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The Effect of Therapeutic Music Interventions on the Behavior of Hospitalized Children in Isolation: Developing a Contextual Support Model of Music Therapy

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The purpose of this study was to provide preliminary data that support or negate a contextual support model of music therapy. The contextual support model of music therapy, based on Skinner and Wellborn's (1994) motivational theory of coping, argues that therapeutic music environments possess elements of structure, autonomy support, and involvement that lead children to become more actively engaged with their environment. This study examined three basic suppositions of the theory: (a) that music interventions create supportive environments, (b) that music interventions increase children's active engagement, and (c) that relationships exist between supportive environments and engaging behavior. Ten pediatric oncology patients restricted to an isolated environment participated in the study. Participants, serving as their own controls, experienced four different environmental conditions. Each condition was videotaped to facilitate collection of environmental and behavioral data. Statistical analyses of these data revealed: (a) that the music environment possessed a significantly higher frequency of environmental support elements than other activities typically experienced by hospitalized children, (b) that therapeutic music interventions elicited significantly more engaging behaviors from hospitalized children than other hospital activities, (c) that positive behavioral effects of music interventions were not maintained in hospital experiences that followed the music session, and (d) that environmental support elements

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were related to some positive behaviors but these behaviors were not consistent across environments.

An increasingly prominent topic in music therapy literature is the use of music in pediatric medical settings. Chetta's (1981) surgical research marked an upsurge in pediatric music therapy publications. Between 1981 and 1998 publications on pediatric music therapy included approximately 23 research studies, 15 descriptive articles, and 3 books (Froehlich, 1996; Loewy, 1997; Maranto, 1996, 1997; Pratt, 1997; Standley, 1992). Despite the growing research base, there is a need for empirical studies that investigate how music functions to facilitate coping in hospitalized children.

Pediatric music therapists frequently claim that music interventions effectively restore a sense of control in patients (Bailey, 1984; Barrickman, 1989; Bishop, Christenberry, Robb, & Rudenberg, 1996; Kallay, 1997; McDonnell, 1984; Pfaff, Smith, & Gowan, 1989). Clinicians also describe two additional constructs, autonomy and relatedness, as focal points of intervention (Aldridge, 1993; Bailey, 1984; Chetta, 1981; McDonnell, 1984; Robb, Nichols, Rutan, Bishop, & Parker, 1995). Despite frequent reference to these constructs, there is a dearth of research examining how music functions to facilitate control, autonomy, and relatedness. Clinical observation suggests that music creates a supportive environment that facilitates success, independence, and supportive interactions with others, and that these experiences promote coping in hospitalized children.

When designing a therapeutic music environment, clinicians must consider how children acquire new skills and the impact of stress on skill development. Children acquire and develop new skills by engaging actively with their environment. The need to engage and interact with the environment can be explained from a motivational perspective. Motivational theorists argue that humans are driven by fundamental psychological needs for competence, autonomy, and relatedness to others (Connell, 1990; Connell & Wellborn, 1991; Deci & Ryan, 1985; Harter, 1983; McClelland, 1951). Children demonstrate this drive as they seek to fulfill these psychological needs through mastery over the environment, independence, and the formation of secure and supportive relationships. In times of stress, children are driven to problem solve and develop

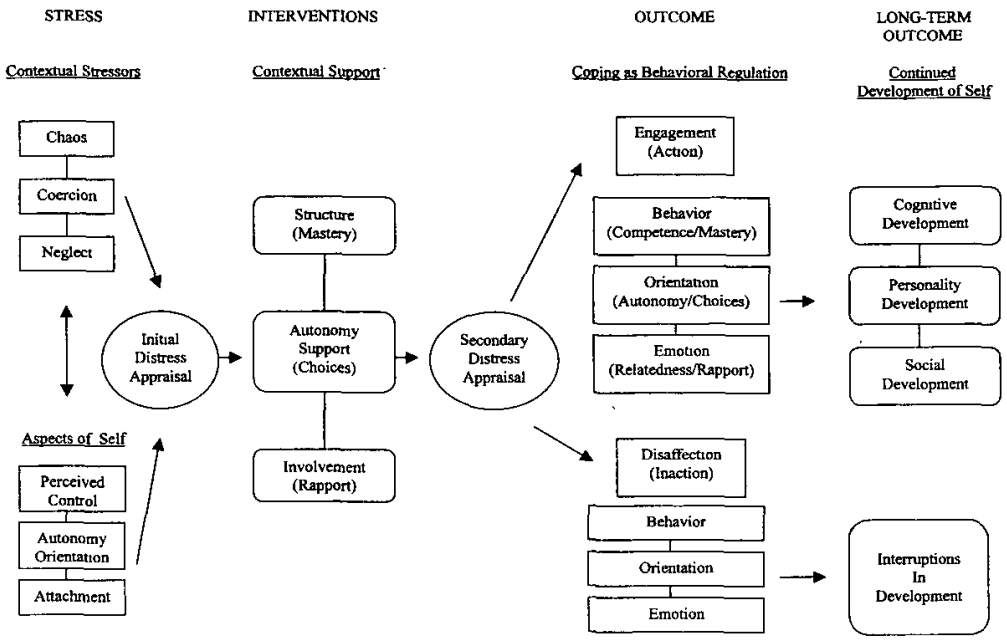

FIGURE 1.
The Contextual Support Model of Music Therapy.

new skills. Overwhelming and prolonged stress, however, may result in stagnation of development and withdrawal from the environment (Connell & Wellborn, 1991).

The motivational theory of coping, developed by Skinner and Wellborn (1994), serves as a theoretical framework for examining how children cope in stressful environments. Part of this theory examines the role of supportive environments in mitigating the effects of a stressful environment. Characteristics of environments identified as supportive are clustered into the following categories: structure, autonomy support, and involvement. Skinner and Wellborn also hypothesize that when children are provided with environmental support, their behavior will be positively affected. These positive behaviors include: active interaction with the environment, orientation toward activities in the environment, and positive affect. Based on these suppositions, the author presents arguments for a contextual support model of music therapy (see Figure 1). This theoretical model of music therapy provides a means for examining the therapeutic function of music, the behavioral outcomes of music interventions, and a theoretical basis for the ensuing study. Three elements of contextual support are identified in the model: structure, autonomy support, and involvement.

The first element of contextual support, structure, refers to environments that communicate clear expectations and consequences, provide optimal challenges, and provide positive feedback regarding competence. In contrast chaotic environments are inconsistent, unfamiliar, unpredictable, and fail to challenge individuals to act. Hospitalization can be a chaotic experience for children. Unfamiliarity of the hospital environment, changes in daily routines, unpredictability of medical tests and discharge dates, and increased dependence on others all contribute to stress appraisals. Structure serves to diminish the effects of chaotic environments by encouraging children to be active agents in their environment. The natural structure of music, prescribed session formats, and the therapist are referenced as elements of a music session that create safe, predictable environments where children can master their fears and experience success (Aldridge, 1993; Barrickman, 1989; Brodsky, 1989; Fagen, 1982; Gettel, 1985; Kallay, 1997; McDonnell, 1984; Micci, 1984; Pfaff et al., 1989; Sims & Burdett, 1996).

Autonomy support, the second contextual element, encourages freedom of expression by permitting children to make choices and decisions about activities. In comparison, coercive environments provide few choices and constrain or control children's activities. Freedom to make choices about daily activities, sleep and meal schedules, visitation, and medical treatment are often limited in hospital environments. Autonomy support serves to lessen the effects of coercive environments and encourages the development of intrinsic motivation, self-regulation, and connection between actions, personal goals, and values. Affording children opportunities to make choices and be independent are discussed in music therapy literature (Aldridge, 1993; Barrickman, 1989; Bishop et al., 1996; Kneisley, 1996; McDonnell, 1984). The flexibility of musical structures allow children creative independence through improvisation and song writing. Presentation of various musical instruments also afford children opportunities to make choices.

Involvement, the third contextual element, is defined as a person's expression of interest, enjoyment, and genuine acceptance of a child. The involved adult is emotionally available and attends to the needs and interests of the child (Connell & Wellborn, 1991; Skinner & Wellborn, 1994). Neglectful environments are characterized by the absence of supportive adults who are willing to invest time with the child. During hospitalization, parents may experi-

ence so much stress that they are unable to meet the emotional needs of their child. Visitation may also be limited due to employment or familial obligations. This leaves the child in need of emotional support that may or may not be available from medical personnel. Contextual involvement serves to mitigate the effects of a neglectful environment and builds a child's sense of security and self-worth (Connell & Wellborn, 1991). Live music involves the presence of another human. The music serves to create a supportive and familiar atmosphere that promotes interaction between the child, family members, medical staff, and therapist (Bailey, 1984; Bishop et al., 1996; Lane, 1996; Marley, 1984; McDonnell, 1984). The role of the music therapist is to support children and facilitate coping, therefore, therapists are able to devote all their attention to the child's emotional needs, acknowledging their feelings and supporting them during difficult procedures (Chetta, 1981; Robb et al., 1995).

Creating supportive environments is a key component of therapeutic music interventions. A contextual support model of music therapy contends that supportive music environments function to facilitate coping by encouraging active engagement and positive interpersonal relationships. For young children this has generally taken the form of active verses passive music interventions. Empirical research documents the effective use of participatory music interventions to elicit active and physical responses from hospitalized children (Aldridge, 1993; Marley, 1984, Osburn, 1997), decrease overt signs of anxiety and distress (Bailey, 1983; Chetta, 1981; Gettel, 1985; Hartley, 1989; Marley, 1984; Micci, 1984), improve immune function (Lane, 1991), increase verbal disclosure (Froehlich, 1984), and elevate mood (Bailey, 1983; Osburn, 1997).

Pediatric music therapists spend much of their time providing bedside and group interventions. The predominant goal of these interventions is to facilitate children's adjustment to the hospital environment. Currently, no music therapy research studies specify coping as a dependent variable. The profession also lacks objective information about how music functions in these settings.

Problematic to research is the objective measurement of coping outcomes. The motivational theory of coping solves this problem by examining coping as a function of behavioral regulation. The motivational coping model asserts that children respond to stressors in three ways: (a) underregulate their behavior, (b) overregu-

late their behavior, or (c) flexibly regulate their behavior. Flexibly regulated coping leads to engagement with the environment. Children who remain engaged with the environment generally cope with stress in an active, flexible, and positive manner. In contrast, children who become disaffected with their environment will react to stress in ways that are passive, rigid, and punitive. Engagement and disaffection are divided into three domains: behavior, orientation, and emotion (Connell & Wellborn, 1991; Skinner, 1995, Skinner & Wellborn, 1994). Operational definitions of behavior in these three domains allow for objective assessment of children's efforts to actively cope and facilitates empirical investigation of music therapy as a form of contextual support.

The purpose of this study was three-fold. First, the study documented and compared observable characteristics of hospital activities and music sessions. Second, the study documented and compared the behavioral responses of hospitalized children during normal hospital activities and music interventions. Third, results of the study serve to provide preliminary data that either support or negate the application of Skinner and Wellborn's Motivational Theory of Coping to music interventions. It is important to note that data from this study are not intended to address the validity of this theory, but rather to provide initial evidence that support or negate the need for further research.

Method

Participants

Ten pediatric oncology patients, ranging in age from 4 to 11 years, participated in this study. The researcher used two music intervention protocols to accommodate variations in development and musical preference. Eight patients participated in the music protocol for children ages four through seven years. Two patients participated in the music protocol for children ages eight through twelve years. All participants were patients on the hematology-oncology unit of a large Midwestern children's hospital and restricted to an isolated environment. Children who participated in this study were placed in isolation due to their neutropenic status (low white blood cell count). When patients are neutropenic they are more susceptible to infection, therefore, they are placed in a private room, the children are unable to leave their room, and additional pre-

cautions for infection control are specified for medical staff and visitors. Criteria for patient participation included: (a) participants must be between the ages of 4 and 12 years inclusive, (b) participants must be pediatric oncology patients restricted to an isolated environment, and (c) English must be the patient's primary language. The attending physician referred patients meeting criteria for the study to the researcher. Prior to participation in the study, patients and their parent(s) were informed of the study's purposes and interventions. If patients and their parent(s) agreed to participate, appropriate consent forms were reviewed and signed before their involvement in the study.

Design

A within subjects design was used to examine the content of three environmental conditions and patient responses to each condition. Participant responses were recorded during one, 1-hour session. Sessions followed an ABCA format that remained consistent for each session. The first and last condition (A), represents the control condition; (B) represents the reading condition; and (C) the music condition. Each session component had a duration of 15 minutes. Because one condition immediately followed the other, the researcher proceeded under the assumption that the music condition would most likely have carry over effects into the reading condition. The four conditions, therefore, were not randomly placed to control for order effects as expected carry over would result in approximately half of the data being deemed inappropriate for statistical analysis. The researcher taped the duration of each condition to facilitate collection of behavioral data.

Setting and Materials

A board-certified music therapist conducted all interventions in the participant's hospital room. Sessions were videotaped using an 8-mm video camera mounted on a tripod. Materials for the reading condition consisted of four commercially produced children's books with audio taped narration (Rabbit Ears Productions, Inc., 1988; Scieszka, 1989; The Walt Disney Co., 1990a, 1990b). Each recorded storybook had a duration of 10–15 minutes. A Sony CFS-W301 tape player was used to play the stories free field. Materials for the music condition included an Alvarez six string acoustic guitar, a Suzuki Omnichord OM-250m, a variety of hand held rhythm instruments,

and several visual aids including books and finger puppets. Before and after each session, the therapist sterilized all materials using "santi-wipes," a prepackaged sterilizing solution available at the hospital. The therapist also followed infection control protocols designated for each patient.

Measurements

Observational measures. The researcher videotaped control and treatment conditions to facilitate collection of behavioral data. A time sampling data collection method, with 10-second observe/5-second record intervals, was used to evaluate the frequency of environmental support elements in the control and treatment conditions, and to evaluate the frequency of participant's behaviors (see Tables 1 and 2). Eight environmental elements were measured in this study including the provision of verbal directions, activities that supported or required action, choices, positive verbal reinforcement, nonverbal reinforcement, activities that were responsive to changes initiated by children, positive adult initiated interaction, and focused attention from an adult. Operational definitions of each environmental element are provided in Table 3. Patient behaviors were measured using five categories of behavior: physical activity, focus of attention, choice making, following directions, and affective state. Operational definitions of each behavior category are provided in Table 4.

Using sample videotapes, two observers were trained in time-sampling procedures. Training continued until interobserver reliability reached a minimum criterion of .85. Reliability was computed using an *index of concordance* (sum of agreements ÷ sum of agreements + disagreements). To ensure consistency between both observers, interobserver reliability checks were conducted on 20% of all coded session material. Interobserver reliability measures were computed four times during the coding process; reliability never fell below .88. The researcher also conducted intraobserver reliability checks every 2 weeks to prevent the occurrence of observer drift. Intraobserver reliability never fell below .88.

The behaviors in each of the two coding forms are comprised of molecular behaviors (e.g., single observable behaviors). These molecular behaviors are organized into molar categories (e.g., an aggregate of molecular measures). The behaviors being observed are low inference and are not used to make conclusions about un-

TABLE 1

Environmental Support Coding Form

Participant's Initials: _____			Coder's Initials: _____				Probe #: _____				Activity During Probe: _____					
Tx Condition	Regular Activities I			Reading		Music				Regular Activites II						
I. Structure	0:10	0:15	0:25	0:30	0:40	0:45	0:55	**1:00**	0:10	0:15	0:25	0:30	0:40	0:45	0:55	**2:00**
(A.) Verbal direction		D		D		D		D		D		D		D		D
(B.) Activity supports/requires action		AS		AS		AS		AS		AS		AS		AS		AS
(C.) Other																
II. Autonomy Support																
(A.) Choices offered		Ch		Ch		Ch		Ch		Ch		Ch		Ch		Ch
(B.) + verbal reinforcement		VR		VR		VR		VR		VR		VR		VR		VR
(C.) Non-verbal reinforcement		NV		NV		NV		NV		NV		NV		NV		NV
(D.) Response to initiated change		R		R		R		R		R		R		R		R
(E.) Other																
III. Involvement																
(A.) Adult initiates + verbal/physical interaction		I		I		I		I		I		I		I		I
(B.) MTs attn. focused on child or shared activity		+		+		+		+		+		+		+		+
(C.) Other																

TABLE 2

Behavioral Response Coding Form

Participant's Initials: _____			Coder's Initials: _____				Probe #: _____				Activity During Probe: _____				
Tx Condition	Regular Activities I		Reading		Music				Regular Activites II						
I. Physical Act.	0:10	0:15	0:25	0:30	0:40	0:45	0:55	**1:00**	0:10	0:15	0:25	0:30	0:40	0:45	0:55	**2:00**
(A.) Active		A		A		A		A		A		A		A		A
(B.) Passive		P		P		P		P		P		P		P		P
(C.) None		N		N		N		N		N		N		N		N
II. Focus of Atten.																
(A.) Focused		F		F		F		F		F		F		F		F
(B.) Scanning		S		S		S		S		S		S		S		S
(C.) Space		SP		SP		SP		SP		SP		SP		SP		SP
(D.) Away		A		A		A		A		A		A		A		A
(E.) Asleep		SL		SL		SL		SL		SL		SL		SL		SL
III. Choice Making																
(A.) Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes
(B.) No		No		No		No		No		No		No		No		No
(C.) Apathetic		?		?		?		?		?		?		?		?
IV. Follows Direct.																
(A.) Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes
(B.) No		No		No		No		No		No		No		No		No
V. Affect																
(A.) Positive		+		+		+		+		+		+		+		+
(B.) Negative		–		–		–		–		–		–		–		–
(C.) Neutral		?		?		?		?		?		?		?		?

TABLE 3

Operational Definitions for Environmental Support Coding Form

Structure: refers to environments that clearly communicate expectations and consequences, provide optimal challenges, and provide positive feedback regarding competence. Observable aspects of structured environments include:

a) An adult gives the child a verbal directive.
b) Ongoing activity supports/requires action from the child.
c) Other: An open line is provided to allow observers to document other behaviors related to this category. These open lines assist in modifying the observational form during initial reliability checks.

Autonomy Support: refers to actiona or events that encourage freedom of expression by permitting children to make choices and decisions about activities. Observable aspects of autonomy support include:

a) An adult provides the child with a choice between two objects/events.
b) An adult provides positive verbal reinforcement concerning the child's independence and/or performance (e.g., reinforces child when he/she initiates an action or question).
c) Non-verbal reinforcement (e.g., head nods, eye brightening, smiles) related to the child's independence (e.g., initiating actions/questions).
d) Adult or activity responds to changes/decisions/actions initiated by the child.
e) Other: An open line is provided to allow observers to document other behaviors related to this category. These open lines assist in modifying the observational form during initial reliability checks.

Involvement: refers to an adult's expression of interest, enjoyment, and genuine acceptance of the child. Observable aspects of involvement include:

a) An adult initiates a positive verbal or physical interaction.
b) Attention of an adult is focused on the child or a shared activity.
c) Other: An open line is provided to allow observers to document other behaviors related to this category. These open lines assist in modifying the observational form during initial reliability checks.

observable constructs. Validity of low inference categories, as is the case in this study, was established by considering the extent to which each behavioral component of a category and their aggregate are theoretically consistent with the conceptualization of the category. This information can be derived from the theoretical and empirical literature (Pellegrini, 1996). For the present study, the behaviors coded were extracted from Skinner and Wellborn's Theory of Coping (1994) and literature related to the formulation of their theory (Connell & Wellborn, 1991; Skinner, 1995; Skinner & Wellborn, 1994). An observational coding system used in a landmark study by Cataldo, Bessman, Parker, Reid-Pearson, and Rogers (1979)

TABLE 4

Operational Definitions for the Behavioral Response Coding Form

Category 1: Physical Activity

Active: The child engages in a play activity during the interval (e.g., painting, puzzles, blocks, dolls, cars, playing instrument, singing, turns pages of a book). The participation must involve active manipulation of materials or active use of self (e.g., moving body to music, finger plays, etc.).

Passive: Child actively attends to what another person is doing (e.g., child watches as the adult moves cars, plays instruments, reads book, or sings) or is involved in the activity through verbal decisions (e.g., child chooses a color or action for the adult to use/execute). This also includes activities that require no physical component (e.g., watching television, listening to a tape).

None: The child does not engage in active or passive play activities during the interval.

Category 2: Focus of Attention

Focused: Child's eyes (attention) are fixated on the activity that he/she is engaged in or that is presented by another adult.

Scanning: The child's eyes are moving about and do not fixate on any object or person.

Space: The child does not appear to be looking at any object or person, but eyes are open.

Away: Child's eyes and/or body are turned away from any activity that is presented by another person; or any activity or event that is the central in the child's environment.

Asleep: Child is asleep or resting with eyes closed.

Category 3: Choice Making

Yes: When presented with two objects or verbal options the child either physically or verbally indicates a choice.

No: When presented with two objects or verbal options the child does not verbally or physically indicate a choice.

Apathetic: Child requires encouragement to make a choice or decision.

Category 4: Follows Directions

Yes: When given a verbal directive the child verbally or physically acts on the direction.

No: Child does not verbally or physically act on a direction.

Category 5: Affective State

Positive: The child smiles or laughs during the interval.

Negative: The child cries, whines, or raises voice during the interval; or the child verbalizes fear or unhappiness (VF), or pain (VP).

Neutral: The child exhibits no overt behavioral responses to indicate an affective state during the interval.

reflects the theoretical orientation of Skinner and Wellborn and was adapted for use in this study.

Construct validity of this coding system was not a concern since this study did not purport to measure unobservable constructs (Pellegrini, 1996; Suen & Ary, 1989). In reference to content validity, low inference molecular measures are content valid by definition. The aggregate of low inference measures into categories, however, must be determined by the extent to which theory or experts consider them a category (Pellegrini, 1996). The content validity of these two coding forms was based on theoretical and empirical research literature (Cataldo et al., 1979; Connell & Wellborn, 1991; Froehlich, 1996; Nolan, 1997; Skinner, 1995; Skinner & Wellborn, 1994; Worchel, Copeland, & Barker, 1987). Criterion validity for low inference molecular measures is a measure of observer accuracy (Suen & Ary, 1989). Reliability, therefore, served to ensure criterion validity for these observational coding forms. Criterion validity was based on the degree of agreement between observers when making independent observations of the same behavior (Pellegrini, 1996; Suen & Ary, 1989).

The Affective Face Scale. The Affective Face Scale, developed by McGrath, de Veber, and Hearn (1985), is a 9-face interval scale that was evaluated using cross-modality matching procedures. Mean affective magnitude for each face was determined from children's direct scaling using brightness matching and visual analog scales. Obtained numerical values were transformed to a scale where the maximum negative affective value equals one and the maximum positive value equals zero. The Affective Face Scale was used as a self-report measure of affect. The researcher used this scale in conjunction with the observational coding forms. Children may experience anxiety or distress that is not behaviorally evident. Using multiple forms of data collection allowed for a multidimensional assessment approach that considers both observable behavior and verbal reports from children (Siegel, 1988).

Procedures

Pre-session control condition. Upon arrival at the participant's room, the investigator showed the child the Affective Face Scale and administered the scale following standardized procedures (McGrath,

de Veber, & Hern, 1985). Following initial administration of the Affective Face Scale, the video camera was set up and the child informed that the researcher would return in approximately 15 minutes. The control condition consisted of the child being videotaped while engaged in activities and events natural to the hospital environment. Control condition activities included watching television, playing Nintendo™, playing with toys, arts and crafts activities, or brief medical procedures (e.g., blood pressure, temperature, checking medications). With the exception of one participant, a Certified Child Life Specialist did not facilitate these activities. After 15 minutes had elapsed, the researcher returned to the participant's room and had the child indicate his/her mood using the Affective Face Scale. The researcher then continued with the reading condition.

Reading condition. During this condition, the investigator offered the child a choice of two taped storybooks. Upon selection of a book, the child and investigator listened to the tape and viewed the book. When the story finished, the children indicated their mood on the Affective Face Scale. The music condition immediately followed the reading condition.

Music condition. The investigator engaged the children in a variety of developmentally appropriate music activities (see Tables 5 and 6). Opportunities for mastery, choice, and social interaction were embedded within the session activities. Activities provided in the music condition are subdivided into four categories for children ages 4 through 7: (a) greeting, (b) instrumental, (c) action songs, and (d) closing; and three categories for children ages 8 through 12: (a) greeting, (b) instrumental, and (c) closing. Complete protocols for session structure are referenced in Robb (1999). The researcher included multiple activities for each category to facilitate flexibility within the music condition. Once the music portion of the session was complete, participants indicated their mood on the Affective Face Scale.

Postsession control condition. After the music session, the investigator would leave the room. A video camera recorded the child's activities and interactions. Activities and interactions recorded in the postsession control condition were the same as those described for the presession control condition. At the conclusion of the 15-minute control condition, the investigator returned and asked the child to indicate his/her mood on the Affective Face Scale.

TABLE 5

Music Therapy Session Protocol (Ages 4 through 7)

Intervention Category	Music Selection	Procedure
I. Greeting	"Willaby Wallaby" *Note: The lyric "monkey" was substituted for elephant in this song.*	1. The MT-BC presented a stuffed animal and informed the child that the monkey likes to sit on people. The child was asked to have the monkey sit on different people in the room as they sang the "Willaby Wallaby" song. 2. The MT-BC started the music and sang about each person in the room. 3. Lyrics and music were improvised during the second verse to match and reflect the actions and contributions initiated by the child (e.g., moving the animal a certain way; facial expressions; verbal comments). These contributions were incorporated into the song and music adjusted stylistically to support the child's verbal and nonverbal communication.
II. Instrumental Interventions	"I am a Great Musician" "Momma Don't Allow" *Note: Vocal and instrumental improvisation followed each verse of the song.*	1. The MT-BC presented, labeled, and demonstrated several instruments. 2. The child explored instruments and selected several to play during the song. 3. Through the lyrics, each child was encouraged to make stylistic decisions about the music (e.g., fast/slow; loud/soft). 4. Vocal and instrumental improvisation followed each verse. During the improvisation the MT-BC matched the child's playing style, actions, and verbal directives. Lyrics were adapted to encourage and reflect the contributions of each child.

TABLE 5

Continued

Intervention Category	Music Selection	Procedure
III. Action Songs	"Five Little Monkeys"	1. The MT-BC presents two action songs activities; the child chooses one.
	Note: This song used five monkey finger puppets, an alligator hand puppet, and sound effects instruments.	2. The child selects materials and sound effects instruments they would like to use. Child may also select items for other people in the room to use.
	"Five Little Speckled Frogs"	3. The MT-BC guides the child through the action song.
	Note: This song used five plastic frogs, a plastic board ("log"). and a hand drum ("pond").	4. The familiar songs are used to motivate and guide the child's participation.
		5. Once the child is familiar with the actions and music, the activity is repeated with the MT-BC soliciting creative ideas from the child.
IV. Closing Intervention	"It's Time to Go" *(original composition)*	1. The MT-BC presented the child with pictures of a car, boat, and train. The child was asked to imitate transportation sounds using a microphone & then select a mode of transportation for the MT-BC's departure.
	Pictures of a boat, train, and car were used to facilitate choice making in this intervention.	2. The MT-BC sang the song with the child and prompted to the child to make transportation sounds at the appropriate time during the song (microphone was used to encourage vocalizations/singing).
		3. The song progressed through all modes of transportation if requested by the child.
		4. The session and song ended when the last mode of transportation was selected.

TABLE 6

Music Therapy Session Protocol (ages 8–12)

Intervention Category	Music Selection	Procedure
I. Opening Intervention	"The Name Game"	1. The MT-BC gave the child, as well as siblings/parents if present, a card and a marker. The MT-BC asked the child to write his/her name vertically on the paper. 2. The child was then asked to choose words that began with each letter of their name that describe them (e.g., favorite hobby, food, aspect of their personality, etc.). The MT-BC also completed a name card. 3. After the child and MT-BC shared their name card with each other, the MT-BC improvised a song about the child and his/her name using the "Name Game" song. 4. The child was then asked to sing along and assist the MT-BC with the omnichord (strumming) on the second playing of the "Name Game" song.
II. Omnichord/Song Selection	12 Musical Selections were offered including selections from pop, Disney, folk, and country genres.	1. The child received a brief introduction to the omnichord (strum pad, accompaniment patterns, and chord buttons). 2. The MT-BC presented the child with a collection of songs. The child selected a song they wanted to learn to play. 3. The MT-BC used modeling and direct verbal instruction to assist the child in learning their song. 4. The child and MT-BC then sang through the song together. The MT-BC added guitar to the Omnichord if the child was musically secure. Otherwise, the MT-BC and child played together on the Omnichord.

Results

Environmental Support Data Analysis

Independent observers recorded multiple aspects of the environment using an environmental support coding form (see Table 1). Analysis of these observational data focused on aspects of the environment identified as desirable according to Skinner and Wellborn's (1994) Motivational Theory of Coping. Desired environmental aspects analyzed in this study included provision of verbal directions, activities that supported or required action, choices, positive verbal reinforcement, nonverbal reinforcement, activities that were responsive to changes initiated by children, positive adult initiated interaction, and focused attention from an adult.

Observational recording procedures produced 40 scores for each aspect of environment. The researcher computed mean scores for each environmental aspect and condition (see Table 7). It is important to note that the statistical analysis did not include nonverbal reinforcement data. Nonverbal reinforcement occurred during sessions; however, during the coding process independent observers determined that nonverbal reinforcement could not be reliably coded due to positioning of the video camera.

Visual inspection of mean scores for each condition revealed higher frequencies for all categories of environmental support during the music condition. Mean frequency scores for two categories, activity supported or required action and focused attention from an adult, were similar between the reading (M = 35.0; 34.1) and music (M = 35.5; 39.5) conditions.

Repeated measures ANOVA analyzed data from the environmental support coding form. Results of the repeated measures ANOVA indicated significant main effects for environment, $F(6, 54) = 98.65$, $p < .001$, and condition, $F(3, 27) = 30.70$, $p < .001$. The analysis also revealed a significant interaction of condition with aspects of environment, $F(18, 162) = 12.08$, $p < .001$, indicating that condition had a differential effect on different aspects of the environment (see Figure 2).

Behavioral Data Analysis

Independent observers recorded multiple behavioral responses using a behavioral response coding form (see Table 2). Children's active engagement with the environment was the desired behav-

TABLE 7

Mean Environmental Support Scores for Each Condition

Aspect of environment/condition	*M*	*SD*	*N*
Verbal directions/control	1.50	2.01	10
Verbal directions/reading	0.40	0.52	10
Verbal directions/music	4.40	3.86	10
Verbal directions/return to control	0.60	0.97	10
Support/require action/control	15.40	16.33	10
Support/require action/reading	35.00	6.27	10
Support/require action/music	35.50	4.33	10
Support/require action/return to control	12.70	15.35	10
Choices offered/control	0.40	1.26	10
Choices offered/reading	0.50	0.53	10
Choices offered/music	4.80	2.70	10
Choices offered/return to control	0.50	0.71	10
Verbal reinforcement/control	0.30	0.48	10
Verbal reinforcement/reading	0.80	1.32	10
Verbal reinforcement/music	3.30	2.31	10
Verbal reinforcement/return to control	0.70	1.06	10
Responsive to change/control	0.10	0.32	10
Responsive to change/reading	0.10	0.32	10
Responsive to change/music	3.50	3.87	10
Responsive to change/return to control	0.20	0.63	10
Initiated interaction/control	16.70	11.67	10
Initiated interaction/reading	8.90	6.45	10
Initiated interaction/music	36.50	3.75	10
Initiated interaction/return to control	13.30	10.24	10
Atten. focused on child/control	13.60	13.39	10
Atten. focused on child/reading	34.10	5.74	10
Atten. focused on child/music	39.50	0.85	10
Atten. focused on child/return to control	12.20	13.96	10

ioral outcome for this study. Analysis of these observational data, therefore, was limited to behavioral responses indicative of engagement with the environment. Engaging behaviors analyzed included active physical responses, focused attention, making choices, following directions, and positive affect. Observational recording procedures produced 40 scores for each behavior category. The researcher computed mean behavior scores for each behavior category and condition. Mean behavior scores are summarized in Table 8.

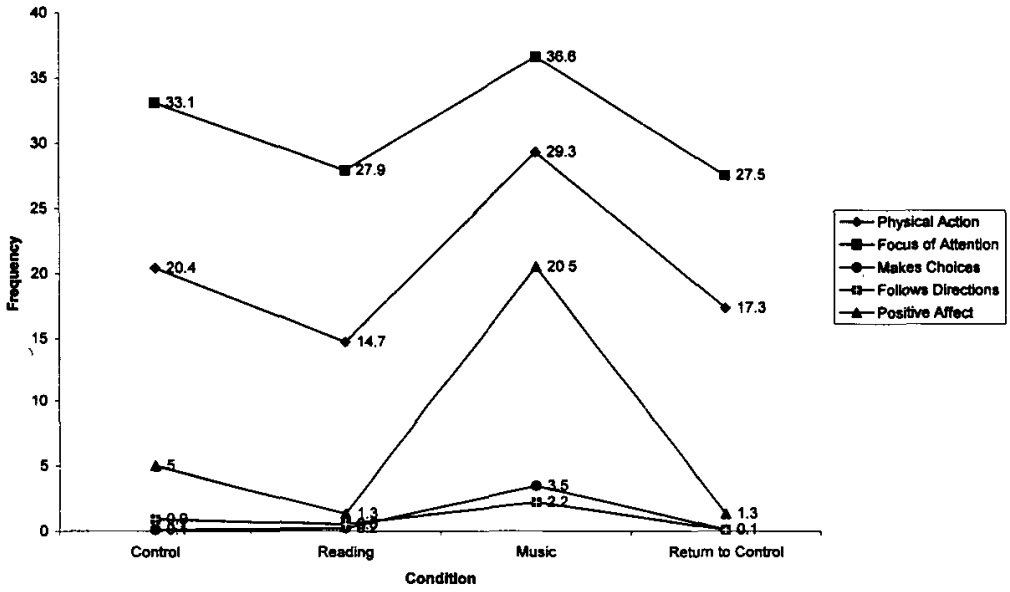

FIGURE 2.
Mean scores for behavior.

Examination of mean scores revealed higher scores for every behavior during the music condition. Graphic analysis of these data showed a decrease in all behaviors except choice making during the reading condition, followed by an increase in all behaviors dur-

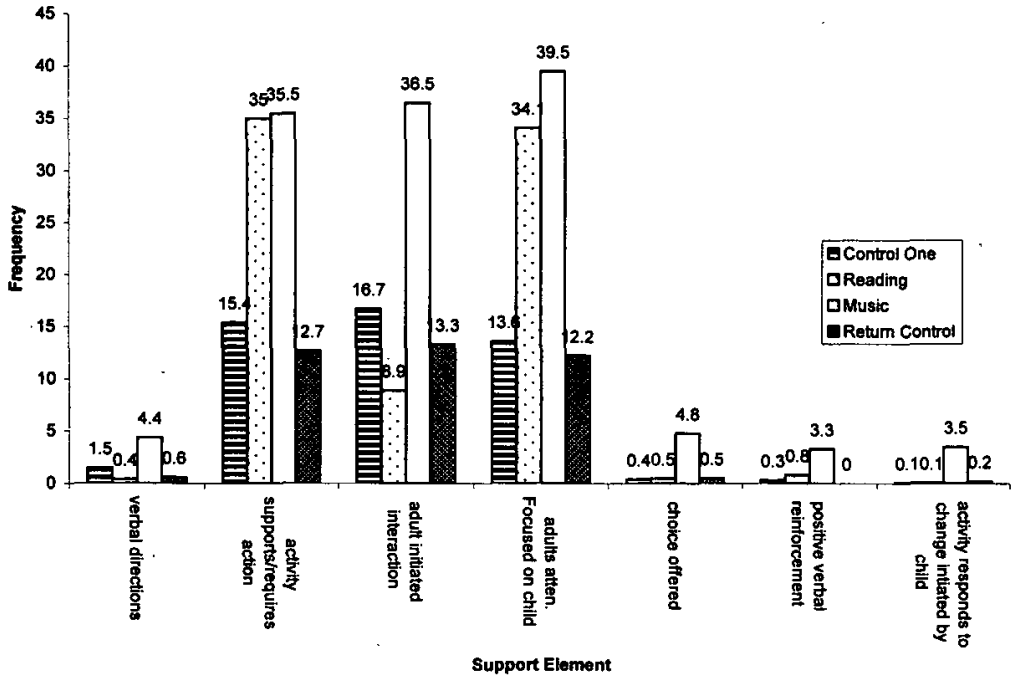

FIGURE 3.
Mean scores for environmental support.

TABLE 8

Mean Behavior Scores for Each Condition

Behavior/condition	*M*	*SD*	*N*
Physical activity/control	20.40	12.05	10
Physical activity/reading	14.70	12.03	10
Physical activity/music	29.30	11.67	10
Physical activity/return to control	17.30	13.68	10
Focus of attention/control	33.10	4.61	10
Focus of attention/reading	27.90	9.68	10
Focus of attention/music	36.60	2.76	10
Focus of attention/return to control	27.50	10.53	10
Making choices/control	0.10	0.32	10
Making choices/reading	0.20	0.42	10
Making choices/music	3.50	2.07	10
Making choices/return to control	0.10	0.32	10
Follows directions/control	0.90	1.45	10
Follows directions/reading	0.50	0.71	10
Follows directions/music	2.20	3.05	10
Follows directions/return to control	0.10	0.32	10
Positive affect/control	5.00	7.50	10
Positive affect/reading	1.30	1.70	10
Positive affect/music	20.50	12.84	10
Positive affect/return to control	1.30	2.58	10

ing the music condition. Further analysis revealed that behaviors returned to preintervention levels or lower during the return to control condition (see Figure 3).

A repeated measures analysis of variance analyzed data from the behavioral response coding form. Results of statistical analysis indicated significant main effects for behavior, $F(4,36) = 94.08$, $p < .001$, and condition, $F(3, 27) = 13.68$, $p < .001$. The analysis also revealed a significant interaction of condition with type of behavior, $F(12, 108) = 3.20$, $p = .001$, indicating that condition had a different effect on different behaviors.

Affective Face Scale Data Analysis

Scores on the Affective Face Scale served as a self-report measure for mood. Mean scores were analyzed using a repeated measures ANOVA with a priori contrasts to determine whether there was a significant interaction between the condition and the affective measure. This statistical test revealed no significant interaction, $F(21, 3) = 1.13$,

TABLE 9

Pearson Product Moment Correlation Coefficients between Mean Scores for Behavior and Environment

Condition	Correlation between behavior and environment
Control	
Pearson Correlation	.898
Sig. (2-tailed)	.000***
N	10
Reading	
Pearson Correlation	.604
Sig. (2-tailed)	.064
N	10
Music	
Pearson Correlation	.852
Sig. (2-tailed)	.002*
N	10
Return to Control	
Pearson Correlation	.087
Sig. (2-tailed)	.811
N	10

*Correlation is significant at the 0.01 level. **Correlation is significant at the 0.001 level.

$p = .36$. The ANOVA a priori contrasts tested for differences in mean affective scores after the music condition and scores that followed the other three conditions. This analysis revealed no significant differences between music and the other conditions ($t(9) = .83$, $p = .43$). Similarly, the second a priori contrast revealed no significant differences in the affective measure when comparing scores for the first and last control condition ($t(9) = -1.21$, $p = .27$). These results indicated no significant difference in mood scores across all conditions.

Relationships Between Combined Environment and Behavior Scores

To determine the overall relationship between environmental support and behavior, one mean environment score and one mean behavior score was computed for participants in each condition. Using these global mean scores, the researcher computed Pearson Product Moment Correlation Coefficients between environment and behavior for each condition (see Table 9). This statistical analysis answered research question 4: Is there a relationship between environmental support elements and children's behavior?

Correlation coefficients revealed significant relationships between environment and behavior scores for the control ($r = .989$, $p < .001$) and music ($r = .852$, $p = .002$) conditions. Significant correlations were not found for the reading ($r = .604$) and return to control ($r = .087$) conditions.

Discussion

The contextual support model of music therapy, based on Skinner and Wellborn's (1994) motivational theory of coping, argues that therapeutic music environments possess elements of structure, autonomy support, and involvement that lead children to become more actively engaged with their environment. This study provides preliminary data that negate or support these arguments. Preliminary examination of this theoretical model required the researcher to first address the basic suppositions of the theory: (a) that music interventions create supportive environments, (b) that music interventions increase children's active engagement with the environment, and (c) that relationships exist between supportive environments and engaging behavior.

Environmental and Behavioral Outcomes

Results of this study support the first assertion that therapeutic music interventions possess more environmental support elements than other activities and events experienced by children in an isolated hospital environment. Visual inspection of mean scores revealed that all environmental support elements were highest in the music condition. When compared with other hospitalized children's experiences, the music condition proved to possess a significantly higher frequency of the following environmental support elements: verbal directions, choices, positive verbal reinforcement, activities that were responsive to changes initiated by children, and positive adult initiated interactions. Music was also higher than the two control conditions for two elements, activities that supported or required action and focused attention from an adult. The music condition did not differ significantly from the reading condition on these two variables.

Early research concluded that many children experienced stress while hospitalized and that aspects of the environment contributed to children's distress. These early studies led to pediatric health care reform, resulting in dramatic changes in health care services

for children (Adams & Bergman, 1965; Bossert, 1994; Illingworth, 1958; Prugh, Staub, Sands, Kirschbaum, & Lenihan, 1953; Siegel & Hudson, 1992). Although clinicians have long asserted that music interventions create a supportive environment within hospital settings, there is a lack of empirical research to support these claims. This study documents the effectiveness of music interventions to positively alter the hospital environment, and provides the music therapy clinician empirical evidence to support arguments regarding the efficacy of music to alter stressful environments.

The contextual support model of music therapy also asserts that music interventions increase children's active engagement with the environment. Scores from the behavioral observation data support this second assertion. A comparison of behavioral scores from the music condition, with scores from control and reading conditions revealed significant differences for the following behaviors: physical activity, focus of attention, making choices, and positive affect. The researcher did not find a significant difference for the behavior following directions.

Several pediatric music therapy studies have systematically investigated the outcomes of active music therapy. These studies documented improved mood states (Bailey, 1983; Osburn, 1997), increased verbalizations about illness (Froehlich, 1984), improved immune function (Lane, 1991), and decreased distress behaviors (Marley, 1984). This study provides additional information regarding the behavioral outcomes of music interventions for hospitalized children. Documentation of hospitalized children's behavioral responses to music interventions allows us to examine how the therapeutic music environment promotes engagement with the environment. Skinner and Wellborn (1994) maintain that children who remain engaged with their environment generally cope with stress in an active, flexible, and positive manner. This study indicates that music interventions effectively elicited engaging behavioral responses in children.

The Affective Face Scale

The researcher used the Affective Face Scale (McGrath, de Veber, & Hearn, 1985) as a self-report measure for affect. This instrument did not reveal significant changes in affect between each condition. Several factors may have contributed to these outcomes. First, two of the participants showed visual signs of anxiety when asked to

identify their "feelings" with the scale. A Certified Child Life Specialist on the unit noted that the scale is sometimes used to measure pain and that there may be some negative associations with the scale. Second, patients meeting the therapist for the first time may not disclose their feeling because of potential intrusiveness. Finally, this measure is a momentary measure; it asks the participants to report how they feel at a given moment. It is possible that in those moments children did not experience the same feelings they had previously experienced during the music, reading, or control conditions. Because people's feelings can change fairly readily, behavioral observation may be a more accurate indicator of affect during each condition.

Maintaining Effects

This study showed that behavior scores from the music condition were not maintained during the return to control condition. Several factors may have contributed to this outcome. Parents often recognize the support that music therapists provide to their hospitalized child. The parent, much like the child, experiences isolation from normal activities and social support. Arrival of the music therapist often affords parents the opportunity to leave the room and take respite, knowing the music therapist will attend to their child's needs. Opportunities for respite are important for parents, but this can be a potential problem if the music therapist has to leave before the parent returns. Several times during this study, parents left the room during the reading and music conditions. The children were fine during these conditions, but when the therapist left the room, some children found the absence of an adult support figure distressing. Clear communication between the therapist and parents sometimes remedies this circumstance. When this situation arises, therapists may facilitate smoother transitions by providing the child with some materials to use in their absence.

In addition to aiding transitions, leaving resources with children and their families may promote carry over effects from the music session. Leaving songbooks, instruments, tapes, or ongoing projects with parents and children may encourage continued engagement in music activities after the therapist's departure. These resources may assist in maintaining the behavioral outcomes of the music session. The researcher did not implement these procedures in this study due to issues of experimental control.

Relationships Between Environment and Behavior

The contextual support model's third assertion states there is a relationship between supportive music environments and the behavioral responses of children. Pearson Product Moment Correlations examined relationships among characteristics of the environment and children's behavioral responses to those environments. Correlations were computed using combined mean scores for each condition; this enabled the researcher to examine the global relationship between environment and behavior. These statistical analyses revealed a significant relationship between environment and behavior for two conditions; the control and music conditions.

One would expect correlations from the combined mean scores to be similar for each condition if the identified measures of environmental support functioned the same way across all environments. These results, however, appear to indicate that the measured elements of environmental support were functioning differently in each condition. Possible explanations include: (a) that specific environmental support elements did not always affect the same behaviors; (b) that characteristics of the child influenced whether a certain environmental support element affected a specific behavior (e.g., one child's physical activity may have increased in response to clear verbal directions, another child's physical activity may have been influenced more by positive verbal reinforcement); (c) that environmental support elements took on unique characteristics within different environments (e.g., in the music condition, interactions initiated by an adult may have been augmented or influenced by the music); and (d) environmental factors not measured in this study may have influenced children's behavior.

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