

*REDUCING INDICES OF UNHAPPINESS AMONG  
INDIVIDUALS WITH PROFOUND MULTIPLE DISABILITIES  
DURING THERAPEUTIC EXERCISE ROUTINES*

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A program was developed to reduce indices of unhappiness that accompanied therapeutic exercise routines among people with profound multiple disabilities. Indices of unhappiness were recorded, using an observation system that had been validated through previous research involving happiness-related variables, while support personnel conducted exercises with 3 participants. A multicomponent program was then implemented that involved presenting highly preferred stimuli before, during, and after each exercise session. Results indicated that the program was accompanied by reduced indices of unhappiness for each participant relative to the traditional method of conducting the exercises, although changes in the preferred stimuli used with 1 participant were required before consistent reductions occurred. Results are discussed regarding the importance of reducing unhappiness indices as a means of enhancing aspects of the daily quality of life for people with profound multiple disabilities. Areas for future research are also discussed, focusing on expanding the unhappiness-reduction procedures to other routine events that may occasion indices of unhappiness.

DESCRIPTORS: unhappiness, happiness, profound multiple disabilities, preferences

A major factor affecting the quality of life for people with developmental disabilities is the degree to which individuals experience happiness and unhappiness during their daily routines. Issues related to happiness among the population of people with developmental disabilities have been discussed repeatedly (see Felce & Perry, 1995, for a review). However, research on happiness-related variables generally has focused on individuals with mild and moderate disabilities, with much less attention directed to people with profound disabilities (Felce & Perry, 1995).

One obstacle to research on happiness among people with profound disabilities is the difficulty in evaluating happiness and

unhappiness (Green & Reid, 1996). Self-report measures typically used with individuals with mild or moderate disabilities to measure happiness and unhappiness (e.g., Chadsey-Rusch, DeStefano, O'Reilly, Gonzalez, & Collet-Klingenberg, 1992) are of little value with people who have profound mental and physical impairments that prohibit conventional communication (Bailey, 1981; Favell, Realon, & Sutton, 1996). However, several investigations have behaviorally defined and reliably observed indices of happiness and unhappiness among individuals with profound multiple disabilities (Favell et al., 1996; Green & Reid, in press; Ivancic, Barrett, Simonow, & Kimberly, 1997). Social validation research has also provided support for the specified indices as a valid means of reflecting the private events of happiness and unhappiness (Green, Gardner, & Reid, 1997; Green & Reid, 1996).

These investigations have often focused on determining activities that are accompa-

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nied by increases in happiness indices. There are also activities during the typical routine of some people with profound disabilities that are associated with indices of unhappiness (Favell et al., 1996). Recognition of the occurrence of unhappiness indices during daily activities has resulted in calls for research on procedures for decreasing unpleasant experiences for individuals who have profound disabilities (Green & Reid, in press). Some support for behavioral research on reducing apparent unhappiness stems from an investigation with a hospitalized infant in which signaling of forthcoming invasive procedures decreased negative affective behaviors that accompanied the procedures (Derrickson, Neef, & Cataldo, 1993). However, research has not yet emphasized means of decreasing indices of unhappiness that occur during routine events for individuals who have profound multiple disabilities.

Although behavioral research has not focused on reducing indices of unhappiness among people who have profound disabilities, a considerable amount of research has occurred in related areas. In particular, investigations have demonstrated ways of reducing harmful behavior, such as self-injury and aggression, in which individuals engage in order to escape a presumably undesired activity (e.g., Groden, Stevenson, & Groden, 1993; Vollmer, Marcus, & Ringdahl, 1995). One means of reducing escape-maintained self-injury and aggression is to increase the desirable or reinforcing properties of the task that the individual is attempting to escape (Iwata, Vollmer, & Zarcone, 1990). The same general process may be used with important adaptive tasks that may not evoke escape behavior but nevertheless are associated with the occurrence of unhappiness indices.

The purpose of this investigation was to evaluate a means of reducing indices of unhappiness that accompany movement exercise activities developed for individuals who

have profound multiple disabilities. Movement exercise routines, typically designed by physical or occupational therapists, are frequently necessary for individuals with profound physical disabilities for mobility and general health reasons (Graff, Ault, Guess, Taylor, & Thompson, 1990, chap. 7). However, movement exercise routines can be invasive and painful (Campbell, 1989) such that the exercises may be unpleasant, particularly for persons with profound mental disabilities who do not comprehend the rationale for the procedures. Hence, therapeutic movement exercises represent a type of activity that is beneficial yet is probably disliked. Determining ways to reduce the unpleasantness of this type of activity may therefore represent an approach to enhancing one aspect of the quality of life for people with profound multiple disabilities.

## METHOD

### *Participants and Setting*

Three women with profound multiple disabilities who attended an adult education program participated in the study. Ms. Burns, Ms. Tucker, and Ms. Rose were 42, 27, and 66 years of age, respectively. Each woman had profound mental retardation as well as significant physical and sensory disabilities. Two women experienced hearing impairments, and 1 had a visual impairment. Each individual was nonambulatory. Difficulties with arm and hand strength and movements prevented the women from independently propelling their wheelchairs. Medical diagnoses included diplegia or quadriplegia and seizure disorders. The women did not display any conventional communication skills (i.e., no word vocalizations or formalized augmentative communication systems) and required full physical assistance from support personnel to complete basic self-care routines such as eating and dressing.

The women were selected to participate in the investigation for three reasons. First, the women had profound mental and physical disabilities that prohibited them from expressing their displeasure with various events through conventional communicative means. Second, each individual had specific movement exercises developed by a physical therapist as part of her individual program plan. Third, informal observations conducted prior to the baseline condition indicated that each woman displayed indices of unhappiness (see *Behavior Definitions* below) during the movement exercises.

All experimental procedures were conducted in the participants' adult education classrooms. Each of the three classrooms served approximately six students at a time and was staffed by two teacher assistants. Intermittent supervision was provided in each classroom by a certified special education teacher. All experimental procedures were conducted by three teacher assistants, one in each of the participants' classrooms. The three assistants had high school degrees and at least 12 years of experience working with individuals with multiple disabilities.

#### *Behavior Definitions*

Target behaviors were indices of unhappiness and happiness (Green & Reid, 1996; Green et al., 1997). Specifically, *indices of unhappiness* were defined as any facial expression or vocalization typically considered to be an indicator of unhappiness among people without disabilities, such as frowning, grimacing, crying, and yelling without smiling. *Indices of happiness* were defined as any facial expression or vocalization typically considered to be an indicator of happiness among people without disabilities, including smiling, laughing, and yelling while smiling.

#### *Observation System and Reliability*

The observation system consisted of a 10-s partial-interval recording process for indices

of unhappiness and happiness. Each 10-s observation interval was separated by a 5-s record interval. Observers included two experimenters, three student interns, and a special education teacher. Reliability observations were conducted by two observers who recorded responses simultaneously and independently. Reliability observations occurred during 30% of all observations, including each experimental condition for each participant. Interobserver agreement was assessed on an interval-by-interval basis for overall, occurrence, and nonoccurrence agreement by dividing the number of agreements by agreements plus disagreements and multiplying by 100%.

For indices of unhappiness for Ms. Burns, Ms. Tucker, and Ms. Rose, mean overall agreement was 99% (range, 95% to 100%), 98% (89% to 100%), and 98% (85% to 100%), respectively. Mean occurrence agreement was 98% (92% to 100%), 70% (0% to 100%), and 86% (0% to 100%), respectively, and respective averages for nonoccurrence were 88% (0% to 100%), 97% (89% to 100%), and 96% (67% to 100%). The somewhat lower occurrence agreement for Ms. Tucker was due to a low frequency in several sessions such that a small number of disagreements deflated the average. Specifically, there were never more than two disagreements between observers regarding the occurrence of unhappiness indices during any session, and during the majority of sessions there were no disagreements. For indices of happiness, overall mean agreement was at least 99% for each participant (range, 94% to 100% across all sessions), mean occurrence was at least 82% (range, 0% to 100%), and nonoccurrence was at least 98% (range, 93% to 100%).

#### *Experimental Conditions*

*Baseline.* During baseline, the movement exercise routine was conducted individually with each participant by an assistant using

procedures that had been in place in the classroom for at least several months prior to baseline assessments. The exercise routine was developed by a licensed physical therapist and was reviewed and approved by each participant's interdisciplinary team. The general purpose of the exercises was to attempt to maintain range of motion in limb and joint movements as well as overall muscle tone. The physical therapist had previously trained each assistant in the method for conducting the routine, and provided intermittent supervision and consultation.

The movement exercise routine consisted of a sequence of eight steps. Each step involved repeated movement trials. The entire process entailed (a) slowly extending the left and right arm six times each, (b) rotating the wrist of each hand six times, (c) lifting the leg to a level at which the thigh was parallel to the ground six times for both legs, (d) rotating the upper torso five times, (e) rotating the head from side to side five times, (f) raising and lowering the head five times, (g) massaging the back for 2 min and, (h) massaging the side of the head for 30 s. The exercise routine typically was implemented once each weekday with each participant and required approximately 10 min to complete.

*Unhappiness reduction program.* In an attempt to reduce unhappiness accompanying the movement exercise routine as indicated through observed indices of unhappiness, a four-component unhappiness reduction program was developed. Each program component involved use of preferred stimuli that had been specifically identified for each of the 3 participants. Preferred stimuli were selected initially based on systematic preference assessments. When possible, to expand the number of stimuli used in the program, stimuli were also selected based on surveys of direct support personnel regarding the favorite items and activities of each participant. The preference assessments were con-

ducted in the same manner as reported in previous research with other individuals with profound multiple disabilities (Green et al., 1988; Green, Reid, Canipe, & Gardner, 1991). This research has indicated that staff identification of favorite items and events reliably resulted in stimuli that were frequently approached by individuals with profound multiple disabilities. Across all individuals and program components, six stimuli were drawn from the preference assessments. These stimuli represented all of the stimuli that were approached on at least 80% of assessment trials (cf. Green et al., 1988, 1991) and included two stimuli (revolving toy carousel and rocking in a hammock) for Ms. Burns, one (gentle back rubs) for Ms. Tucker, and three (juice, pudding, and a Casio® music player) for Ms. Rose. Two stimuli were included based on staff recommendations as favorite items; these were one stimulus (back and arm rubs with soft verbal interaction) for Ms. Burns and one (brushing her hair with soft verbal interaction) for Ms. Rose. Staff members did not identify any favorite stimuli for Ms. Tucker beyond the stimulus identified as preferred in the systematic preference assessment.

The first component of the unhappiness reduction program involved presenting a preferred stimulus or activity immediately prior to beginning the exercise routine. Conditions were arranged to begin an exercise routine exactly as in baseline (i.e., the participant was escorted to the part of the classroom in which the exercise routine was typically implemented, the assistant told the participant that it was time for exercise) but immediately before initiating the routine, a preferred stimulus was provided for 5 min. Preferred stimuli presented at the beginning of each session included gentle rubs on the arms for Ms. Burns, gentle rubs and stroking of arms along with soft verbal interaction for Ms. Tucker, and brushing the hair and soft verbal interactions with Ms. Rose.

The second component of the unhappiness reduction program involved pairing a preferred stimulus with the actual presentation of the movement exercises. Preferred stimuli were presented for 5 s to 10 s at 1-min intervals throughout the exercise routine. The preferred stimuli presented here for Ms. Burns, Ms. Tucker, and Ms. Rose were activation of a toy carousel that revolved and presented musical bells, gentle shoulder rubs, and provision of a sip of punch or taste of pudding, respectively. The third component of the unhappiness reduction program involved briefly interrupting any activity during the exercise routine that was accompanied by indices of unhappiness and redirecting to, or presenting, a preferred stimulus for a maximum of 30 s. The preferred stimuli used in this component were the same as those just described for the second component of the program. If the unhappiness indices occurred while one of the specific steps of the movement exercise routine was ongoing, that exercise step was reinitiated and repeated after the interruption or redirection such that the complete exercise routine was always provided.

The final component of the unhappiness reduction program involved immediately following the entire movement exercise routine with a preferred stimulus for 10 min. The preferred stimuli involved rocking in a hammock, verbal interaction along with gentle shoulder and arm rubs, and activation of an electronic music board for Ms. Burns, Ms. Tucker, and Ms. Rose, respectively. During each application of the program, observations were conducted only during the actual exercise movements (i.e., not during the presentation of the preferred stimuli).

The unhappiness reduction program was altered after initial implementation with Ms. Burns (see *Experimental Design* and *Results* below) by changing the preferred stimuli that were provided. Specifically, the hammock was used as the preferred stimulus in

each of the four program components. Also, the fourth program component was altered by moving the hammock next to a wall such that Ms. Burns could rock herself by pushing her foot against the wall.

An experimenter individually trained each of the three assistants to implement the unhappiness reduction program. Training included verbal instructions, modeling in a role-play situation, and questions and answers. In addition, an experimenter periodically observed exercise sessions and provided verbal feedback regarding each assistant's proficiency in implementing the procedures.

### *Experimental Design*

The experimental design for Ms. Burns and Ms. Tucker was a multiple probe across the 2 participants. Specifically, although the exercise sessions were typically conducted once each weekday, probe observations were conducted during two or three sessions per week. The sessions and probe observations for Ms. Burns and Ms. Tucker were conducted concurrently. When the probe observations were not being conducted, the exercise sessions were conducted in accordance with the procedures representing the respective experimental condition in effect. For Ms. Rose, a combined alternating treatments and reversal design was employed. Following an initial baseline condition (i.e., the original movement exercise routine), the baseline condition and the unhappiness reduction program were alternated across two sessions daily, with the order of the two conditions reversed across days. Subsequently, the baseline condition alone was reinstated, followed by the unhappiness reduction program alone.

## RESULTS

### *Unhappiness Indices*

As indicated in Figure 1, indices of unhappiness occurred for both Ms. Burns and



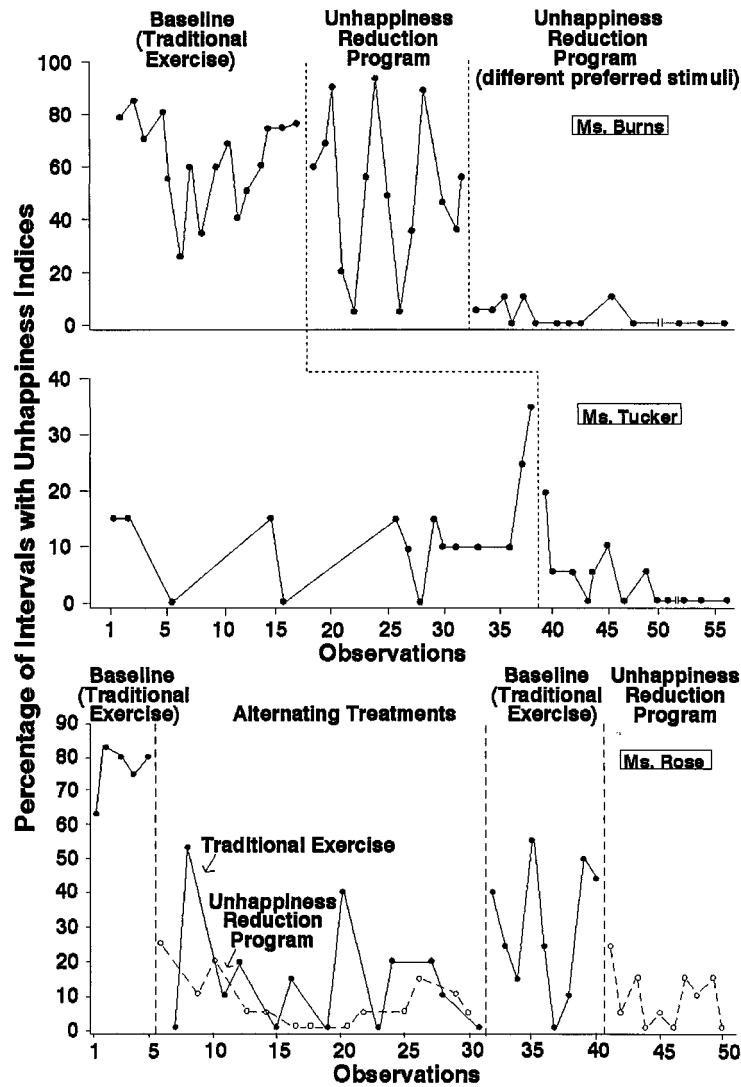


Figure 1. Percentage of observation intervals with indices of unhappiness for Ms. Burns (top panel), Ms. Tucker (middle panel), and Ms. Rose (bottom panel) during each observation in each experimental condition. The break in the data indicates when the follow-up observations were initiated.

Ms. Tucker during baseline, although the percentage of intervals observed were quite different for the 2 participants (note the different vertical axes on Figure 1). Indices of unhappiness occurred during an average of 62% (range, 25% to 85%) of the observation intervals in baseline for Ms. Burns and 12% (range, 0% to 35%) of intervals for Ms. Tucker. During the first unhappiness reduction program for Ms. Burns, there was no consistent effect on indices of unhappi-

ness (average of 51%; range, 5% to 90%). However, with alteration in the preferred stimuli used in the second application of the program, there was an immediate reduction in unhappiness indices, with an average of 4% (range, 0% to 10%). When the program was subsequently in effect for Ms. Tucker, unhappiness indices decreased from baseline levels to 5% (range, 0% to 20%) and did not occur during the last two sessions. Throughout the follow-up observations,

which spanned a period of over 7 weeks (54 days) with the unhappiness reduction program in effect, there were no indices of unhappiness for either participant.

The bottom panel of Figure 1 presents indices of unhappiness for Ms. Rose. During the initial baseline when the traditional exercise movement routine was in place, unhappiness indices averaged 76% (range, 63% to 83%). During the next condition with the unhappiness reduction program, unhappiness indices decreased to an average of 8% (range, 0% to 25%). However, there was also a decrease in unhappiness indices during the alternating baseline sessions (average 15%; range, 0% to 55%). During the alternation between the unhappiness reduction program and baseline, there appeared to be a sequence effect. That is, on the days when the program preceded application of the traditional exercise routine during the baseline session, indices of unhappiness were noticeably lower during the baseline session (average of 3%) than on days when the baseline session preceded the unhappiness reduction program (average of 24% during these baseline sessions). However, there appeared to be no such sequence effect on indices of unhappiness during the program. Indices of unhappiness averaged 9% during the program sessions when the program sessions preceded baseline sessions and 7% when the baseline sessions preceded the program sessions. When the baseline-only condition was reinstated, unhappiness indices increased to an average of 29% (range, 0% to 55%), although not to the average observed during the original baseline. When the unhappiness reduction program was then reintroduced, indices of unhappiness decreased to an average of 9% (range, 0% to 25%).

#### *Happiness Indices*

Results for indices of happiness were variable across the 3 participants. For Ms. Tucker and Ms. Rose, happiness indices

were very infrequent. Ms. Tucker never displayed any indices of happiness, and Ms. Rose displayed happiness indices during only one session, which occurred during follow-up while the unhappiness reduction program was in effect. By contrast, happiness indices for Ms. Burns were more frequent and tended to have an inverse relationship to indices of unhappiness. Happiness indices for Ms. Burns averaged 5% during baseline (range, 0% to 28%) and 8% (range, 0% to 35%) during the first unhappiness reduction program (which was not accompanied by changes in unhappiness indices). However, during the second program implementation in which unhappiness indices were reduced substantially (Figure 1), indices of happiness increased to an average of 24% (range, 0% to 65%). During follow-up, happiness indices were variable, with no occurrence during two sessions and a 15% occurrence during one session.

## DISCUSSION

Results indicate that the unhappiness reduction program was accompanied by decreases in indices of unhappiness that routinely occurred during important exercise routines developed by a physical therapist. When preferred stimuli were presented before, during, and after the exercise routines, reductions occurred for each of the 3 participants who had profound multiple disabilities. For the 2 individuals for whom follow-up observations were available, the reductions and actual elimination of indices of unhappiness were maintained across a period of 7 weeks. For Ms. Burns, the unhappiness reduction program was also accompanied by some increases in indices of happiness.

Although reductions in indices of unhappiness occurred for each participant, an alteration of the program was necessary before reductions were apparent for Ms. Burns. Specifically, the preferred stimuli provided

during the program were changed. When the stimuli were changed to rocking in a hammock, noticeable reductions in unhappiness indices occurred. One explanation for the effects of the hammock compared to the other preferred stimuli (rubs on the arm and activation of a musical toy) is that, based on the systematic preference assessment, the hammock was a more strongly preferred stimulus (i.e., the hammock was approached on 100% of assessment trials, whereas the other stimuli were approached on less than 100% but more than 80%). The hammock was not used initially because of the effort and time that would be required to repeatedly position Ms. Burns in and out of the hammock. However, after testing alternatives, it was determined that the exercise routine could be completed with Ms. Burns positioned in the hammock throughout the routine, so that using the hammock as a preferred stimulus as part of the unhappiness reduction program became more practical.

In evaluating effects of the program, several experimental design manipulations with Ms. Rose were conducted before functional control of the program became evident. During the alternating treatments presentation of the program with the traditional exercise routine, there were reductions in unhappiness indices during both of the two types of sessions. One explanation for the reduction during the alternating baseline sessions is a carryover effect from the program sessions. As indicated previously, unhappiness indices were observed less often during baseline sessions that followed program sessions relative to baseline sessions that preceded program sessions. It may also be that simply providing two exercise sessions per day, as occurred during the alternating treatments condition (in contrast to one session per day in the baseline-alone and program-alone conditions), was responsible for the reduction in unhappiness indices. In this regard, the physical therapist who designed

and supervised implementation of the exercise activities indicated that toward the end of the alternating treatments condition and the subsequent baseline-only condition, Ms. Burns appeared to have increased flexibility in her joints. Increased flexibility likely made the exercises less uncomfortable for Ms. Burns. The physical therapist also suggested that the improvement in flexibility may have been a result of the increased number of exercise sessions conducted during the alternating treatments condition. Such an explanation might likewise relate to why unhappiness indices during the second baseline-alone condition were less common than during the first baseline-alone condition (i.e., during the latter condition, improvement in flexibility had occurred relative to the first condition). Future research could address the issue of number of sessions per day, in conjunction with consultation from appropriate movement therapists, as a means of reducing unhappiness indices that occurred during exercise activities. However, the baseline-alone and program-alone conditions that followed the alternating treatments condition, with respective increases and decreases in unhappiness indices, indicated that the program resulted in fewer indices of unhappiness than did the traditional exercise routine.

Although each component of the unhappiness reduction program involved presentation of preferred stimuli, the temporal nature or contingency with which the stimuli were presented varied across program components. Future research should determine whether all four components are necessary for reducing indices of unhappiness. Reducing the procedural components of the unhappiness reduction program may enhance the ease with which it is implemented by support personnel. We note that implementing the program added approximately 20 min to the amount of time required to conduct the exercise routine with each par-



ticipant. Even though the extra time did not appear to cause problems for the assistants who conducted the exercises, reducing or eliminating components may reduce the amount of time and response effort necessary for implementing the procedures.

As with previous research on happiness-related variables, it should be stressed that the measures of unhappiness are most accurately referred to as *indices* of unhappiness. Unhappiness is generally considered a private event and, as such, is not readily amenable to direct behavioral study with the more typical behavior analysis methodologies (cf. Ivancic et al., 1997). Support for the indices of unhappiness defined in this investigation as representing the private event of unhappiness among individuals with profound multiple disabilities exists with previous social validity investigations involving the definitions (e.g., Green & Reid, 1996). As such, the measures represent one of the few research-based means of evaluating unhappiness among people whose disabilities are so severe that they cannot describe their private events. Nevertheless, because the targeted behaviors represent indirect measures of the private event of unhappiness, the results should be interpreted accordingly.

In addition to the issue of attempting to measure private events such as unhappiness, there are two other areas in which implementation and interpretation of effects of the unhappiness reduction program warrant caution. First, because one component of the program involved temporarily discontinuing an exercise and providing a preferred stimulus when indices of unhappiness were observed, there is a risk of reinforcing unhappiness indices. No indication of such a reinforcement effect was apparent in the current study, perhaps because the assistant always returned to the specific exercise and completed it with the participant. Nevertheless, careful monitoring of the possibility of increasing unhappiness indices in this man-

ner should be included during implementation of the program. A second caution pertains to the performance of the assistant to ensure that his or her behavior does not represent a potential confounding variable to the effects of the program due to, for example, different rates of praise. Throughout this study, an experimenter conducted periodic probes using a prepared observation sheet regarding the degree to which each of the eight exercise routines and presentation of preferred stimuli occurred as planned. There was no indication of unplanned changes in staff behavior during the program relative to baseline sessions. However, because quantified measures of praise presentations were not included in the probes, such a source of potential confounding effects cannot be totally discounted.

In light of the previously reported social validity support for the indices of unhappiness and the reductions in the indices accompanying the unhappiness reduction program in this investigation, additional research in this area is warranted. In particular, more comprehensive observations of the potential occurrence of unhappiness indices across a wider variety of typical routines in the lives of people with profound multiple disabilities are needed in order to determine possible activities that are unpleasant. Subsequently, evaluations of procedures for reducing the unpleasantness (e.g., through the unhappiness reduction program) could be conducted. Objectively identifying and reducing sources of unhappiness during routine activities seems to represent one means through which support personnel can enhance the quality of life of people with very significant disabilities.

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## STUDY QUESTIONS

1. How does this study differ from previous research on affective states (e.g., “happiness”) of individuals with severe disabilities?
2. Describe the dependent variables that were measured in the study. What other behavioral correlates (not measured) might serve as indicators of the affective states under investigation?
3. What was the target activity and its purpose?
4. Describe the four components of the “unhappiness reduction program” in terms of reinforcement contingencies and schedules.
5. How is the depiction of the data for Ms. Burns and Ms. Tucker (Figure 1) different from that typically seen in a multiple baseline design?
6. Describe the results that were obtained for the 3 participants.

7. What explanations do the authors provide to account for Ms. Rose's behavior during the multielement phase of her treatment evaluation? What points of clinical interest might be inferred from these explanations?
8. What potential problem might result from delivering reinforcers contingent on unhappiness indices, and what might account for the fact that this problem was not observed during the course of the study?

Questions prepared by Juliet Connors and Gregory Hanley, The University of Florida