An Evaluation of Enhanced Self-Regulation Training in the Treatment of Childhood Obesity

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Obese children (8–13 years old) and at least one of their parents participated in a behaviorally oriented treatment program. Participants in a standard treatment condition experienced a multicomponent intervention in which parents were given primary responsibility for following program prescriptions. An enhanced child involvement condition provided the same basic intervention but with greater emphasis on, and training in, child self-regulation. Children in both conditions achieved a significant reduction in percentage overweight and triceps skinfold during the 6-month treatment period. Overall, the follow-up period of 3 years was characterized by increases above posttreatment levels. There was, however, some suggestion in the 3-year follow-up results and the long-term patterns over a 6 1/2-year period of the benefits of the enhanced child involvement approach. Findings are discussed in terms of suggestions for reconsideration of treatment goals, improved interventions, and refinements in the assessment of self-regulatory behavior.

KEY WORDS: childhood obesity, obesity treatment; self-regulation.

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There is currently appreciable caution being expressed regarding the likely success of weight-loss efforts with adults (Kramer, Jeffrey, Forster, & Snell, 1989; Stunkard & Berkowitz, 1990). Related to such findings has been a reconsideration of the goals of intervention. It may be more reasonable, for example, to seek to interrupt a pattern of increasing obesity, or to stabilize and facilitate acceptance of some reasonable body weight, than it would be to attempt to achieve nonobese status (cf. Brownell & O’Neil, 1993; Garner & Wooley, 1991).

The importance of research concerning effective interventions for the problem of childhood obesity is based on several considerations. There is first of all concern based on the prevalence of childhood obesity (e.g., Gortmaker, Dietz, Sobol, & Wehler, 1987; Raymond, 1986). Of immediate concern for obese children are the increased risks for health and psychosocial difficulties during childhood (e.g., Berenson, 1980; Israel & Shapiro, 1985; Lauer, Anderson, Beaglehole, & Burns, 1984). There is also, of course, consideration of the association with increased risk for adult obesity (e.g., Abraham, Collins, & Nordsieck, 1971; Charney, Goodman, McBride, Lyon, & Pratt, 1976; Ginsberg-Fellner, 1981). An appreciable aspect of the interest in the treatment of childhood obesity arose from the difficulties encountered in achieving long-term weight loss in adults and from a preventative perspective. It was hoped that early intervention would prove more successful than the difficult task faced in treating adult obesity.

Although research regarding the treatment of childhood obesity suggests some of the same difficulties encountered with adults, it also suggests that multifaceted behavioral treatment programs seem to be the most promising interventions available for children and that such programs do hold some promise (Epstein, Valoski, Wing, & McCurley, 1990; Israel, 1990). The need for attention to parental involvement in such programs is well supported (Israel, 1988). Parents influence the child’s weight-related behaviors (e.g., Klesges et al., 1986, 1990). Furthermore, parental attendance (e.g., Brownell, Kelman, & Stunkard, 1983; Kingsley & Shapiro, 1977; Kirschenbaum, Harris, & Tomarken, 1984), general child management skills (Israel, Stolmaker, & Andrian, 1985), general problem-solving skills (Graves, Meyers, & Clark, 1988), and choice by the parent of a helper or weight-loss role (Israel, Solotar, & Zimand, 1990) have all been shown to influence treatment outcome.

Although the history of the behavioral treatment of adult obesity has been both implicitly and explicitly tied to an emphasis on self-regulation (cf. Brownell & O’Neil, 1993; Stuart & Davis, 1972), the treatment strategies developed for overweight children have given less explicit attention to this issue. Retrospective data have suggested the importance of child self-regulation to long-term success in weight control (Cohen, Gelfand, Dodd, Jensen, & Turner, 1980). Thus, the logic of behavioral interventions and some preliminary data regarding self-regulation, along with the demonstrated importance of parental involvement, described above, suggest that the relative contributions of parent management
and child self-regulation becomes an important issue. Consistent with the above logic and the Cohen et al. (1980) observation, research has suggested the potential long-term benefits of targeting both parental and child behavior change and no differences between conditions of standard parental control and one in which the child assumes part of the management of contingencies (Epstein et al. 1990; Epstein, Wing, Valoski, & Gooding, 1987).

The importance of self-regulatory mechanisms in the treatment of childhood obesity is part of a larger resurgence of interest in the empirical analysis of voluntary action management. A variety of terms are often used interchangeably to describe this capacity, and there is at present an absence of clear paradigmatic consensus (Karoly, 1993). The perspective employed in the present investigation, similar to other efforts, views self-regulation as a multidimensional construct. Self-regulation is also viewed as a process that exists within ongoing environmental/social transactions that enable the individual to guide goal-directed behaviors over time and changing circumstances. Thus, self-regulation is not something that the individual accomplishes alone, but rather is part of a larger social influence process.

The present study examines the contribution of the inclusion of a multiple-component self-regulation intervention. The intervention drew on several influences. A four-component model of self-regulation, which included goal setting, self-monitoring, self-evaluation, and self-consequation and that drew on work such as that of Kanfer and Karoly (cf. Kanfer & Karoly, 1972; Karoly & Kanfer, 1982), served as the core of the intervention. In addition, since children attempting weight reduction repeatedly have to deal with circumstances that may be considered self-regulatory failure (e.g., inappropriate eating or failure to exercise) and are inevitably placed in many high-risk situations (cf. Kirschenbaum & Tomarken, 1982), self-regulatory skills germane to these situations were also a central part of this intervention.

In a fashion parallel to the investigation of parenting skills (Graves et al., 1988; Israel et al., 1985), the multiple aspects of child self-regulation that are often components of existing treatment programs were explicitly enhanced and examined for their contribution to treatment effectiveness. It was expected that the advantages of adding enhanced self-regulatory training would be most important following treatment and after the initial phases of follow-up. This is a period of no contact with the treatment program and a time when both normal developmental considerations and reduced parental adherence to program prescriptions (Israel et al., 1990) are likely to place greater emphasis on child self-regulatory components. In addition, various aspects of the self-regulation concept were assessed. These included specific self-regulatory behaviors, related constructs (such as problem solving, that are interwoven into a self-regulatory approach) and more general cognates such as locus of control. Thus, the contribution of both the enhanced self-regulation training and of these various attributes to treatment outcome and long-term follow-up could be examined.
METHOD

Subjects

Participants were recruited through newspaper articles, letters to pediatricians, and letters to school nurses. Thirty-four overweight children between the ages of 8 years 11 months, and 13 years 0 months (\(M = 10\) years 11 months, \(SD = 1\) year 2 months) and their parents participated in the program. The criteria for participation were (a) child age 8–13 years, (b) child at least 20% overweight according to weight for height, age, and gender norms, (c) at least one parent willing to attend sessions and cooperate with the requirements, (d) medical clearance from a physician, (e) absence of any physical or psychological difficulties suggesting that the program would be an inappropriate intervention (e.g., physical injury limiting activity or need for immediate treatment of a behavior problem), and (f) informed consent of both the parent and child to the treatment program and associated research.

Treatment and Follow-up

Thirty-six families were randomly assigned to one of two treatment conditions, subject to constraints imposed by scheduling and the aim of balancing percentage overweight, age, and sex of the children across conditions. Two of these families did not meet the criteria for participation as it was discovered that the child of one family was receiving pharmacological treatment for another problem and the father from the other family refused to complete required forms and questionnaires. Thus 34 families, 18 in the standard treatment (ST) condition and 16 in the enhanced child involvement (ECI) condition participated. Parents and children met in separate groups comprising 5 to 7 families for 8 weekly 90-minute sessions followed by 9 biweekly sessions for a total of 26 weeks of treatment.

Treatment for both conditions was based on a four-prong approach identified by the acronym CAIR consisting of discussions and homework assignments regarding Cue control, physical Activity, food Intake, and Rewards. Families were asked to monitor children’s food intake, activity, adherence to cue control rules, and parents were asked to reward appropriate behaviors such as staying under a prescribed calorie limit, and reaching an activity minimum. In addition, parents received training in general child-management principles (e.g., identifying problem behaviors, planning a program to change behaviors, and implementing such a program) and were required to read the book *Living with Children* (Patterson, 1976) which paralleled the content of parent training.

Treatment for the ST condition included all the above-mentioned components with emphasis on parent responsibility for the completion of homework
assignments and for the motivation of their children to follow program rules or prescriptions.

The ECI condition, in contrast to the ST condition, placed less emphasis on parental control and focused more attention on the children's management of their own weight loss efforts. Children in this condition received comprehensive training in self-management skills introduced sequentially throughout treatment with particular emphasis after Week 8. Training components included instruction in (a) self-goal setting (including how to choose an appropriate behavior to change), (b) formulating and implementing a plan to change behavior, (c) self-evaluation (i.e., how to monitor progress and modify plans), (d) self-reward, and (e) training in problem-solving behaviors appropriate for high-risk or tempting situations. Each component was presented to the children didactically and through therapist modeling, and the children were assigned homework exercises to practice the new skills. In addition to rewarding children for behaviors required by the standard weight-loss program (e.g., staying below the prescribed calorie limit and engaging in a minimum of physical activity each week) parents in this condition also rewarded their children for engaging in self-management skills.

Follow-up assessments were conducted at both 1 year and 3 years following the end of treatment (26 weeks).

Measures

Height, weight, and triceps skinfold thickness was measured on site on Week 1 of treatment, Week 26 (posttreatment), and at 1-year follow-up. Height and weight measurements at 3-year follow-up were obtained from pediatric or school records or on site. In addition, each child's weight history for at least a 3-year period prior to treatment was obtained from pediatric or school records. Based on these measures, percentage overweight and percentage over triceps skinfold norm were calculated.

All of the following measures of self-regulation and self-control were administered both during a pretreatment assessment interview and at Week 26, except for the Parent's Situation Record and the Homework Questionnaire which were not administered at assessment.

The Locus of Control Scale for Children (LOCSC; Nowicki & Strickland, 1973) and the Self-Control Rating Scale (SCRS; Kendall & Wilcox, 1979) were viewed as measures of a general, related cognate. The Eating and Activity Self-Control Scale (EASC) was a slightly modified version of the measure of per-

\[\text{Percentage overweight} = 100 \times \frac{\text{actual weight} - \text{normal weight}}{\text{normal weight}}\]

\[\text{Percentage over triceps skinfold norm} = 100 \times \frac{\text{triceps skinfold thickness} - \text{normal thickness}}{\text{normal thickness}}\]

'Percentage overweight = 100 × (actual weight - normal weight)/normal weight, where normal weight is defined as the average weight for individuals of a particular age, gender, and height. Percentage over triceps skinfold norm = 100 × (triceps skinfold thickness - normal thickness)/normal thickness, where normal thickness is defined as the average thickness for individuals of a particular age and gender.
ceived control over weight-related behaviors employed by Cohen et al. (1980). It contains self-control and parental control subscales. The Means-Ends Problem Solving Test (MEPS; Shure & Spivack, 1972), and two measures developed for the present study, the Situational Competency Test for Overweight Children (SCOTOC), and the Parent's Situation Record (SR) were employed to evaluate children's problem-solving skills. The MEPS was employed to assess general ability to supply the means towards achieving goals in hypothetical interpersonal situations. The SCOTOC was developed to assess, through hypothetical situations, children's responses to temptation to overeat. The SR, completed weekly by parents during Weeks 22 to 26, measured children's responses to actual (not hypothetical) tempting situations encountered outside the treatment sessions. The SR was scored to provide indices of refusals to eat in tempting situations, and the use of social skills in tempting situations and successful refusals. Last, the Homework Questionnaire, administered at Week 26, measured parents' impressions of the percentage of responsibility their children assumed for completing specific weekly homework assignments. These measures were thus employed as indices of general self-regulatory style and of specific self-regulatory behaviors included in the ECI condition.

RESULTS

Weight-Related Measures

Of the 34 families beginning treatment, 8 families (4 in each condition) failed to complete 26 weeks of treatment leaving 14 and 12 families in the ST and ECI condition, respectively. Of these 26 families completing treatment, 6 families (3 in each condition) were not available for follow-up at both 1 and 3 years posttreatment. There were no differences between the two conditions with respect to parental absolute weight, % overweight, or triceps skinfold. The mean % overweight for both conditions at Week 26, 1 year posttreatment, and 3 years posttreatment and mean % over triceps norm for both conditions at Week 26, and 1 year posttreatment for those children for whom data were available through the 3-year follow-up are presented in Table I.

During the treatment period (through Week 26) 9 of the 11 children in the ST condition decreased their % overweight (ranging from -8.01 to -20.72%), 1 stabilized (+0.31%), and 1 gained (+5.11%). In the ECI condition, 7 of the 9 children decreased in % overweight (ranging from -9.63 to -32.77%), 1 stabilized (-0.96%), and 1 gained (+2.94%). Collapsed across conditions, the mean loss in % overweight during treatment was -13.08%. An examination of all 26 subjects who completed treatment resulted in a nearly identical pattern of within-treatment change in % overweight. In addition, analyses parallel to those presented below for the reduced follow-up sample size, yielded parallel findings.
Table I. Mean Percentage Overweight and Percentage Over Triceps Norm

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Week 1</th>
<th>Week 26</th>
<th>1 Year</th>
<th>3 Year</th>
</tr>
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<tbody>
<tr>
<td>ST</td>
<td>11</td>
<td>45.94</td>
<td>33.43</td>
<td>45.15</td>
<td>52.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(17.11)</td>
<td>(17.00)</td>
<td>(23.87)</td>
<td>(24.37)</td>
</tr>
<tr>
<td>ECI</td>
<td>9</td>
<td>48.10</td>
<td>32.55</td>
<td>42.32</td>
<td>43.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(18.31)</td>
<td>(17.35)</td>
<td>(22.50)</td>
<td>(21.18)</td>
</tr>
<tr>
<td>% Over triceps norm*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>11</td>
<td>131.65</td>
<td>101.30</td>
<td>129.83</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(56.27)</td>
<td>(59.94)</td>
<td>(65.13)</td>
<td></td>
</tr>
<tr>
<td>ECI</td>
<td>9</td>
<td>118.43</td>
<td>82.99</td>
<td>132.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(27.13)</td>
<td>(39.60)</td>
<td>(77.34)</td>
<td></td>
</tr>
</tbody>
</table>

*Numbers in parentheses are standard deviations.
*Triceps skinfold was not measured at 3-year follow-up.

regarding change in % overweight and triceps skinfold during the treatment period. Thus, it does not appear that those participants for whom follow-up data were not available differed in their response to treatment from those present through the 3-year follow-up.

A 2 (Condition) x 3 (Time) mixed-model analysis of covariance, with Week 1 % overweight as the covariate, indicated only a significant effect of Time, $F(2, 36) = 8.52, p < .001$. In contrast to what is suggested by the pattern of means between 1 and 3 years posttreatment presented in Table I, no significant effect of Condition or of Condition x Time emerged. The absence of statistical significance may have been due to lack of power as post hoc power analyses were calculated at .19 and .14 for the effect of Condition, and the Condition x Time interaction, respectively.

The results for triceps skinfold data were similar to the respective % overweight data. Collapsed across conditions, there was a mean reduction in % over triceps norm of 32.64% from Week 1 to Week 26. A 2 (Condition) x 2 (Time) mixed-model analysis of covariance, with Week 1 % over triceps norm as the covariate, revealed only a significant effect of Time, $F(1, 18) = 16.27, p < .01$.

Although the general trend during the follow-up period for both treatment groups was a gain in % overweight and % over triceps norm, a somewhat different picture emerges if one examines the pattern for individual children during this period. It is noteworthy, for example, that 44% of the ECI children versus 0% of the ST children were below posttreatment (Week 26) % overweight levels at 3-year follow up (Fisher's exact; $p = .026$).

**Self-Regulation Measures**

The mean scores on the various measures of self-regulation from Week 1 and Week 26 are presented in Table II change in scores over the 6 months of
treatment were evaluated through 2 (Condition) × 2 (Time) mixed-model analyses of variance. Correlations between scores and change in % overweight during treatment were also assessed.

No significant effects for Condition or for the Condition × Time interaction were found for any of the measures. However, a main effect of Time was obtained with the LOCSC, EASC, and SCRS. Children adopted a significantly

Table II. Mean Scores on Self-Regulation Measures at Assessment and Week 26*

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>Assessment</th>
<th>Week 26</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Locus of Control Scale for Children</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>14</td>
<td>12.71 (4.27)</td>
<td>12.07 (3.73)</td>
</tr>
<tr>
<td>ECI</td>
<td>12</td>
<td>14.42 (3.53)</td>
<td>11.00 (3.30)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self-Control Rating Scale (Parent form)</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>14</td>
<td>117.00 (29.93)</td>
<td>94.71 (36.54)</td>
</tr>
<tr>
<td>ECI</td>
<td>12</td>
<td>98.50 (16.82)</td>
<td>89.92 (24.31)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self-Control Rating Scale (Teacher form)*</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>9</td>
<td>107.89 (57.66)</td>
<td>93.56 (49.111)</td>
</tr>
<tr>
<td>ECI</td>
<td>8</td>
<td>70.00 (22.32)</td>
<td>66.00 (26.33)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EASC Self-Control subscale</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>14</td>
<td>20.71 (3.05)</td>
<td>26.43 (5.43)</td>
</tr>
<tr>
<td>ECI</td>
<td>12</td>
<td>20.33 (3.06)</td>
<td>28.08 (4.66)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EASC Parental Control subscale</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>14</td>
<td>38.07 (7.05)</td>
<td>44.86 (5.70)</td>
</tr>
<tr>
<td>ECI</td>
<td>12</td>
<td>39.33 (6.62)</td>
<td>43.08 (6.26)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Means-Ends Problem-Solving Test</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>14</td>
<td>1.74 (0.47)</td>
<td>1.69 (0.51)</td>
</tr>
<tr>
<td>ECI</td>
<td>12</td>
<td>1.93 (1.04)</td>
<td>1.76 (0.58)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Situational Competency Test for Overweight Children&lt;</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>14</td>
<td>0.57 (0.28)</td>
<td>0.64 (0.29)</td>
</tr>
<tr>
<td>ECI</td>
<td>12</td>
<td>0.67 (0.34)</td>
<td>0.56 (0.24)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Parent's Situation Record (Week 26 scores only)**</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>8</td>
<td>0.49 (0.27)</td>
<td>0.76 (0.39)</td>
</tr>
<tr>
<td>ECI</td>
<td>8</td>
<td>0.40 (0.29)</td>
<td>0.55 (0.42)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Homework Questionnaire (Week 26 scores only)</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>14</td>
<td>50.71 (31.31)</td>
<td>28.57 (28.10)</td>
</tr>
<tr>
<td>ECI</td>
<td>12</td>
<td>59.17 (45.33)</td>
<td>44.58 (37.69)</td>
</tr>
</tbody>
</table>

*Numbers in parentheses are standard deviations.
*The number of subjects is reduced because of missing data.
<Only the mean proportion of times children gave in to the situations is presented as this was seen as the primary score of the SCTOC.
more internal locus of control (LOCSC) from Week 1 to Week 26, $F(1, 24) = 7.10, p < .05$. Similarly, analysis of the EASC indicated an increase in children's self-control and parental control regarding weight-related behaviors, $F(1, 24) = 52.54, p < .001$, and $F(1, 24) = 16.23, p < .001$, respectively. Parental judgments from the SCRS also indicated significantly more self-controlled behaviors at Week 26 than at Week 1, $F(1, 24) = 5.18, p < .05$.

LOCSC scores from assessment and Week 26 were not correlated with change in % overweight during treatment. However, for the ECI condition alone, Week 26 LOCSC scores suggest that the more internal the score, the greater was the decrease in % overweight, ($r = .67, p < .05$). Week 26 LOCSC scores significantly predicted change in % overweight during the short-term follow-up period such that the more internal the score, the smaller the gain in % overweight ($r = -.58, p < .01$). Higher EASC self-control scores at assessment were significantly correlated with decreases in % overweight during treatment ($r = -.39, p < .05$), while EASC parental control scores were not. Although scores on the self-control and parental control subscales were not significantly correlated with longer term change in % overweight, there was a trend for high self-control and low parental control to be related to better maintenance during long-term follow-up. Efforts to analyze the interaction or joint relationship of parent and self-control did not significantly predict change in % overweight beyond individual effects. Change in % overweight was not significantly correlated with the SCRS, MEPS, SCTOC, SR, or the Homework Questionnaire measures. Correlations with the Situational Record, however, were of the greatest magnitude and the correlation between changes in % overweight from Week 26 to 1 Year and use of skills for refusal was significant ($r = .42, p < .05$). This may suggest attention to self-regulatory behavior in tempting situations during the last weeks of treatment.

**Long-Term Patterns**

One additional method for evaluating the impact of the two treatment conditions, weight history records, was available. Percentage overweights were calculated for periods corresponding to 1, 2, and 3 years prior to treatment. Since heights and weights corresponding to exactly these times were, obviously, not available, a linear interpolation procedure was employed. If, for example, no measures were available for 1 year prior to treatment but height and weight at 16 months prior to treatment were available, it was assumed that change during that 16-month period was linear and a % overweight for 12 months was calculated and employed. A measurement was required to be within 6 months of the respective year date. Although this procedure assumes a linearity of change between adjacent measurement points, it does not impose any particular pattern over the time period as a whole.
Figure 1 illustrates the patterns of % overweight for the two conditions over this 6 1/2-year period. Trend analysis was employed to examine patterns of weight change during the two periods during which there was no active treatment. For the 3 years prior to treatment, trend analysis indicated a significant linear component and nonsignificant quadratic and cubic components for both the ST and ECI conditions, $F(1, 10) = 10.11, p < .01$, and $F(1, 8) = 30.23, p < .001$, respectively. From the end of treatment to the 3-year follow-up, the ST group continued to exhibit a significant linear trend but not a significant quadratic trend, $F(1, 10) = 22.33, p < .001$. The ECI group, by contrast, showed a nonsignificant linear trend but a significant quadratic trend, $F(1, 8) = 7.61, p < .025$.

**DISCUSSION**

The results of the present investigation are consistent with much of the literature in that a multifaceted behavioral treatment program was successful in producing weight loss in children. However, the findings also suggest that, in general, such success is short-lived and yields more modest results than once might have been hoped for. Overall, there was a pattern of weight gain during the follow-up period and most children did not achieve nonobese status. At the both
1- and 3-year follow-up assessments three children (two in the ECI condition) had maintained a nonobese status.

What encouragement there is in the present findings, however, may be related to the development of greater self-control in treated children. The treatments employed in the present investigation seem to have been associated with increases in perceived self-control during the treatment period and assignment of greater responsibility to the child does not seem to have impaired treatment effectiveness. There are several other findings that, although interpreted with caution, also suggest the promise of enhanced self-regulation training. There is some suggestion that posttreatment levels of control beliefs, as assessed by the LOCSC and EASC, and actual behavior, as assessed by the Situation Record, are associated with better outcomes during the follow-up period. Similarly, findings regarding the number of children who maintain percentage overweights below end of treatment levels favor the ECI condition and the failure to find differences between conditions may have been a function of reduced power. Clearly there is room for improvement here in the degree of success achieved. An optimistic perspective suggests that pursuit of improved self-regulatory training and better methods of assessing relevant attributes might lead to improved interventions for at least some children. The present findings do not allow a particular articulation of the self-regulation construct and the problem of weight control in children. Continued investigations to identify important self-regulatory components, development of interventions that enhance weight-related self-regulatory skills in children, and refinement of procedures to assess self-regulation do, however, seem warranted. The failure in the present investigation to find uniform relationships between aspects of self-regulation and outcome may be due in part to the measures employed to assess the components of self-regulation. Given the present findings, attention to measures of actual behavior and measures specific to the weight-loss context seem deserving of particular attention.

In light of the accumulating literature regarding the difficulty of achieving long-term weight loss, it is also reasonable to rethink appropriate goals. Rather than uniformly insisting on nonobese status or large decreases in percentage overweight as goals, it may be reasonable to evaluate interventions in terms of whether they alter patterns of increasing obesity. In that context, the long-term patterns in the present sample again favor an enhanced child involvement approach. Again, this interpretation is made with appropriate caution but also does not ignore a pattern that seems to emerge in the present findings.

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