Objective. This study was designed to compare measures of pain when children with burn injuries were engaged in a purposeful activity, specifically a play activity, versus rote exercise.

Method. Two 6-year-old children participated in a study using a single-subject, randomized multiple treatment design to compare two conditions: purposeful activity and rote exercise. Data were gathered for each session on four dependent measures: number of repetitions of therapeutic exercise completed, number and type of overt distress behaviors displayed, scores on self-report scales of pain intensity, and overall enjoyment of the activity.

Results. Visual inspection of the graphed data suggested that, early in the rehabilitation process, the use of a play activity in comparison to rote exercise yielded better outcomes in terms of all four dependent measures. Additionally, the data implied that there may be a point later in the rehabilitation of a child with a burn injury when rote exercise may be as effective as play activities in meeting therapeutic goals.

Conclusion. This study supports the belief that purposeful activity can yield results equal to or better than those achieved using rote exercise. Replication of this study is warranted, and the development is indicated of a measure of overt behavioral distress that is more appropriate than those currently available for children with burn injuries.

Historically rooted in the foundations of occupational therapy is the premise that purposeful and meaningful activities may be used to evaluate, improve, or maintain a person’s ability to participate in occupations. Purposeful activity is the term most often used in occupational therapy literature to identify the therapeutic activities that are goal directed and characterized by purpose and meaning as determined by the person participating in the activity (American Occupational Therapy Association [AOTA], 1993, 1995; Katz, Marcus, & Weiss, 1994). Both purposefulness and meaningfulness are thought to increase effort and time spent pursuing an activity because cognitive, social, and emotional sources of motivation are accessed through added purpose and meaning. Additionally, the engaged person receives immediate feedback regarding the application of such activities in daily life (Dutton, 1989; Trombly, 1995). Although a number of studies have specifically focused on the effectiveness of using purposeful activity versus rote exercise or nonpurposeful activity (Katz et al., 1994; Hsieh, Nelson, Smith, &
Occupation has been defined as “an individual’s active participation in self-maintenance, work, leisure, and play” (AOTA, 1994, p. 912). Play is often recognized as the primary occupation of children and is designated as a developmental phenomenon that contributes to the evolution of other occupations such as work, activities of daily living, and leisure (Knox, 1993; Pratt, 1989). Play has been described as a developmentally appropriate and powerful medium for evaluation of occupational performance skills and for interventions to improve or maintain these skills (Knox, 1993; Pratt, 1989). Play, as used in therapy, may vary depending on the age and motivation of the player, the theoretical perspective of the therapist, the environment, and the purpose (Burke, 1993; Knox, 1993). Play may be used as a modality to assess and promote sensorimotor, cognitive, and psychosocial function, or to address the occupational behaviors of play (Burke, 1993; Pratt, 1989). Play also has been postulated to be an effective nonpharmacological intervention for pain relief in children (McGrath, 1990).

Pain may be defined as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (p. 5217) and is noted as invariably subjective in nature (Merskey, 1986). In addition to these immediate neurophysiological, emotional, and psychological elements associated with the perception of a noxious stimulus, Parker and Cinciripini (1984) also noted the ensuing behavior problems and subjective reports of discomfort and distress that often accompany a pain experience. The formulation of an operational definition for pain is further complicated when addressing pain in children. This is due to developmental factors such as a limited vocabulary, which may affect the ability to describe a pain experience (Tyler, 1990; Varni, 1983).

The evaluation of pain has included the measurement of physiological responses, self-report, and the observation of overt behaviors (Sanders, 1979). Several physiological responses have been examined for their relation to pain, including heart rate, blood pressure, palmar sweating, oxygenation changes, and endocrine responses (Carter, 1994; Marvin, 1995; McGrath, 1990). It is difficult, however, to identify pain as the sole impetus for these physiological changes. Other stress responses to noxious stimuli, such as anxiety, may contribute to these changes. Therefore, physiological responses may not be accurate measures of pain (Hester, 1993; McGrath, 1990).

Covert pain behaviors are measured via self-reports. Examples of such measures are the Oucher (Beyer, Villarruel, & Denyes, 1995), the Poker Chip Tool (Hester, 1979), the “pain thermometer” (Jay, Ozolins, Elliott, & Caldwell, 1983), and the Eland Color Tool (Eland, 1985). These instruments are limited in that they address only pain intensity, and, because they are self-report measures, they may be influenced by familial factors, environmental cues, and anxiety or fear (McGrath, 1990).

Overt responses often associated with pain include observable motor behaviors indicative of discomfort or distress, such as crying (Jay & Elliot, 1984), and observable pain responses, including recorded intake of pain medication (Engel, 1988). Because pain and anxiety are difficult to separate in the clinical setting, the term behavioral distress is used to capture the verbal, behavioral, and physiological indications of the inseparable elements of pain and anxiety (Katz, Kellerman, & Siegel, 1980; McGrath, 1990). Examples of pediatric pain assessments that are designed to measure overt behavioral distress are the Children’s Hospital of Eastern Ontario Pain Scale (CHEOPS; McGrath et al., 1985), the Observational Scale of Behavioral Distress (OSBD; Jay et al., 1983), and the Procedural Rating Scale, Revised (Katz et al., 1980). Discernible pain responses are frequently recorded in pain diaries, which serve as a vehicle to compile information regarding medication intake, daily activities, and therapy measures (Engel, 1988; Turnquist & Engel, 1994). However, overt behaviors may not always accurately reflect a child’s pain experience.

Because the assessment of pain is complicated, multidimensional evaluation is advisable. Self-reports coupled with periodic observations of overt and physiological pain behaviors by a trained person appear warranted to determine the impact of pain experiences.

The role of occupational therapists in pediatric pain management is emerging. In a survey of 129 occupational therapists, Turnquist and Engel (1994) found that occupational therapists working with children lacked sufficient knowledge about pain in children. The authors suggested that further research and education on pediatric pain as it relates to the delivery of comprehensive occupational therapy services were warranted. Information concerning pain control might be especially pertinent for occupational therapists working with children who have sustained burn injuries, due to the universal presence of pain after burn injuries.

The role of the occupational therapist on a burn unit is multifaceted and somewhat variable depending on the specific protocols and policies established by the facility. A few of the traditional roles include (a) splinting and pressure treatments to prevent deformity (e.g., contracture, hypertrophic scarring) while maximizing proper positioning; (b) facilitation and adaptation of activities of daily living, including provision of adaptive equipment and instruction in its use as appropriate; (c) use of psychosocial therapeutic interventions to address the emotional well-being of the child; and (d) provision of developmentally appropriate treatment activities to address range of motion, strength, and function.
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Continued research concerning the efficacy of purposeful activity versus rote exercise in occupational therapy assessments and interventions, especially with regard to the pediatric population, is warranted. Because play is considered the primary occupation of children (Knox, 1993; Pratt, 1989), it is reasonable that purposeful activities used in pediatric therapy include play activities. Play also was noted to be one of the strategies for pain management in children (McGrath, 1990).

The current study was designed to examine the differences in participation, overt pain behaviors, pain perceptions, and personal satisfaction with the overall experience of a therapeutic activity when children with burn injuries were engaged in a play activity versus rote exercise.

For each participant, the following research questions were addressed:

1. Does the number of repetitions of a therapeutic movement differ when the participant is engaged in a purposeful activity versus rote exercise?
2. Does the number of overt distress behaviors (as measured by the OSBD [Jay et al., 1983]) exhibited by the participant differ when engaged in a purposeful activity versus rote exercise?
3. Do a participant's self-report measures of pain intensity (measured by the Oucher [Beyer et al., 1995]) differ during purposeful activities versus rote exercise?
4. Do a participant's reports of overall enjoyment as measured on a Likert-type Fun Scale differ when engaged in purposeful activity versus rote exercise?

Method

Participants

The participants in this study were two 6-year-old boys who both had sustained a second-degree to third-degree (indeterminate to deep) burn injury involving one or more extremities with potential for impaired mobility in at least one joint. Participant one sustained an 11% total body surface area (TBSA) intermediate to deep gasoline flame burn to the nondominant, left side of his body. The dorsal aspect and palmar surface of his hand were burned, including all digits, dorsal wrist, medial/posterior aspect of the forearm and upper arm (noncircumferential), and a portion of the pectoral area of his chest. He underwent one surgical procedure for a split thickness skin graft to the left hand, arm, and chest, with the donor site being the right side of his back and his left buttock.

Participant two was right-hand dominant and was admitted for hospitalization as a result of a 16.5% TBSA intermediate to deep gasoline flame burn to the right face, right arm (noncircumferential). Included were the posterior forearm and fingers, but not the palm; right posterior/medial lower extremity (noncircumferential); and left lower extremity (primarily the posterior calf). He required surgery for excision and autografting of his right upper extremity, hand, and lower extremity, with his back as the donor site. Early in his rehabilitation, participant two also underwent two anesthesia-assisted procedures for staple removal, wound care, and dressing changes.

Coincidentally, both participants were Hispanic, and their primary language was English. The participants were recruited from the inpatient burn unit at a medical center on the west coast. After review of each child’s medical chart, it was determined that both had had an unremarkable past medical history. Neither had a record of a previous serious painful injury or illness. Both boys had a referral for therapy services that included range of motion to improve functional performance. Both were medically stable and were postsurgery by a minimum of 72 hr before initiation of the research protocol.

Alternate Treatment Conditions

Condition One. The first treatment condition consisted of therapeutic activities deemed purposeful (i.e., playing a game that was identified by the child as an activity that he enjoyed doing). Each child and his parent(s) were interviewed before initiation of the study to determine which play activities were purposeful and meaningful to the child. This interview included a parent or guardian questionnaire developed by the first author. For each child, the principal investigator designed or modified between 8 and 10 of the identified play activities to promote mobility so that individual range-of-motion goals could be established during the initial occupational therapy assessment. At the beginning of each treatment session in which a purposeful activity condition was applied, the child was given a choice of three play activities. The decision as to which three choices to offer the child each session was based on availability of the toy or game, prior success with the activity (e.g., the child had completed the desired number of repetitions while doing the activity in another session or had reported enjoying the activity), and where the activity was to take place (i.e., gym vs. patient room). The child was then given instructions related to the game or play activity and told the expectations for repetitions of movements within the set range-of-motion goal.
Condition Two. The second condition involved using rote exercise to promote range of motion. In these therapy sessions, the child was instructed to perform a certain number of repetitions of a range-of-motion exercise corresponding to the range-of-motion goals determined during the initial occupational therapy evaluation.

Research Design

A single-subject, multiple-treatment, randomization design was implemented to compare the effectiveness and perceptions of purposeful activity versus rote exercise. An initial baseline phase was not necessary because the two treatment conditions were compared with one another in rapid alternation (Kazdin, 1982). The two conditions were randomly selected over a 2-day block of time so that each condition occurred twice in the 2 days, but did not necessarily alternate during the course of 1 day. This design was chosen to reduce the predictability of treatment conditions for any given therapy session, which is an important consideration because a child's ability to predict a treatment activity may influence his or her level of anxiety, willingness to participate or perception of pain before initiation of the session. Three such treatment blocks (6 days) were completed for one child. To get a clearer picture of outcomes, one additional block of trials (8 days total) was completed with the second child.

Measures

The following measures were recorded for both participants on each day when therapy was provided during the study:

Repetitions. One repetition was defined as movement through the desired active range of motion. The number of repetitions was tallied by the primary investigator during the activity.

OSBD score. The OSBD is a revised version of the Procedural Behavior Rating Scale (PBRS; Katz et al., 1980). This assessment is comprised of eight operationally defined behaviors that have been shown to indicate pain, anxiety, or both in children (Jay et al., 1983)—crying, screaming, physical restraint, verbal resistance, requesting emotional support, verbal pain, flailing, and information seeking. Each behavioral category is assigned a weight according to the desired active range of motion. The number of repetitions was tallied by the primary investigator during the activity.

Oucher score. The Oucher is a self-report tool for children 3 to 12 years of age (Beyer et al., 1995). There are three ethnic versions: white or Caucasian, black or African-American, and Hispanic. It comprises an ordinal scale denoting 20-unit intervals from 0 to 100 and an ordinal scale composed of six pictures of children in various expressions of pain. When the child is initially introduced to the Oucher, he or she is asked to count from 1 to 100 by ones, choose which of two numbers is greater, and sequence six equilateral triangles (or squares/circles) of increasing size. These questions determine whether the child is cognitively mature enough to use the Oucher and, if so, which scale to use. If the child is able to complete all these tasks, he or she uses the numerical scale. Otherwise, if the child is able to complete only the task of sequencing the shapes from smallest to largest, then the child is instructed to use the pictures to identify the level of his or her pain. Both children in this study used the Hispanic version and the photographic scale.

Research Design

The directions further explain that "0" or the bottom picture is the “least amount of hurt” the child has ever experienced, whereas “100” or the top picture is the “most hurt” the child has ever had. During the course of the current study, a number on a scale of 0 to 5 was recorded both before and after each activity depending on which picture the participant identified as indicative of the amount of hurt he was experiencing. In other words, if the child chose the picture immediately above the bottom picture on the scale as reflective of how much hurt he was having, then a score of 1 was recorded in the participant's journal.

Content validity of the original Oucher was examined by Beyer and Aradine (1986) in a study where 78 Caucasian children, 3 to 7 years of age, from three sites were asked to sequence six photographs. A concordance coefficient of 0.73 (p < .01) was revealed using Kendall’s coefficient of concordance. The content validity of the Hispanic version was later examined (Marshall, 1988, as cited in the Oucher manual; Villarruel & Deynes, 1991). The agreement according to Kendall’s coefficient of concordance was 0.65, p < .0001. The construct validity of the original Oucher also was evaluated (Aradine, Beyer, & Tompkins, 1988; Beyer & Aradine, 1987, 1988). In addition, as reported in the Oucher manual technical report (Beyer et al., 1995), the construct validity, including both convergent and dis-
criminant validity, of the African-American and Hispanic versions of the Oucher was examined.

**Fun Scale Score.** For the purposes of the current study, the first author developed the Fun Scale. The number associated with the face chosen by the child as indicative of the amount of fun he had during the activity was recorded as the Fun Scale score for that session (see Figure 1). Although this scale appears to have face validity, no formal reliability or validity studies were conducted.

**Data Collection**

After the participants had been recruited, informed consent obtained, and an initial assessment had been completed, data collection began. During the initial assessment, the primary investigator obtained standardized range of motion measurements using the goniometer (Trombly, 1995) and appropriate active range of motion goals were established, including the range of motion goal used for the purposes of this study. The goal for the first participant was 10 repetitions of 0–80º active left shoulder abduction. Ten repetitions of 0–90º active right shoulder flexion was the research-oriented goal for the second participant. The goal motion for this study was based on the participants’ ability to actively range the joint and the appropriateness of a twice-a-day therapy regimen for range of motion of this joint. The number of desired repetitions was established on the basis of common clinical practice in the burn unit at the medical center in addition to the primary investigators’ clinical judgment regarding attainable therapeutic goals. Additionally, during the initial assessment, both participants were introduced to the Oucher and were administered the outlined procedure for determining which form to use (Beyer et al., 1995). It was concluded that both participants would use the ordinal (photographic) form in the Hispanic ethnic version.

Materials required for data collection included:

1. a video camera with tripod stand
2. a camera that develops photos instantly
3. a universal goniometer
4. the Parent or Guardian Play Questionnaire, which was designed to gather information regarding their child’s play interests. (This questionnaire, which is available from the first author, included toys or games appropriate for children 5 to 12 years of age that were available on the burn unit)
5. the Child Play Interview, which was similar to the Parent or Guardian Play Questionnaire but was intended to gather information from the child’s perspective
6. age-appropriate toys and games
7. the Oucher (Beyer et al., 1995)
8. the OSBD (Jay et al., 1983)
9. the Likert-type Fun Scale (see Figure 1)

Data were collected in the occupational therapy—physical therapy clinic of the medical center burn unit or the participant’s room. The video camera was set up in a static position to tape the therapeutic activity. Therapy was scheduled Monday through Sunday as needed and appropriate. Timing of daily sessions was determined on an individualized basis, taking into account established medication, procedures or wound care, and mealtime schedules. As common practice dictates, an attempt was made to arrange therapy sessions to coincide with the maximum effectiveness of medication for pain relief by consulting with the pharmacist and nursing staff. In addition, therapy sessions were scheduled at times when the participant was adequately rested.

Both the morning and afternoon therapy sessions began with the participant rating his pain intensity on the Oucher (Beyer et al., 1995). This was immediately followed by the videotaped therapeutic activity. Directly after the activity, the participant (a) again rated his pain intensity on the Oucher; and (b) rated his overall experience on the Likert-type Fun Scale. After completing the desired minimum number of repetitions of the therapeutic activity (or after the child’s refusal to continue participating) and the self-report rating tasks, the video camera was turned off and the therapy session continued as appropriate to meet intervention goals (including more repetitions of the therapeutic activity being researched if the child chose to do so after being asked whether he wanted to continue).

To determine whether the range of motion goal was achieved during both the rote exercises and purposeful

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**Figure 1.** Fun Scale: A Self-Report Tool to Measure Fun Experienced During Therapy. Note: The Fun Scale was developed specifically for this study and allowed each participant to rate his overall enjoyment of the therapeutic activity.
activities, trained occupational therapists (one specializing in burn rehabilitation and one specializing in adult physical disabilities) were asked to view randomly selected 1-min clips of video from each of the taped sessions. Next, each therapist was instructed to determine whether the goal was met or not as compared to an instant photo of the participant positioned at the goal angle of range of motion determined in the initial occupational therapy evaluation. After reviewing the 1-min clips of each videotaped session for both participants, the raters agreed that the respective therapeutic goals were met in each of the sessions.

Lastly, overt distress behaviors were scored on the OSBD (Jay et al., 1983) by the principal investigator and one other pediatric occupational therapist. Once data collection was completed for the study, the videotaped therapy activities were re-recorded in random order and an auditory signal (i.e., a beep) was superimposed onto the videos at 15-sec intervals. The two raters viewed the videotapes simultaneously while seated out of view of one another and recorded any of the eight behaviors occurring at the moment each 15-sec interval ended. The frequencies of behaviors were observed during each activity. Next, the frequency for each category was divided by the number of intervals, resulting in a mean interval score. The mean interval score for each behavioral category was then multiplied by the assigned weighted score for that category, which resulted in a weighted mean interval score. Lastly, the weighted mean interval scores for each category were added yielding the total OSBD score for that activity (Jay et al., 1983).

Reliability

Interrater reliability on the OSBD (Jay et al., 1983) was calculated using kappa \((k)\) (Kazdin, 1982). This statistic was chosen to correct for chance due to the low rate of occurrence and high rate of nonoccurrence of distress behaviors when scoring the video clips using the OSBD (Jay et al., 1983).

The interobserver agreement on scoring the eight behavioral categories of the OSBD (Jay et al., 1983) for the therapeutic activities recorded on video ranged from \(k = .79\) to 1, implying a level of interrater reliability significantly over and above that which might have occurred by chance. The point-by-point agreement ratio (Kazdin, 1982) also was computed and yielded ratios from 99%-100% for the eight behavioral categories on the OSBD (Jay et al., 1983) for both participants.

Results

Figures 2 through 4 present the results obtained with each subject on each measure. The figures were constructed to show the entire range of scores possible on each measure to make it easier for the reader to discriminate how the participants performed relative to those scales. Results for the two therapy sessions completed on any given day are plotted closer to one another than are the results for adjacent days, enabling readers to discriminate when during the day (AM or PM) each session was conducted. Regression lines are also plotted to summarize the change in scores over time for each condition.

Repetitions

The first participant generally chose to stop performing when the target number of repetitions (10) was reached (see Figure 2). On two occasions, he stopped well short of the target (day 2, PM, rote exercise, and day 3, PM, play) and once exceeded the target by nearly a factor of 2 (day 7, AM, play). Overall, it would appear that neither the time of day nor the experimental condition exerted differential influences on the number of repetitions completed by the first participant.

The second participant demonstrated a strong reaction to the experimental conditions. When exposed to rote exercise, he always completed the target number of repetitions, but never exceeded it. The number of repetitions completed with play therapy, on the other hand, always exceeded the target, and generally increased over time.

OSBD Score

Higher scores on the OSBD indicate greater numbers of
observed overt distress behaviors. For the first 4 days of the study, the first participant displayed fewer distress behaviors during play than during rote exercise (see Figure 3). By the end of the experiment, however, overt signs of distress behaviors had generally disappeared for both conditions.

The second participant displayed overt distress behaviors on only one day (day 2, PM, rote exercise). Without more variance in the results, no conclusions can be drawn about the relative effects of experimental conditions on the distress of this child.

Change in Oucher Scores

The data presented in Figure 4 reflect the difference between the pre-therapeutic activity and post-therapeutic activity Oucher scores for any given session. For example, on the first day of rote exercise, the first participant reported an Oucher score of 1 before the therapy began and an Oucher score of 3 at the end of therapy. The difference between those scores is \((3 - 1 = 2)\). As with the OSBD scores, a higher score is worse, reflecting an increase in pain over the course of the session.

During the early part of the experiment, the first participant always recorded an increase in pain after rote exercise; however, after play, he reported either no change or a decrease in pain. The advantage of play diminished over time, however, and was generally gone by the end of the experiment (see Figure 4).

The second participant also demonstrated more favorable results with play during the early part of the experiment. He had either no change or an increase in self-reported pain in response to rote exercise, whereas he had either no change or a decrease in self-reported pain after play. As with the first participant, those differences generally were absent by the end of the experiment.

Fun Scale

The first participant rated play as the “most fun he’d ever had” after 6 of the 8 sessions, but never rated rote exercise higher than 3 on the 5-point scale. Generally, however, rote exercise was being rated more highly as time progressed.

The second participant always rated play as the “most fun he’d ever had.” Like the first participant, he never rated exercise higher than 3 on the 5-point scale and, although the regression for rote exercise was ascending, the change over time was very modest.

Discussion

The most important finding of this study was that scores on the four dependent measures (i.e., number of repetitions of therapeutic exercise completed, number and type of overt distress behaviors displayed, scores on self-report...
scales of pain intensity and “fun”) generally were better for play activities than for rote exercise. Visual inspection of the graphs of OSBD scores, Fun Scale scores, and especially Oucher scores suggests that, as time progresses after trauma, the differences in reports of pain intensity and enjoyment between the two conditions (purposeful activity and rote exercise) become less pronounced. These results suggest directions for intervention. For example, range of motion embedded in play activities may be the most effective use of therapy time early in the rehabilitation process because the child may experience less pain intensity, perform more repetitions, and enjoy the activity more. However, later in the rehabilitation process, rote exercise may be equally effective and take less time (average of 1–2 min versus the average of 7–8 min it took to complete the exercises embedded in a play activity). Alternatively, once the child is demonstrating few pain behaviors, the child may be self-motivated to engage in therapeutic play with parental monitoring and indirect therapist supervision. To make informed decisions regarding transitioning from therapist-monitored therapeutic play to either rote exercise or family-monitored play, the post-injury progression of pain in children needs to be monitored.

Clinical Observations and Implications

The Oucher and the Fun Scale both appeared to have clinical utility. Both discriminated between the two experimental conditions, were simple to administer, and were well received by the participants. The Oucher easily could be incorporated into the delivery of improved therapy services and nursing care, including wound and medication management. Parents of the children expressed appreciation for having a tool to use to help their children describe the amount of “hurt” they were experiencing. Similarly, the Fun Scale facilitated communication. The participants willingly rated how much fun they had during therapy and were not reluctant to express boredom or dislike. Fun Scale scores were helpful in treatment planning. Activities that the child identified as “most fun” were used as viable choices for future treatment sessions, whereas activities with lower ratings, with the exception of range of motion, were not repeated. Additionally, activities rated as 5 (most fun) were often noted as activities in which the participant did more repetitions and reported less intense pain. This same procedure easily could be replicated in other clinical settings.

During the course of the study, the first participant had a clear downward trend in the frequency of distress behaviors as measured by the OSBD. Because pain behavior regulation was not part of the treatment intervention, the gradual decline of overt pain behaviors for participant one may reflect the healing process. As tissue regeneration naturally occurred, it is likely that improved well-being and pain reduction were experienced and that this resulted in a decrease in overt distress behaviors as measured by the OSBD. However, because a lack of overt pain behaviors cannot be equated with the absence of pain (Engel, 1988), it is recommended that practitioners monitor children’s reports of pain and overt behaviors (e.g., activity levels, pain behaviors such as medication use, facial grimacing) when establishing and modifying therapeutic interventions. Increased pain intensity may occur several hours after physical exercise; therefore, it may be important to have the child complete pain diaries at regular intervals throughout the day.

Clinical observations suggested that play (a) distracted participants’ attention away from their pain complaints and increased enjoyment of the therapeutic activity; and (b) resulted in more fluid, spontaneous movement. Additionally, quality movement in two or more joints simultaneously occurred more often during play than during rote exercise, where movement typically was focused on one joint at a time. These benefits may carry over into other functional activities and compliance with target behaviors. Although this is beneficial, practitioners need to be aware that it may be tempting to exceed therapeutic physical activity quotas. Research by Fordyce (1976) suggested that when adults exceed preestablished activity quotas, it may result in exacerbated pain states, usually delayed by several hours. This pain, in turn, may result in consequent activity avoidance, distress (e.g., anxiety), increased pain medication use, and lack of motivation for additional physical retraining. If future research demonstrates that this finding is valid for children, then pacing of activity may be important. Therefore, to appropriately assist in the rehabilitation of children who are reinforced by accelerated activity, instruction in a pacing regimen may be beneficial for the children, their parents, and professionals working with the children.

Future Research

The current study suggests that children voluntarily engage in more repetitions when involved in a play activity as compared to when involved in rote exercise. Although findings suggested no increase in reported pain intensity immediately after intervention, in view of the previously cited research by Fordyce (1976), it is important to study the effects of more repetitions on pain perception one or more hours after intervention.

This study also highlighted the need for the development of a measure of overt distress designed for children with burn injuries. The OSBD proved to be less than an ideal measure for several reasons. First, because many of the distress behaviors that occurred fell between the 15-sec scoring intervals, the OSBD was not sensitive enough to accurately depict the degree of overt distress being demonstrated by the participants. It would appear that shorter intervals or whole interval recording procedures might be warranted (Kazdin, 1982). Second, the OSBD does not include many behaviors that were demonstrated by the participants that may be indicative of distress (e.g., facial grimacing, touching wounds). Third, the OSBD does not
take into account well behaviors exhibited by the participants (e.g., smiling, positive verbalizations). Due to these identified limitations of the OSBD and the complexity of pain, a new multidimensional measure needs to be developed for use with children with burn injuries.

Experiences with the Fun Scale were positive and point to the need for more research directed at further developing this measure. Results from this study identified possible clinical use of the Fun Scale in facilitating communication and in discriminating between children's perceptions of different activities. However, before recommending widespread use of this measure, rigorous examination of its psychometric properties is indicated.

Last, the impact of volition on therapeutic outcomes needs to be determined. The greater impact of play versus rote exercise on outcomes may have resulted from the child's personal causation and interests (Neville, Kielhofner, & Royeen, 1985). In this study, the child was given the opportunity to select the play activity, but not the rote exercise. This opportunity may have resulted in the child having more feelings of control and enjoyment, which may have resulted in improved Oucher, OSBD, and Fun Scale scores.

Occupational therapy is based on the idea that purposeful activity may be used to evaluate, improve, or maintain functional performance skills required for activities of daily living, work, and play or leisure. The current study suggests that the use of play in therapy with children with burn injuries can yield results that are equal to and often better than those achieved using rote exercise in terms of repetitions, overt distress behaviors, self-reported pain intensity, and self-reported enjoyment of the activity.

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