
ASSESSING INDICES OF HAPPINESS AND UNHAPPINESS IN INDIVIDUALS WITH DEVELOPMENTAL DISABILITIES: A REVIEW

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The behavioral deficits of individuals with profound multiple disabilities (PMD) make it difficult to assess their satisfaction and quality of life. To address this problem, researchers have recently evaluated affective behavior (i.e., indices of happiness and unhappiness) to document the effects of therapeutic interventions and to assist with clinically relevant decisions. We review the recent literature on indices of happiness and unhappiness and discuss its major themes. In addition, potential concerns with this technology are discussed and clinical recommendations are provided. Copyright © 2007 John Wiley & Sons, Ltd.

INTRODUCTION

Current diagnostic criteria for mental retardation are impaired general intellectual functioning and significant limitations in adaptive behavior, both appearing before the age of 18 (American Psychiatric Association, 2000). Approximately 85% of individuals with mental retardation meet diagnostic criteria for mild mental retardation, with the remaining individuals meeting diagnostic criteria for moderate, severe, or profound mental retardation (American Psychiatric Association, 2000). Some individuals with more severe forms of mental retardation suffer from a variety of debilitating physical disabilities. Individuals in this subset of the population are sometimes referred to as having *profound multiple disabilities* (PMD; Ivancic & Bailey, 1996). These individuals are often non-ambulatory with little motor control and may have other physical disabilities including severe spasticity, muscle rigidity, and sensory impairment (Reid, Phillips, & Green, 1991). Such individuals often have severe adaptive-behavior deficits and are often completely dependent on their caregivers (Bailey, 1981).

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In a review of the early literature involving individuals with PMD, Reid et al. (1991) summarized evidence that operant procedures could be effectively used with this population. Behavioral targets in early studies included hand raising (Fuller, 1949), eye blinking (Brownfield & Keehn, 1966), and lever pressing (Haskett & Hollar, 1978). Building on this early work, subsequent researchers attempted to create more meaningful behavioral change. Behavioral targets in these latter studies included improving postural control (Grove, Dalke, Fredericks, & Crowley, 1975) and other adaptive behavior such as smiling (Sternberg, Pagnatore, & Hill, 1983), manipulation of leisure items (Jones, Favell, Lattimore, & Risley, 1984), and activation of leisure materials (e.g., music) using microswitches (Wacker, Berg, Wiggins, Muldoon, & Cavanaugh, 1985).

A major theme in recent research with individuals with PMD has been the assessment of individual preference (e.g., Pace, Ivancic, Edwards, Iwata, & Page, 1985). However, such research is sometimes difficult because individuals with PMD are often unable to effectively communicate and exhibit little motor behavior (Green & Reid, 1999a). To address this difficulty, behavioral researchers have extended the body of research on identifying preferences by including affective behavior as a dependent variable. Early researchers (i.e., Realon, Favell, & Phillips, 1989) investigated the frequency of smiles and interaction with a given item to determine preference. More recently, this research has frequently employed the terms 'indices of happiness and unhappiness' to describe its focus (e.g., Green & Reid, 1996; Davis, Young, Cherry, Dahman, & Rehfeldt, 2004). Indices of happiness and unhappiness are facial expressions and vocalizations typically considered to correspond to respective private sensations among people without disabilities. Thus, happiness indices include smiling, laughing, and yelling while smiling; unhappiness indices include frowning, grimacing, crying, and yelling without smiling (Green & Reid, 1996).

The purpose of the current article is to review the recent literature on indices of happiness and unhappiness with individuals with PMD. Two methods were used to identify articles to be included in this review. First, articles were identified using a PsychINFO search, using the keywords indices of happiness and indices of unhappiness. Second, an ancestral search was conducted by examining the reference lists of articles identified through the PsychINFO search. Articles including the keywords indices of happiness and unhappiness were reviewed and selected for inclusion in the manuscript. This review begins with a summary of the lead article in this line of research (Green & Reid, 1996), followed by a review of the literature's fundamental themes. We then discuss the benefits and limitations of using indices of happiness and unhappiness with individuals with PMD. Finally, we provide recommendations for assessing indices of happiness and unhappiness in clinical practice.

GREEN AND REID (1996)

In a three-phase investigation, Green and Reid (1996) introduced and validated a method that has served as the standard in this literature. The authors first provided operational definitions of the two index classes. The definitions of these classes reflect indicators of happiness or unhappiness observed in typically developing people. The initial step in the validation of the aforementioned indices was to correlate them with stimulus preference. The authors used a duration-based preference assessment to identify one preferred and one non-preferred item for four children with PMD. The percentage of intervals in which indices of happiness or unhappiness were observed was recorded during the presentation of each item. The authors found that two participants engaged in more indices of happiness with the preferred item compared to the non-preferred item. These same participants displayed no indices of unhappiness. The other two participants displayed more indices of unhappiness when the non-preferred item was presented compared to the preferred item. These two participants displayed no indices of happiness. These data suggest a relation between stimulus preference and indices of both happiness and unhappiness.

For further validation, Green and Reid (1996) presented videotapes of sessions from the first study to practitioners (i.e., teacher assistants, group-home managers), some of whom had experience with the participants and some of whom did not. The practitioners were presented with videotapes showing short segments of sessions with each participant and were asked to subjectively rate, using a 7-point Likert scale, the level of happiness each participant appeared to experience. Ratings corresponded with the objective data collected in the first study. That is, the two participants who displayed indices of happiness were rated as happier than the two who did not. The two participants who displayed more indices of unhappiness were rated as unhappier than the two participants who did not. These subjective outcomes provided the initial support for the use of direct observation of indices of happiness and unhappiness with individuals with PMD.

In their final phase, Green and Reid (1996) sought to demonstrate that indices of happiness could be increased through environmental manipulation. The authors recorded the percentage of intervals in which indices of happiness occurred both before and after the implementation of a 'fun time' program, a three-component program designed to increase participants' contact with preferred stimuli. The components included in this program were (a) the non-contingent presentation of preferred stimuli, (b) social interaction between a teacher assistant and the participant in ways believed to be preferred by the participant, and (c) the presentation of preferred stimuli or removal of non-preferred stimuli contingent upon indices of happiness or unhappiness, respectively. The authors demonstrated that this program resulted in increases in indices of happiness for all three of their participants with

PMD, providing evidence that these indices can be altered through environmental manipulation. This finding laid the groundwork for future investigations that actively sought to increase indices of happiness.

RESEARCH ON INDICES OF HAPPINESS AND UNHAPPINESS

The methodology employed by Green and Reid (1996) has influenced a number of subsequent studies in this area. These studies are reviewed in the following sections and are organized based on their primary purpose.

Increasing Indices of Happiness

Seven studies have directly manipulated environmental events in an attempt to increase the frequency of indices of happiness. Ivancic, Barrett, Simonov, and Kimberly (1997) replicated the Green and Reid (1996) investigation. Seven participants were divided into two groups following a 10-min observation to determine their activity level. Four participants who were alert and engaged in relatively normal levels of motor movement were considered the 'movement' group, while the remaining three participants were considered the 'minimal movement' group. Participants were then exposed to the fun-time program developed by Green and Reid (1996). Three of four participants in the movement group displayed an increase in indices of happiness when preferred stimuli were presented, replicating the previous results. The other participant in the movement group showed a decrease in indices of unhappiness. Interestingly, the participants in the minimal movement group did not display increases in indices of happiness.

The Ivancic et al. (1997) study differed from the Green and Reid (1996) study in that preferred stimuli were selected using caregiver report instead of a systematic preference assessment. Additionally, Ivancic et al. employed a classification variable (i.e., level of movement/alertness) to determine for which participants the fun-time program would be more effective. Members of the minimal movement group did not show increases in happiness indices during the program, suggesting that the assessment of indices of happiness might not be appropriate for these individuals.

Lancioni, O'Reilly, Campodonico, and Mantini (2002) evaluated the effects of staff-nominated preferred stimuli on indices of happiness of four individuals with PMD. When participants were presented with non-contingent preferred stimuli, increases in positive engagement and indices of happiness were observed. These findings replicate those obtained by Ivancic et al. (1997) in that caregiver nomination, rather than a stimulus preference assessment, was used to identify preferred stimuli.

Green, Gardner, and Reid (1997) also replicated and extended the Green and Reid (1996) investigation by comparing the effects of preferred stimuli identified by caregivers with preferred stimuli identified by a systematic preference assessment on indices of happiness. The authors did not replicate the findings of Ivancic et al. (1997) or Lancioni, O'Reilly, Campodonico et al. (2002) because preferred items identified by caregivers did not produce a consistent increase in indices of happiness. For two of three participants, the fun-time program was more effective in increasing indices of happiness when based on systematically assessed versus caregiver-nominated stimuli. These findings correspond to the consensus in the applied literature that client-based preference assessments are more effective for identifying reinforcers than caregiver nomination (e.g., Green, Reid, White, Halford, Brittain, & Gardner, 1988). The authors also collected data on indices of unhappiness, which occurred infrequently for all participants in the study.

Davis et al. (2004) conducted a component analysis of Green and Reid's (1996) fun-time program, to determine whether providing participants with social interaction alone was as effective in increasing indices of happiness as providing participants with social interaction and preferred items. Using a multielement design, standard classroom programming was compared with two conditions: social interaction and social interaction plus preferred items for three participants with PMD. For all three participants, social interactions plus preferred items resulted in the most indices of happiness, although both social interactions with and without preferred items were superior to the standard classroom program.

Favell, Realon, and Sutton (1996) conducted a series of short studies designed to document the effects of environmental events on a happiness score (including positive and negative affective behavior) and increase the happiness score by manipulating environmental events. Each of these studies involved participants with PMD. In their first study, indices of happiness and unhappiness were observed during leisure activities (e.g., music time) and short walks. Higher happiness scores were observed during walking, with lower scores consistently observed during leisure activities, providing some support that indices of happiness may be used as a measure of preference for this population. In another study, researchers attempted to increase indices of happiness by providing participants with a 'positive environment program,' which involved interacting with participants on a one-to-one and group basis, as well as providing participants with leisure materials. Mixed results were obtained, with 14 of 20 participants showing increases in indices of happiness, and the remaining participants showing decreases in or comparable levels of indices of happiness. In the final study, Favell et al. demonstrated that providing one participant with conversation opportunities with staff members increased indices of happiness.

Realon, Bligen, La Force, Helsel, and Goldman (2002) employed environmental enrichment to increase indices of happiness of individuals with PMD. Alertness, defined as being awake and not drowsy, and affect (i.e., a score on a happiness index) were measured

prior to and after training staff to use the 'positive environment program' (as described above) when interacting with participants. Overall, increases in indices of happiness, as well as alertness, were observed. However, one participant (out of 19) showed a decrease in both indices of happiness and engagement, nine participants showed no increase in engagement, and three participants showed no increase in indices of happiness.

Singh, Lancioni, Winton, Wahler, and Singh (2004) employed an alternative method to increase indices of happiness of three adults with PMD. Three of six staff members were provided with mindfulness training, which consisted of providing the caregiver with information on the philosophy of mindfulness (e.g., focusing on the moment), leading the caregiver in a series of meditation exercises, and requiring the caregiver to read a book on the philosophy of mindfulness. Subsequently, clients displayed more indices of happiness when interacting with staff members who received this training compared to those who did not. Because mindfulness training teaches individuals to focus their thoughts and attention 'in the moment,' it is possible that such training increased staff member attentiveness to client behavior, possibly resulting in a richer, more client-centered interaction. Such interactions, as observed in other investigations (e.g., Davis et al., 2004; Green & Reid, 1996), have been shown to increase indices of happiness in individuals with PMD.

Collectively, the aforementioned studies demonstrate that indices of happiness can be increased using environmental manipulations based on preferred stimuli, individual-centered interactions, and, in one case, by training staff to be more 'mindful' (Singh et al., 2004). The evidence suggests that such manipulations are most likely to reliably affect indices of happiness when (a) preferred stimuli are identified using stimulus preference assessments (Green et al., 1988; Green, Reid, Canipe, & Gardener, 1991; Green et al., 1997) and (b) individuals are alert and not minimally responsive (Ivancic et al., 1997). However, there is some support for identifying preferred stimuli via staff nomination when the stimulus is considered 'the most preferred stimulus' by familiar staff (Fisher, Piazza, Bowman, & Amari, 1996; Ivancic et al., 1997; Lancioni, O'Reilly, Compodonico et al., 2002), as opposed to asking staff to identify the client's most preferred stimulus from an arbitrarily derived stimulus list.

Decreasing Indices of Unhappiness

Several studies (e.g., Green et al., 1997; Green & Reid, 1996; Ivancic et al., 1997) have assessed indices of unhappiness as a secondary measure to the assessment of indices of happiness. For example, in an attempt to increase indices of happiness, Green and Reid (1996) reported two individuals who displayed decreases in indices of unhappiness, even though they did not display corresponding increases in indices of happiness. To date, only two studies have primarily focused on reducing indices of unhappiness. First, Green and Reid (1999b) implemented a four-component program

to reduce indices of unhappiness during an exercise routine for three individuals with PMD. The four components in this program included presenting preferred stimuli, identified via formal assessment, before the beginning of the exercise routine, at fixed intervals while the participant was exercising, when the participant displayed indices of unhappiness while exercising, and immediately following the completion of the exercise routine. All participants displayed fewer indices of unhappiness as a result of this program. A multielement design was employed to evaluate the program for one of these participants. The comparison condition in the design was the individual's traditional exercise program, which did not include access to preferred stimuli. Interestingly, a carryover effect was observed in that indices of unhappiness occurred less frequently in traditional-exercise sessions when they were alternated with sessions of the four-component program than when they were implemented consecutively in adjacent phases. This finding suggests the authors' program produced behavioral maintenance, albeit across a somewhat limited timeframe.

In a subsequent investigation, Green, Reid, Rollyson, and Passante (2005) implemented the four-component program described above with three individuals with PMD during various habilitative tasks (e.g., scooping food with a spoon). The authors sought to reduce participant resistance (e.g., pulling away) to the program, as well as indices of unhappiness. Decreases in resistance and indices of unhappiness were observed for all participants. Improvements were also demonstrated in task completion and staff teaching proficiency.

The results of the studies on decreasing indices of unhappiness, along with the aforementioned investigations on increasing indices of happiness, demonstrate the mutability of affective behavior of individuals with PMD. Given the paucity of research in this area, additional research is warranted on programs that are capable of reducing indices of unhappiness. However, we caution against providing preferred stimuli contingent on indices of unhappiness because of the potential reinforcement effect that might ensue. That is, contingent preferred stimuli could increase indices of unhappiness. The Green and Reid (1999b) and Green et al. (2005) investigations did not demonstrate such an outcome, probably because preferred stimuli were also presented independent of indices of unhappiness. We urge future researchers to behave similarly by providing response-independent stimuli when those same stimuli are provided contingent on indices of unhappiness. Finally, it might be advisable to assess indices of both happiness and unhappiness during programs designed to increase indices of happiness in the event that they do not change, but indices of unhappiness do.

Evaluating Activities Using Indices of Happiness

The previously mentioned studies sought to change the affective behavior of individuals with PMD. However, eight studies in this literature have also employed

indices of happiness, not as a target of change, but to evaluate activities for individuals with PMD. For example, Green and Reid (1999a) evaluated indices of happiness across leisure (e.g., listening to music) and habilitation (e.g., drinking through a straw) tasks with five participants with PMD. Four participants displayed more indices of happiness during the leisure task compared to the habilitation task and one of these four also demonstrated more indices of unhappiness during the habilitative task. A fifth participant rarely displayed indices of happiness, but displayed more indices of unhappiness during the habilitative task.

In a similar investigation, Yu et al. (2002) evaluated indices of happiness across leisure and work tasks with two groups of individuals (i.e., severe vs. profound disabilities). The authors demonstrated that the majority of participants in each group displayed greater indices of happiness during leisure activities compared to work activities. Furthermore, the group of individuals with severe disabilities displayed greater differences between activity types compared to the group with more profound disabilities. These results parallel those observed by Ivancic et al. (1997) who found that a stimulation program produced fewer indices of happiness for individuals displaying little motor behavior compared to individuals who were more active.

Logan, Jacobs, Gast, Murray, Daino, and Skala (1998) compared levels of indices of happiness observed in five children with PMD during interactions with typically developing peers and during interactions with peers with PMD. In all cases, participants showed more indices of happiness when interacting with typically developing peers. However, due to the severity of the disabilities experienced by the peers with PMD, it is likely that they were unable to interact with target peers in ways that would result in higher levels of indices of happiness (e.g., talking to the participant). Therefore, the higher levels observed during interactions with typical peers may have resulted from a greater number of interactions.

The findings of Green and Reid (1999a), Yu et al. (2002), and Logan et al. (1998) have at least two notable implications. First, the correlation of indices of happiness with leisure activities, especially those with increased social opportunities, appears to provide modest validation of this approach. Second, the fact that affective behavior occurred differentially across activities has implications for the use of indices of happiness to aid in the identification of preferred activities for individuals with PMD.

Two investigations have employed indices of happiness in the evaluation of work options for individuals with PMD. Reid, Green, and Parsons (1998) used indices of happiness to evaluate preference of the type and location of various work activities. The authors observed indices of happiness of four individuals with PMD in center-based and supported work (i.e., community) experiences. Two of the four participants displayed more indices of happiness during supported work experiences and two participants displayed similar affective behavior in both contexts. In a related study, Parsons, Reid, and Green (2001) evaluated indices of happiness and

unhappiness during various work activities for participants with PMD. Two participants displayed differentially more indices of happiness than unhappiness across various tasks and a third participant displayed the opposite pattern. The authors then correlated task engagement with indices of happiness and unhappiness and found modest correspondence between the variables. The most salient finding in this study was that participants differentially displayed affective behavior across specific tasks (rather than task areas such as leisure vs. work).

Lancioni, O'Reilly, Singh, Oliva, and Groeneweg (2002) used indices of happiness to evaluate enrichment activities for three individuals with PMD. The authors evaluated indices of happiness during periods of non-contingent and contingent (via a microswitch) stimulation. Although non-contingent and contingent stimulation both produced more indices of happiness compared to a baseline condition that included familiar stimuli, there were no significant differences between stimulation conditions. Lancioni, O'Reilly, Singh, Oliva, Campodonico, and Groeneweg (2003) demonstrated similar findings for two of the three participants 5–6 months later. The third participant displayed slightly more indices of happiness during the contingent stimulation program. This participant's outcome is similar to findings reported by Hanley, Piazza, Fisher, Contrucci, and Maglieri (1997) who found that two individuals with mental retardation preferred functional communication training to non-contingent reinforcement when given the choice. Although both treatments had previously been shown equally effective in reducing destructive behavior, participants preferred the intervention in which reinforcer delivery was under their control.

Using Indices of Happiness to Assess Social Validity

The studies described above (Evaluating Activities Using Indices of Happiness) employed indices of happiness to document that such indices could occur differentially across tasks, settings, and types of stimulation. Seven studies have extended such efforts by using indices of happiness to more explicitly draw inferences about consumer satisfaction when primary dependent variable data are also available for evaluation. In other words, these studies have employed indices of happiness to assess social validity (Wolf, 1978) of various environmental manipulations.

Lancioni, Singh, O'Reilly, Oliva, Campodonico, and Groeneweg (2004) used indices of happiness to assess the effects of an exercise improvement program. Two individuals with PMD received contingent preferred stimuli, identified using a single-stimulus preference assessment, for responses on a stationary bicycle and stepper machine. The authors demonstrated increases in exercise responses and indices of happiness for both participants. Two potential mechanisms of action could have been responsible for the observed changes. The contingent preferred stimuli could have increased the reinforcing properties of exercise (an establishing

operation) or decreased the aversive properties of exercise, possibly as a result of increased flexibility (an abolishing operation). Both of these mechanisms could conceivably result in increased indices of happiness.

Lancioni and colleagues replicated the aforementioned findings across a variety of exercise and habilitative activities including walker use (Lancioni, Singh, O'Reilly, Campodonico et al., 2005), foot and leg movements (Lancioni, O'Reilly, Singh, Campodonico, Marziani, & Oliva, 2004; Lancioni, Singh, O'Reilly, Piazzolla, Pidala, & Oliva, 2005), and stationary bicycle use (Lancioni, Singh, O'Reilly, Campodonico, Oliva, & Groeneweg, 2004). Two investigations from this group produced mixed findings. Lancioni, Singh, O'Reilly, Oliva, Campodonico, and Groeneweg (2003) provided preferred stimuli contingent upon the exercise responses to a stationary bicycle and stepper machine by three individuals with PMD. One of three participants demonstrated increases in bicycle peddling and two of the three participants demonstrated increases in steps. All participants displayed more indices of happiness on the stationary bicycle, but only two of the three participants demonstrated more indices of happiness on the stepper machine. Thus, some participants displayed increased indices of happiness in the absence of increased exercise. Similarly, Lancioni, O'Reilly, Singh, Oliva, Piazzolla, and Groeneweg (2004) demonstrated that while a stimulation program reduced the problem behavior of two individuals with PMD, only one of them displayed increased indices of happiness.

Lindauer, DeLeon, and Fisher (1999) investigated the effects of environmental enrichment on the self-injurious (SIB) and affective behavior of a woman with PMD. The enriched environment was created by placing preferred stimuli, identified with a single-stimulus preference assessment, in the immediate environment. Environmental enrichment eliminated SIB, increased indices of happiness, and reduced indices of unhappiness. The authors noted that environmental enrichment requires fewer staff resources than the fun-time program evaluated in earlier studies (e.g., Green & Reid, 1996) and, therefore, might be an attractive treatment alternative.

The studies reviewed in this section lend support to the notion that providing additional stimuli during lesser or non-preferred activities (e.g., exercising) may result in increased responding and increased indices of happiness. While indices of happiness (and unhappiness) are potentially important measures of social validity, their use raises some questions. For example, consider an activity that produces a demonstrated therapeutic outcome (e.g., increased mobility), but does not also increase indices of happiness. This outcome might be obtained for at least three reasons: (a) the individual's affective behavior is not particularly mutable (e.g., Fran in Green et al., 1997), (b) the therapeutic activity is not particularly enjoyable, or (c) the therapeutic activity is aversive. This situation presents a significant challenge to the clinician who must determine whether to retain, modify, or eliminate the therapeutic activity. Although any assessment of social validity is capable of

producing this interpretation problem (Schwartz & Baer, 1991), we believe the problem is particularly troublesome in this instance as the research on indices of happiness and, more importantly, a resultant clinical technology are not yet well developed.

An additional use for this technology as a social validity measure may include observing fluctuations in indices of happiness and unhappiness across the course of a day, as opposed to measuring indices of happiness during a given activity. Measuring indices of happiness across the course of a day may provide information regarding times of the day or daily activities during which a client is more likely to engage in indices of unhappiness. Clinicians can then use this information to schedule an increased number of pleasurable activities during this time, or to add pleasurable stimuli to less enjoyable activities, which may help to increase clients' quality of life.

POTENTIAL BENEFITS AND LIMITATIONS WITH THE TECHNOLOGY

Given the adaptive-behavior deficits of individuals with PMD, we believe the clinical use of indices of happiness offers the possibility of substantial clinical benefit. Quite simply, the absence of indices of happiness or presence of indices of unhappiness can cause occasional changes in programming. By observing affective behavior, work, leisure, and therapeutic activities can be added to or subtracted from an individual's support plan to ensure greater quality of life. Furthermore, the use of the technology is consistent with the philosophies of person-centered planning and self-determination.

Despite the potential benefit offered by this technology, there are a few concerns with its use. First, relations between indices of happiness and unhappiness and presumed private events (e.g., the physical sensation of elation) are difficult to establish in individuals with communication impairment. It has been shown that children with developmental disabilities exhibit positive affective behavior later than typically developing children (Blacher, 1984; Schillace, 1964). Additionally, it is possible for a person to experience a pleasurable internal feeling without engaging in any overt indicators of this behavior. For example, a person watching a sad movie may be enjoying the movie, but may not show any overt indicators of happiness, and may, in fact, show overt indicators of sadness. Therefore, overt indicators may not always match the internal experience of an individual. Furthermore, affective behavior has been shown to be amenable to environmental contingencies (Cooke & Apolloni, 1976; Jones & Hong, 2005). These findings offer the possibility that differences can exist between affective behavior and presumed private sensations among individuals with developmental disabilities (these differences probably differ to some degree

between individuals without disabilities). Such uncertainty should be acknowledged when implementing a technology of affective behavior.

A second concern, which was mentioned earlier, is that it is unclear what a clinician should do when measures of increased adaptive behavior or reduced problem behavior do not correspond with predicted changes in indices of happiness or unhappiness. There is a risk that despite obvious clinical benefit (e.g., a substantial reduction in SIB), useful therapeutic interventions might be discounted unless they produce corresponding changes in affective behavior. We believe this risk to be greater when clinicians who have limited training or paraprofessionals are making clinical decisions.

A final, albeit less significant, concern is the drift from operationalizing an internal construct (i.e., increasing *indices* of happiness) to its reification (e.g., increasing *happiness*). This drift appears to have already occurred, as early studies were quite exact in their vocabulary, while more recent studies have begun referring to 'happiness' as their dependent variable. Given the uncertainty of how well public affective behavior and private sensations correspond for individuals with PMD, we believe it is especially important to keep our language focused on public, observable behavior (see Malott, 2002).

Even with the aforementioned concerns, we realize that there are few alternatives for assessing preference and quality of life for individuals with PMD and we value this approach as a useful supplement to existing clinical methods. In fact, the development of the technology reviewed in this article was driven by the defining limitations of this population. Given the concerns articulated herein, however, we strongly recommend that this technology be reserved for individuals with no other way to express preference. Populations that may benefit from the use of this technology to measure preference include individuals with PMD, as well as individuals who have lost the ability to communicate preference, such as those individuals with severe dementia or who have experienced a traumatic brain injury.

CLINICAL RECOMMENDATIONS

We offer the following practice recommendations based on the existing literature on using indices of happiness and unhappiness with individuals with PMD. First, the technology should be reserved for environments in which reliable, direct-observation data collection systems (e.g., partial-interval recording) can be implemented. Collecting valid data on indices of happiness and unhappiness is labor-intensive and requires trained staff. Although using subjective data systems (e.g., rating scales) might seem to be a reasonable alternative for environments where objective systems are not feasible, the concerns regarding the clinical use of affective behavior at all lead us to strongly caution against less rigorous data collection methods. Second, data collection systems should be individualized. Although Green and Reid (1996) provided a thorough definition of

indices of happiness and unhappiness, it is likely that each individual may display idiosyncratic affective behavior necessitating a customized data system. For example, one person may yell while smiling to indicate happiness while another may clap his or her hands. In order for accurate data on the frequency of indices of happiness to be collected, the operational definition used to identify these indices must be individualized to reflect the particular overt behaviors that person engages in to express pleasure. Third, if possible, data should be collected on another primary dependent variable such that data on indices of happiness or unhappiness can be evaluated alongside less ambiguous dependent variables. For example, Lancioni, O'Reilly, Campodonico et al. (2002) measured positive engagement and indices of happiness. This allowed researchers to state that indices of happiness increased as positive engagement increased, possibly providing further validation for the idea that indices of happiness can be reflective of a pleasurable internal experience. Finally, all data collected on indices of happiness should be interpreted with caution. As demonstrated repeatedly, indices of happiness can be manipulated by external environmental events (e.g., Cooke & Apolloni, 1976; Green & Reid, 1996). Therefore, it is possible that indices of happiness may be under the control of spurious variables and not be representative of presumed private sensations. For example, in some cases described in the literature, indices of happiness should have increased as a result of increased access to preferred stimuli or interactions with caregivers, however, no such increase was observed (e.g., Green et al., 1997; Realon et al., 2002). Until we can better predict such apparent discrepancies, a more conservative interpretation of indices of happiness and unhappiness seems to be warranted.

CONCLUSION

To date, the research has shown that indices of happiness and unhappiness can be changed through environmental manipulation, can occur differentially across activities and environments, and can be used along with primary dependent variable data to make clinical decisions. The research described in this article represents an interesting and important starting point for incorporating affective behavior of individuals with PMD into their clinical supports.

REFERENCES

- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders – text revision* (4th ed.). Washington, DC: Author.
- Bailey, J. S. (1981). Wanted: A rational search for the limiting conditions of habilitation in the retarded. *Analysis and Intervention in Developmental Disabilities, 1*, 45–52.

- Blacher, J. (1984). Attachment and severely handicapped children: Implications for intervention. *Journal of Developmental and Behavioral Pediatrics, 5*, 178–183.
- Brownfield, E. D., & Keehn, J. D. (1966). Operant eyelid conditioning in Trisomy-18. *Journal of Abnormal Psychology, 71*, 413–415.
- Cooke, T. P., & Apolloni, T. (1976). Developing positive social-emotional behaviors: A study of training and generalization effects. *Journal of Applied Behavior Analysis, 9*, 65–78.
- Davis, P. K., Young, A., Cherry, H., Dahman, D., & Rehfeldt, R. A. (2004). Increasing the happiness of individuals with profound multiple disabilities: Replication and extension. *Journal of Applied Behavior Analysis, 37*, 531–534.
- Favell, J. E., Realon, R. E., & Sutton, K. A. (1996). Measuring and increasing the happiness of people with profound mental retardation and physical handicaps. *Behavioral Interventions, 11*, 47–58.
- Fisher, W. W., Piazza, C. C., Bowman, L. G., & Amari, A. (1996). Integrating caregiver report with a systematic choice assessment to enhance reinforcer identification. *American Journal on Mental Retardation, 101*, 15–25.
- Fuller, P. R. (1949). Operant conditioning of a vegetative human organism. *The American Journal of Psychology, 62*, 587–590.
- Green, C. W., Gardner, S. M., & Reid, D. H. (1997). Increasing indices of happiness among people with profound multiple disabilities: A program replication and component analysis. *Journal of Applied Behavior Analysis, 30*, 217–228.
- Green, C. W., & Reid, D. H. (1996). Defining, validating, and increasing indices of happiness among people with profound multiple disabilities. *Journal of Applied Behavior Analysis, 29*, 67–78.
- Green, C. W., & Reid, D. H. (1999a). A behavioral approach to identifying sources of happiness and unhappiness among individuals with profound multiple disabilities. *Behavior Modification, 23*, 280–293.
- Green, C. W., & Reid, D. H. (1999b). Reducing indices of unhappiness among individuals with profound multiple disabilities during therapeutic exercise routines. *Journal of Applied Behavior Analysis, 32*, 137–147.
- Green, C. W., Reid, D. H., Canipe, V. S., & Gardener, S. M. (1991). A comprehensive evaluation of reinforcer identification process for persons with profound multiple handicaps. *Journal of Applied Behavior Analysis, 24*, 537–552.
- Green, C. W., Reid, D. H., Rollyson, J. H., & Passante, S. C. (2005). An enriched teaching program for reducing resistance and indices of unhappiness among individuals with profound multiple disabilities. *Journal of Applied Behavior Analysis, 38*, 221–233.
- Green, C. W., Reid, D. H., White, L. K., Halford, R. C., Brittain, D. P., & Gardner, S. M. (1988). Identifying reinforcers for persons with profound handicaps: Staff opinion versus systematic assessments of preferences. *Journal of Applied Behavior Analysis, 21*, 31–43.
- Grove, D. N., Dalke, B. A., Fredericks, H. D., & Crowley, R. F. (1975). Establishing appropriate head positioning with mentally and physically handicapped children. *Behavioral Engineering, 3*, 53–59.
- Hanley, G. P., Piazza, C. C., Fisher, W. W., Contrucci, S. A., & Maglieri, K. A. (1997). Evaluation of client preference for function-based treatment packages. *Journal of Applied Behavior Analysis, 30*, 459–473.
- Haskett, J., & Hollar, W. D. (1978). Sensory reinforcement and contingency awareness of profoundly retarded children. *American Journal of Mental Deficiency, 83*, 60–68.
- Ivancic, M. T., & Bailey, J. S. (1996). Current limits to reinforcer identification for some persons with profound multiple disabilities. *Research in Developmental Disabilities, 17*, 77–92.

- Ivancic, M. T., Barrett, G. T., Simonow, A., & Kimberly, A. (1997). A replication to increase happiness indices among some people with profound multiple disabilities. *Research in Developmental Disabilities, 18*, 79–89.
- Jones, M. L., Favell, J. E., Lattimore, J., & Risley, T. R. (1984). Improving independent engagement of nonambulatory multihandicapped persons through the use of leisure materials. *Analysis and Intervention in Developmental Disabilities, 4*, 313–332.
- Jones, S. S., & Hong, H. (2005). How some infant smiles get made. *Infant Behavior and Development, 28*, 194–205.
- Lancioni, G. E., O'Reilly, M. F., Campodonico, F., & Mantini, M. (2002). Increasing indices of happiness and positive engagement in persons with profound multiple disabilities. *Journal of Developmental and Physical Disabilities, 14*, 231–237.
- Lancioni, G. E., O'Reilly, M. F., Singh, N. N., Campodonico, F., Marziani, M., & Oliva, D. (2004). A microswitch program to foster simple foot and leg movements in adult wheelchair users with multiple disabilities. *Cognitive Behavior Therapy, 33*, 137–142.
- Lancioni, G. E., O'Reilly, M. F., Singh, N. N., Oliva, D., Campodonico, F., & Groeneweg, J. (2003). Stimulation and microswitch-based programs for enhancing indices of happiness: A maintenance assessment. *Behavioral Interventions, 18*, 53–61.
- Lancioni, G. E., O'Reilly, M. F., Singh, N. N., Oliva, D., & Groeneweg, J. (2002). Impact of stimulation versus microswitch-based programs on indices of happiness of people with profound multiple disabilities. *Research in Developmental Disabilities, 23*, 149–160.
- Lancioni, G. E., O'Reilly, M. F., Singh, N. N., Oliva, D., Piazzolla, G., & Groeneweg, J. (2004). Assessing influence of stimulation on mood and aberrant behavior of persons with multiple disabilities during brief treadmill sessions. *Perceptual and Motor Skills, 99*, 931–936.
- Lancioni, G. E., Singh, N. N., O'Reilly, M. F., Campodonico, F., Oliva, D., & Groeneweg, J. (2004). Effects of automatically delivered stimulation on persons with multiple disabilities during their use of a stationary bicycle. *Perceptual and Motor Skills, 98*, 1363–1367.
- Lancioni, G. E., Singh, N. N., O'Reilly, M. F., Campodonico, F., Piazzolla, G., & Scalini, L., et al. (2005). Impact of favorite stimuli automatically delivered on step responses of persons with multiple disabilities during their use of walker devices. *Research in Developmental Disabilities, 26*, 71–76.
- Lancioni, G. E., Singh, N. N., O'Reilly, M. F., Oliva, D., Campodonico, F., & Groeneweg, J. (2004). Use of simple exercise tools by students with multiple disabilities: Impact of automatically delivered stimulation on activity level and mood. *Journal of Developmental and Physical Disabilities, 16*, 171–178.
- Lancioni, G. E., Singh, N. N., O'Reilly, M. F., Oliva, D., Campodonico, F., & Groeneweg, J. (2003). Assessing the effects of automatically delivered stimulation on the use of simple exercise tools by students with multiple disabilities. *Research in Developmental Disabilities, 24*, 475–483.
- Lancioni, G. E., Singh, N. N., O'Reilly, M. F., Piazzolla, G., Pidala, S., & Oliva, D. (2005). Wheelchair-bound persons with multiple disabilities learning to use simple foot-leg responses within a microswitch-based program. *Journal of Developmental and Physical Disabilities, 17*, 327–336.
- Lindauer, S. E., DeLeon, I. G., & Fisher, W. W. (1999). Decreasing signs of negative affect and correlated self-injury in an individual with mental retardation and mood disturbances. *Journal of Applied Behavior Analysis, 32*, 103–106.
- Logan, K. R., Jacobs, H. A., Gast, D. L., Murray, A. S., Daino, K., & Skala, C. (1998). The impact of typical peers on the perceived happiness of students with profound multiple disabilities. *Journal of the Association for Persons with Severe Handicaps, 23*, 309–318.
- Malott, R. W. (2002). What OBM needs is more Jewish mothers. *Journal of Organizational Behavior Management, 22*, 71–87.

- Pace, G. M., Ivancic, M. T., Edwards, G. L., Iwata, B. A., & Page, T. A. (1985). Assessment of stimulus preference and reinforcer value with profoundly retarded individuals. *Journal of Applied Behavior Analysis, 18*, 249–255.
- Parsons, M. B., Reid, D. H., & Green, C. W. (2001). Situational assessment of task preferences among adults with multiple severe disabilities in supported work. *Journal of the Association for Persons with Severe Handicaps, 26*, 50–55.
- Realon, R. E., Bligen, R. A., La Force, A., Helsel, W. J., & Goldman, V. (2002). The effects of the positive engagement program (PEP) on the behaviors of adults with profound cognitive and physical disabilities. *Behavioral Interventions, 17*, 1–13.
- Realon, R. E., Favell, J. E., & Phillips, J. F. (1989). Adapted leisure materials versus standard leisure materials: Evaluating several aspects of programming for profoundly handicapped persons. *Education and training in mental retardation, 24*, 168–177.
- Reid, D. H., Green, C. W., & Parsons, M. B. (1998). A comparison of supported work versus center-based program services on selected outcomes for individuals with multiple severe disabilities. *The Journals of the Association for Persons with Severe Handicaps, 23*, 69–76.
- Reid, D. H., Phillips, J. F., & Green, C. W. (1991). Teaching persons with profound multiple handicaps: A review of the effects of behavioral research. *Journal of Applied Behavior Analysis, 24*, 319–336.
- Schillace, R. (1964). Developmental comparisons of mentally retarded and neurotic children. *American Journal of Mental Deficiency, 69*, 211–219.
- Schwartz, I. S., & Baer, D. M. (1991). Social validity assessments: Is current practice state of the art? *Journal of Applied Behavior Analysis, 24*, 189–204.
- Singh, N. N., Lancioni, G. E., Winton, A. S. W., Wahler, R. G., & Singh, J. (2004). Mindful caregiving increases happiness among individuals with profound multiple disabilities. *Research in Developmental Disabilities, 25*, 207–218.
- Sternberg, L., Pagnatore, L., & Hill, C. (1983). Establishing interactive communication behaviors with profoundly mentally handicapped students. *Journal of the Association for Persons with Severe Handicaps, 8*, 39–46.
- Wacker, D. P., Berg, W. K., Wiggins, B., Muldoon, M., & Cavanaugh, J. (1985). Evaluation of reinforcer preferences for profoundly handicapped students. *Journal of Applied Behavior Analysis, 21*, 331–343.
- Wolf, M. M. (1978). Social validity: The case for subjective measurement or how applied behavior analysis is finding its heart. *Journal of Applied Behavior Analysis, 11*, 203–214.
- Yu, D. C. T., Spevack, S., Hiebert, R., Martin, T. L., Goodman, R., Martin, T. G., et al. (2002). Happiness indices among persons with profound and severe disabilities during leisure and work activities: A comparison. *Education and Training in Mental Retardation and Developmental Disabilities, 37*, 421–426.