to avoid thinking about his/her symptoms)	Self-reported nausea, vomiting, and extent of bother caused by these symptoms (scale of 0–10). Parent-rated child's nausea, vomiting, and bother (scale 0–10). Hypnotizability (SHCSC).	1. Reductions in nausea, vomiting, and bother in both groups. No differences between intervention groups. 2. Hypnotizability was not related to symptom reduction in the hypnosis group.
Chemotherapy (63)	N = 8, 10–17 years old; 5 L, 1 Lymph, 2 Bone tumors	Baseline post-test	Hypnosis, distraction (e.g., playing games), relaxation, reassurance and information	Self-reported nausea, vomiting, and extent of bother and disruption of activities caused by these symptoms (scale of 0–10). Parent-rated child's nausea, vomiting, bother, and disruption of actives (scale 0–10).	1. Reductions in nausea, vomiting, bother, and disruption of activities.

Table 1 *(Continued)*

Medical procedure/ authors	Sample	Research design	Intervention	Variables	Major results/significant findings
Chemotherapy (18)	N = 12, 10–18 years old; 8 Sarcomas, 1 Testicular Seminoma, 1 Neurobl, 2 ALL	Repeated measures factorial	Hypnosis (e.g., imagery, fantasy, suggestions for safety, feeling thirst) vs. standard procedure control group (e.g., comfort, deep breathing, and distraction)	Self-reported nausea and vomiting (e.g., severity 0–100). Nurse-rated nausea and vomiting (e.g., duration amount of vomiting). Psychophysical scaling of child's severity and intensity of nausea (adapted PPP). Oral intake.	1. Reduction in frequency, amount, severity and duration of vomiting in the hypnosis group. 2. Children in the hypnosis group reported being 'less bothered' by chemotherapy. 3. Children in the hypnosis group tended ($p = 0.071$) to have greater oral intake 24 h post-infusion.
Chemotherapy (51)	N = 3, 11–17 years old; 3 ALL	Combined multiple-baseline & ABAB withdrawal	Distraction (i.e. played video games)	Self-reported anticipatory distress (24-h symptom checklist e.g., bit nails, insomnia). Self-reported and observer-rated distress due to side effects (e.g., distress, scale 0–4 due to dizziness, nausea). State anxiety (STAI). Observer-rated distress (modified PBRS).	1. Reductions in anticipatory symptoms and state anxiety with video game use. The effect was replicated on the withdrawal and reintroduction of video game use. 2. Reductions in observer-rated distress with video game use. The effect was replicated on the withdrawal and reintroduction of video game use. 3. The introduction and withdrawal of video games produced changes (reductions and exacerbations) in postchemotherapy side effects.
Chemotherapy (6)	Study 1: N = 26, 9–20 years old; 7 L, 6 Lymph, 11 Sarcoma, 1 Teratoma, 1 Brain Tumor	Study 1: Repeated measures factorial	Distraction (played video games) vs. control (no attempts to limit or change children's behavior)	Study 1:Self-reported nausea (no nausea to nausea as bad as it could be). Observer-rated nausea-related behaviors.	Study 1: 1. Reductions in nausea for the intervention group. 69% of the children who played video games reported a sizeable decrease in nausea vs. 23% of the children in the control group reported a similar decrease.
	Study 2: N = 15 of initial 26, 9–18 years old; 6 L, 4 Lymph, 1 Brain Tumor, 4 Sarcoma	Study 2: Combined ABAB withdrawal and repeated measures		Study 2:Self-reported nausea (same format as Study 1). Self-reported anxiety (no anxiety to anxiety as bad as it could be). Pulse rate. Blood pressure.	Study 2: 1. The introduction and withdrawal of the opportunity to play video games produced changes (reduction and exacerbation, respectively) in nausea. 2. In one instance (of nine comparisons) a physiological measure changed significantly, video game playing was associated with an increase in physiological arousal (i.e. increase in systolic blood pressure). 3. Contrast groups (based on the use of antiemetics) indicated that the group receiving antiemetics tended to rate their nausea as more severe and to report greater changes in nausea with the withdrawal and introduction of video games.

Table 1 *(Continued)*

Medical procedure/ authors	Sample	Research design	Intervention	Variables	Major results/significant findings
Chemotherapy (16)	N = 54, 5–17 years old; 20 L, 34 Solid Tumor	Repeated measures factorial	Hypnosis (e.g., fantasy, suggestions for feeling good, security, feeling hungry and wanting to socialize) vs. active cognitive distraction/ relaxation (e.g. counting dots on a father's tie, deep breathing), vs. equal amount of therapist attention (control group)	Self-reported anticipatory nausea and vomiting (yes or no). Self-reported and parent-reported postchemotherapy side effects (e.g., severity in terms of duration of nausea and vomiting on a scale from 0–10). Distress (indicated by how much chemotherapy bothered the child). Functional dysfunction (e.g., days of disruption of school and social activities).	1. Shorter duration of nausea in both intervention groups vs. the control group. 2. Shorter duration of vomiting in the hypnosis vs. control group. 3. In general, side effects for the hypnosis group improved over time, for the active cognitive distraction/ relaxation group side effects improved slightly or stayed the same, and for the control group they got worse. 4. Functional dysfunction (e.g., in school, social, eating and sleeping) was determined by emetic potential of chemotherapy and total symptom score was predicted by emetic potential and prophylactic antiemetics.
Chemotherapy (15)	N = 20, 6–18 years old; 5 L, 8 HL, 7 Solid Tumors	Repeated measures factorial	Hypnosis (e.g., imaginative involvement, suggestions for feeling safe and well, for turning off the vomiting-control center in the brain) and p.r.n. antiemetics vs. equal amount of therapist attention and standard antiemetic regimen (control group)	Self-reported nausea (five faces). Vomiting (frequency scale 0–9). Practice of hypnosis (for the intervention group). Antiemetic medication use (from medical records).	1. The hypnosis group used less p.r.n. medication. 2. At 1 to 2 months post-diagnosis, the hypnosis group experienced less anticipatory nausea, but no significant differences were found at 4–6 months post-diagnosis.
Social Reintegration (55)	N = 64, 5–13 years old; 36 ALL, 7 HD, 2 NHL, 3 Wilm's tumor, 3 Neurobl, 4 Rhabdomyosarcoma, 1 Osteogenic-sarcoma, 1 Ewing's sarcoma, 2 Brain tumor, 5 Other	Repeated measures factorial	Multimodal behavioral (e.g., modeling and cue-controlled relaxation) and standard intervention vs. standard intervention only	Self-reported depression (CDI), anxiety (STAIC), general self-esteem (SPPC), and perceived social support (SSSC). Parent-reported behavioral and emotional problems and social competence (CBCL).	1. At 9 months post-intervention the behavioral intervention group displayed fewer behavioral problems, experienced increased school competence, and reported greater social and emotional support from classmates and teachers compared to pre-intervention. No such differences were found in the standard intervention group.

Abbreviations: Disease: L = leukemia, AL = acute leukemia, ALL = acute lymphocytic leukemia, AM = acute myelogenous leukemia, ANLL = acute non-lymphocytic leukemia, HD = Hodgkin's disease, Lymph = lymphoma, Neurobl = neuroblastoma, NHL = non-Hodgkin's lymphoma.
Procedures: BMA = bone marrow aspiration, LP = lumbar puncture, VP = venipuncture.
Measures: CAMPIS = Child–adult medical procedure interaction scale, CDI = Children's depression inventory, CBCL = Child behavior checklist, FACES = Faces scale, a set of face drawings, HLOC = Health locus of control scale, II = Illness impact, ICS = Imagery clarity scale, MPQ = McGill pain questionnaire, OSBD = Observation scale of behavioral distress, PBRS = Procedural behavior rating scale, PBRS-r = Procedural behavior rating scale-revised, PBS = parent behavior scale, SHCSC = Stanford hypnotic clinical scale of children, SSIMP = Self-Statement inventory for medical procedures, SSSC = Social support scale for children, SPPC = Self-perception profile for children, STAI = State-trait anxiety inventory, STAIC = State-trait anxiety inventory for children, RSES = Rosenberg self-esteem scale.

treatment effectiveness possible (e.g. comparing distraction through hypnosis as compared to distraction thorough focusing on objects in the room). Second, there has been an increased interest in making training in behavioral interventions available to family members and other healthcare providers in the hope of adding to the benefits of an intervention provided by trained professionals. Third, behavioral interventions are also being applied to new areas outside of symptom management, for example to facilitate school reintegration. In addition, recent work has involved the application of both behavioral interven-tions and cognitive remediation for neuropsychological (attention difficulties) deficits (56).

One of the main thrusts of future work may well be the application of behavioral theory and research in order to prevent problems. For example, how can chemotherapy be given so as to reduce the development of aversive side effects, such as food aversions? We do not mean to suggest that behavioral interventions are a panacea for all the challenges faced by pediatric oncology patients. Nor are we suggesting that behavioral interventions be used exclusively, but rather as adjunctive treatments to other biological and psychosocial interventions. Indeed, there are limits to the application of behavioral principles such as challenges to family adaptation. As noted by Ostroff & Steinglass (57), there are challenges experienced by most families of children with cancer such as the family's need to change and adjust to the different stages of the child's illness (e.g., from illness-focus during acute phase to post-treatment readjustment). These areas of potential difficulty faced by the families of children with cancer are outside the realm of behavioral interventions and may be more effectively treated by family therapy interventions designed specifically to address them (57). In addition, there are many factors (i.e. cultural influences) which may contribute to the patients' and their families adjustment, or lack thereof, which are also outside the realm of behavioral principles.

It is clear that behavioral researchers and clinicians have made a significant contribution to our understanding of patients' responses to cancer diagnosis, treatment, and rehabilitation and to the design of effective methods for reducing pediatric patients' distress. Indeed, the behavioral approach, with its focus on behavior rather than on psychodynamic constructs, has done much to depsychopathologize adjustment problems in cancer patients. Patients and their families are generally open to the use of behavioral intervention and to not associating it with stigma. In a very real sense it gives power to both the patient and the parents. It puts them in greater control. The strength of the work that has been conducted leads one to expect important advances in the future.

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