*SELF-CONTROL TRAINING IN THE CLASSROOM:
A REVIEW AND CRITIQUE*

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Self-control training in classroom settings is becoming widespread. Establishing effective self- rather than externally controlled behavior modification programs in schools would enable children to control their own academic and social behavior, while enabling teachers to devote more time to teaching. The following components of self-control are reviewed in the present article: self-recording, self-evaluation, self-determination of contingencies, and self-instruction. Self-control strategies designed for the maintenance of appropriate classroom behavior, and issues associated with self-control training, such as the reliability of self-observation, response maintenance, generalization, and the role of external control, are examined. Finally, suggestions for maximizing the potential effectiveness of self-control training in the classroom (*e.g.*, teaching self-observational procedures, teaching students to provide themselves with instructions and praise), as well as future areas for experimental investigation (*e.g.*, social changes that may be associated with self-control procedures), are presented.

DESCRIPTORS: self-control, self-management, self-recording, self-regulation, classroom behavior

Behavior modification programs have demonstrated that the academic and social behavior of school-aged children in classrooms can be effectively altered through a variety of procedures (Ayllon and Rosenbaum, 1977; Copeland and Hall, 1976; Drabman, 1976; O'Leary and Drabman, 1971). For the most part, these programs have focused on using external agents (parents, teachers, peers, therapists) to arrange and administer the contingencies applied in the classroom. Lovitt (1973) has pointed out that teachers have traditionally been delegated the functions of evaluating the child's performance in an academic program and delivering the appropriate consequences contingent on that evalua-

tion. Teachers have also been assigned the responsibility of controlling the social behavior of children in the classroom. One inevitable result of this type of educational system is that, because of involvement with the mechanics associated with developing academic skills and controlling social behavior, the time available for the teacher to teach becomes restricted.

Kazdin (1975a) has discussed several potential disadvantages associated with relying on external agents to design and administer classroom contingencies: (a) a great deal of behavior may occur unnoticed by these external agents, especially when they work with several children simultaneously; (b) because external agents are paired with the administration of contingencies, they may acquire discriminative properties and become cues for the performance of target behaviors, the occurrence of which may become restricted to the presence of those cues; (c) difficulty may be encountered in generalizing behaviors to situations in which externally administered contingencies have not been applied. To avoid these disadvantages, researchers (*e.g.*, Kaz-

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din, 1975a; O'Leary and Drabman, 1971; O'Leary and O'Leary, 1976) have emphasized the potential importance of self-control procedures with which children can be taught to evaluate their performance and administer the appropriate contingencies. These procedures might enable children to develop their own academic and social skills, while teachers devote more time to teaching and less time to classroom mechanics and social behavior.

Several authors have reviewed and discussed self-control processes in children (*e.g.*, Bandura, 1969; Karoly, 1977; Masters and Mokros, 1974; O'Leary and O'Leary, 1972, 1976). Whereas early studies of self-control with children were conducted in laboratory settings, recent research has been conducted in the classroom (McLaughlin, 1976). The purpose of the present article is to: (a) present research dealing with self-control training in classrooms, (b) evaluate the effectiveness of this training, (c) discuss factors associated with effective self-control training, and (d) suggest some future directions for self-control research in the classroom.

Self-Observational Procedures

Behavioral self-observation involves individuals monitoring their own behavior and subsequently recording that behavior. This is the initial and an extremely important step in self-control training. It provides individuals with systematic data regarding their behavior, with which they can evaluate the effects of any proposed strategies for change. Self-observation can have a reactive effect on the target behavior being self-observed, whereby the behavior changes as a function of the self-observational process (*e.g.*, Jeffrey, 1974; Kanfer, 1970b; Kazdin, 1974a, 1974b; McFall, 1977; Nelson, 1977). In this capacity, self-observation also functions as a behavior-change technique. O'Leary and O'Leary (1976) have made a distinction between self-recording and self-evaluation, both of which are self-observational procedures. In self-recording, behavior is monitored and recorded with a minimum amount of judg-

ment (*e.g.*, recording the number of occurrences of a particular behavior). In self-evaluation, the self-monitoring process is followed by an evaluation of the behavior on a subjective basis, usually with an externally provided criterion (*e.g.*, rating behavior according to a scale of 1-10).

Self-Recording

Many authors have found self-recording alone to be effective in producing behavior change in nonclassroom settings (*e.g.*, Johnson and White, 1971; Kanfer, 1970b, 1971; Kazdin, 1974b; Lipinski and Nelson, 1974; Nelson, Lipinski, and Black, 1976a). This finding has also received support from studies conducted in classrooms. The effects of self-recording on academic behavior and classroom disruption were investigated by Broden, Hall, and Mitts (1971). In one experiment, self-recording appeared to be associated with a 48% increase in study behavior, even though self-recording did not occur in 10 of 23 sessions, and the correlation between student records and those of an independent observer was very low. Self-recorded study behavior was also paired with praise from the student's counselor, thereby precluding separate assessment of the effects of self-recording from those of self-recording plus praise. It appears likely that instructions and the opportunity to self-record may have been responsible for the observed changes in study behavior irrespective of the occurrence or accuracy of self-recording.

In a second experiment, a decrease in inappropriate verbalizations was initially obtained with self-recording in the absence of any contingencies, but these verbalizations gradually increased until the rates were equal to those in baseline. As in the first experiment, student records were not significantly correlated with those of an observer. The results of this experiment showed that self-recording could be effective in at least initiating a desirable change in behavior.

Working with potential high school dropouts, Gottman and McFall (1972) found that appropriate classroom participation significantly

increased when self-recorded and decreased when nonparticipation was self-recorded. In two experiments with elementary school children exhibiting behavior disorders, Lovitt (1973) found that self-recording was associated with decreases (86% and 55%, respectively) in inappropriate behaviors. Although these latter two studies showed that desirable effects could be obtained with self-recording, the period of time allotted for self-recording was too brief to demonstrate any long-term effects of this procedure.

Knapczyk and Livingston (1973) found that the addition of self-recording to token reinforcement did not produce any significant changes in the reading performance of junior high school educable mentally retarded students relative to token reinforcement alone. Their data, however, reflected a decreasing trend when self-recording was removed and an increasing trend when it was reinstated. It is therefore possible that self-recording may have added slightly to the effects of token reinforcement. Ballard and Glynn (1975) found that self-recording had no effect on the writing skills (*e.g.*, number of sentences written) of third graders. When self-reinforcement was added to self-recording, writing output more than doubled.

The studies dealing with self-recording in classrooms indicate that it can initiate desirable changes in behavior (Broden *et al.*, 1971; Gottman and McFall, 1972; Lovitt, 1973) and enhance the effects of other reinforcement procedures (Knapczyk and Livingston, 1973). The results of the Ballard and Glynn (1975) study suggest that the changes obtained with self-recording may require reinforcing contingencies in order to maintain these behavioral changes. Variables affecting the pattern of behavior change associated with self-recording and theoretical mechanisms for these changes have been discussed by several authors (Kazdin, 1974a; Nelson, Lipinski, and Black, 1976b). The applied literature has shown that in those instances where self-recording has been effective, the changes obtained in target behaviors have been

in a desirable direction (*i.e.*, appropriate behaviors have increased and inappropriate behaviors have decreased). Although self-recording has also been shown not to have an effect on target behaviors, there has been no evidence of any deleterious effects.

Self-Evaluation

Several authors have emphasized the necessity of an externally provided criterion for self-evaluating performance before behavior change can occur (Kanfer, 1970a; Kanfer and Phillips, 1970; Spates and Kanfer, 1977). However, when Santogrossi, O'Leary, Romanczyk, and Kaufman (1973) had disruptive adolescents in a psychiatric hospital school rate their own behavior according to rules of classroom conduct, this self-evaluation procedure did not produce any substantial effects on the level of disruptive behavior. Teacher-determined reinforcement resulted in an 80% decrease in disruptive behavior, which was maintained for only a brief period by self-evaluation plus self-determined reinforcement. Additionally, Turkewitz, O'Leary, and Ironsmith (1975) found that self-evaluation had no effect on the level of disruptive behavior in children manifesting academic and social problems. Teacher-determined reinforcement produced a 68% decrease in disruptive behavior relative to baseline. This low level of disruption was maintained by a combined self-evaluation, self-reinforcement, and matching procedure.

Self-evaluation has also been included as a component in a package of techniques designed to teach self-control skills (Bolstad and Johnson, 1972; Drabman, Spitalnik, and O'Leary, 1973; Robertson, Simon, Pachman, and Drabman, *in press*). In these studies, the role of self-evaluation was unclear, because its effects after being paired with token reinforcement could not be separately assessed.

Neither self-recording nor the self-evaluation of behavior according to some criterion can be performed without self-monitoring of that behavior. The results of only two studies demonstrating no effect associated with self-evaluation

alone do not rule out the possibility that self-evaluation may have a desirable effect on target behaviors. Yet, it seems doubtful that requiring students to evaluate their behavior relative to an externally provided criterion will increase the effectiveness of self-recording. The failure of externally instructed self-evaluation to add to the effectiveness of self-recording is not surprising, since in applied settings instructions to self-record probably serve as discriminative stimuli for self-evaluation.

Reliability of Self-Observation

Reliability refers to the consistency of measurement between self-recordings of behavior and those of one or more independent observers. Several self-control studies have included reliability measures for observers' records of student behavior, without assessing the reliability of students' records (Glynn and Thomas, 1974; Gottman and McFall, 1972; Humphrey, Karoly, and Kirschenbaum, Note 1). Other studies have compared self-recordings and observer records and have reported low correlations between these two measures (Brodén *et al.*, 1971; Kaufman and O'Leary, 1972; Turkewitz *et al.*, 1975). In these studies, it is not clear if self-monitoring occurred or whether the self-recording of target behaviors or of any behaviors was responsible for the changes obtained in target behaviors. What does seem clear is that instructions to self-record a target behavior combined with self-recording of some behavior(s) can have a desirable effect on the target behavior (Brodén *et al.*, 1971; Gottman and McFall, 1972; Lovitt, 1973).

Several self-control studies have included elaborate procedures to assure high levels of accuracy in self-recorded target behaviors. These procedures have consisted of awarding students bonus points for matching or being within a specified range of an external agent's records and penalizing them for being beyond that range. Matching procedures, whether abruptly or gradually withdrawn in an effort to transfer control of contingencies from an external source

to the students, have resulted in high levels of reliability in self-observed behavior (Bolstad and Johnson, 1972; Drabman *et al.*, 1973; Robertson *et al.*, *in press*; Turkewitz *et al.*, 1975). Other authors have reported high levels of reliability of self-recorded behavior without using matching procedures (Ballard and Glynn, 1975; Frederiksen and Frederiksen, 1975; Glynn, Thomas, and Shee, 1973; Knapczyk and Livingston, 1973; Thomas, 1976). These studies either did not assess the role of self-recording or self-evaluation alone or found the procedures did not have an effect on target behaviors. In light of the findings described above, it may not be necessary to program for high levels of accuracy in self-recorded behavior in order to obtain desirable changes in target behaviors.

Conclusions

The results of these studies dealing with self-observational procedures lead us to the following tentative conclusions: (a) Self-recording appears to have either desirable or no effects on target behaviors. These desirable effects have, unfortunately, consisted of only modest changes. To increase their applied significance, future studies should focus on variables that can produce greater magnitudes of behavior change. Self-recording has not been shown to have a deleterious effect. (b) Desirable effects associated with self-recording may be short-term, requiring the addition of reinforcing contingencies for their maintenance. (c) Self-evaluation does not appear to add to the effectiveness of self-recording. (d) Self-recording does not have to be accurate in order to produce desirable changes in target behaviors. (e) Further assessment of accurate *versus* inaccurate self-recording is needed to determine which, if any, situations will require training for accurate self-recording, clearly a more costly procedure than simply allowing students to self-record regardless of their accuracy.

Future research could include a multiple-baseline-across-behaviors design with initially

inaccurate self-recorders to investigate this issue. Changes obtained in target behaviors A and B following training in accurate self-recording for behavior A would indicate that inaccurate self-recording is as effective as accurate self-recording. The failure of behavior B to change prior to training in accurate self-recording for this behavior would suggest the necessity for training accurate self-recording in certain situations. (f) Future studies designed to investigate the effects of self-observational procedures used alone need to provide adequate periods of time for assessing these effects.

SELF-DETERMINED *versus* EXTERNALLY DETERMINED CONTINGENCIES

A number of studies have been conducted to compare self- with teacher-determined contingencies. Lovitt and Curtiss (1969) investigated this strategy in two experiments with the academic responses of a student who had behavior problems and found an increase in median response rate (47% and 44%, respectively) when contingencies were student-determined. Following baseline (Phase I), Bolstad and Johnson (1972) had each of three groups of disruptive first and second graders receive externally determined reinforcement (Phase II). In Phase III, two of these groups recorded their own behavior and received reinforcement for matching an accuracy criterion (self-regulated). Matching was withdrawn in Phase IV, in which reinforcement for the two self-regulated groups was determined by their self-ratings of disruptive behavior. The third group received externally determined reinforcement throughout Phases III and IV.

When reinforcement was withdrawn in Phase V (extinction), one self-regulated group continued to self-record disruptive behavior. The results showed that disruptive behavior decreased at least 67% for all three groups in Phase II. A further decrease was obtained in all

three groups during Phase III and was maintained throughout Phase IV. The differences between the two self-regulated groups and the externally regulated group were not significant in any of these phases. Yet, the self-regulated groups had 42% fewer disruptions than the externally regulated group in Phase III and 39% fewer disruptions in Phase IV. Disruptive behavior increased for all three groups in Phase V, with no significant differences between the self-regulated groups and the externally regulated group. Once again, however, the self-regulated groups averaged 39% fewer disruptions than the externally regulated group.

Farnum, Brigham, and Johnson (Note 2) found that although both teacher- and student-determined performance goals were effective in increasing the math productivity of fifth graders, students consistently completed the most work in the self-determined condition and overwhelmingly preferred self-determined contingencies. The response-facilitation effect of being able to choose one's own contingencies has received additional support from several studies by Brigham and his associates (*e.g.*, Brigham, Note 3; Brigham and Bushell, 1973; Brigham and Sherman, 1973; Brigham and Stoerzinger, 1976).

Research by Glynn (1970) involved four different ninth-grade classes receiving either experimenter-, self-, chance-determined, or no reinforcement. Test performance was measured across these groups during token reinforcement, extinction, and self-reinforcement. The results showed that during token reinforcement and extinction, self- and experimenter-determined reinforcement were equally effective in producing significantly higher test performance than chance-determined and no reinforcement. When allowed to determine their own reinforcement, students previously in the chance-determined group performed worse than the other two reinforcement groups and the no-reinforcement group. It appeared that an inconsistent reinforcement history, as in the chance-determined group, might impair students' subsequent abili-

ties to apply self-determined contingencies effectively.

Results obtained by Felixbrod and O'Leary (1973, 1974) and Frederiksen and Frederiksen (1975) further supported and extended the findings of Glynn (1970), that self- and externally determined reinforcement can be equally effective in producing behavior change. Felixbrod and O'Leary (1974) also found that during extinction, the differences in academic performance between a group that had externally imposed standards and one whose standards were self-determined during a prior reinforcement period were not significant. Yet, the former group outperformed the latter group by at least 40%.

The effect of stringent standards on performance has been discussed by several authors (*e.g.*, Bandura, 1974; Kanfer, 1970a; Liebert, Hanratty, and Hill, 1969; Locke, Cartledge, and Koeppl, 1968). In laboratory settings, stringent standards have been established through verbal instructions (*e.g.*, Liebert and Allen, 1967; Liebert and Ora, 1968) and modeling (*e.g.*, Bandura, Grusec, and Menlove, 1967; Bandura and Kupers, 1964; Hildebrandt, Feldman, and Ditricks, 1973; McMains and Liebert, 1968; Mischel and Liebert, 1966, 1967). Several studies conducted in classrooms have shown that students tend to select more lenient performance standards in self-determined reinforcement relative to externally imposed standards in externally determined reinforcement (Felixbrod and O'Leary, 1973, 1974; Frederiksen and Frederiksen, 1975). Brownell, Colletti, Ersner-Hershfield, Hershfield, and Wilson (1977) developed a prompt for selecting stringent standards and socially reinforced the selection of these standards for the academic performance of third and fourth graders. Their results showed that students in a self-determined performance standards group presented with the prompt selected more stringent standards than students in a self-determined group without the prompt. Furthermore, stringent standards, whether self- or externally determined, produced significantly ($p < .05$) greater academic performance than

lenient standards during reinforcement. During extinction, no significant differences were found between stringent and lenient performance standards. Those groups whose standards were previously self-determined, however, completed significantly ($p < .05$) more math problems than those groups who had externally imposed standards, regardless of the stringent *versus* lenient distinction.

Conclusions

The research reviewed in this section leads us to suggest the following tentative conclusions regarding self-determined contingencies: (a) Self-determined contingencies can be as effective as or more effective than externally determined contingencies during periods of reinforcement. (b) The role of prior self-determined contingencies during subsequent extinction periods is not clear. One study (Felixbrod and O'Leary, 1974) found students who previously determined their own contingencies performed worse than those whose contingencies were externally determined. Another study (Brownell *et al.*, 1977) found the opposite effect. Further research is needed to provide more data concerning the effects of prior self-determined contingencies relative to externally determined contingencies during subsequent periods of extinction. (c) Being able to choose one's own contingencies may function as a response facilitator. To date, this response facilitation effect appears to be moderate. Future studies should attempt to identify variables resulting in greater magnitude of behavior changes, thereby increasing their applied significance. (d) An inconsistent pattern of externally determined reinforcement can have a detrimental effect on an individual's subsequent ability to apply self-determined reinforcement. (e) Students' tendencies to choose lenient performance standards when determining their own reinforcement can be altered by prompting the selection of more stringent standards, which can produce greater performance than lenient standards.

SELF-CONTROL STRATEGIES IN THE MAINTENANCE OF APPROPRIATE CLASSROOM BEHAVIOR

Authors of the major reviews of the token economy literature (Kazdin, 1975*b*, 1977; Kazdin and Bootzin, 1972, 1973; O'Leary and Drabman, 1971) have emphasized the use of self-control skills to maintain appropriate behaviors initially obtained with externally determined reinforcement. Working in a psychiatric hospital school, Kaufman and O'Leary (1972) found that adolescent students in a token reinforcement classroom obtained an average 82% reduction in disruptive behavior relative to nontoken phases. An average 78% decrease in disruptive behavior relative to nontoken phases was found for students in a response cost token classroom. Following several periods of externally determined contingencies, students in both classrooms were instructed to rate their own behavior and decide on the number of tokens they should receive. Using these self-control procedures, students in both groups maintained the low levels of disruptive behavior previously achieved with externally determined contingencies, while awarding themselves the highest possible ratings.

The authors suggested several possibilities for the maintenance of appropriate behavior: (a) self-administration of contingencies may have become reinforcing; (b) failure to remain well-behaved might have resulted in a return to teacher ratings, which would have been lower than student ratings, thereby resulting in less reinforcement; (c) academic skills may have developed during teacher-determined reinforcement and may have become intrinsically reinforcing; and (d) students may have been adventitiously reinforced for high ratings and low levels of disruption (Kaufman and O'Leary, 1972).

In an attempt to replicate these findings with a similar population, Santogrossi *et al.* (1973) found that teacher-determined reinforcement re-

sulted in an 80% decrease in disruptive behavior relative to baseline. When the students were allowed to determine their own reinforcement, this low level of disruption was maintained only for a short time, with disruptive behavior eventually increasing to baseline levels. During this period the students were giving themselves the highest possible ratings, even while displaying alarming levels of disruptive behavior. A matching condition, instituted to resolve this problem, resulted in higher levels of disruption than during baseline. It appeared that two problems were associated with this method of introducing matching: (a) a second abrupt shift in stimulus control occurred, with reinforcement becoming partially controlled by the teacher; and (b) it represented an aversive procedure, in that the magnitude of reinforcement was lowered, due to the penalty for inaccurate self-evaluations.

To resolve the problems in the Santogrossi *et al.* (1973) study, Drabman *et al.* (1973) used the following successive steps to transfer the evaluation and reinforcement duties gradually from the teacher to the students: (a) students recorded points awarded by the teacher; (b) students were awarded bonus points for matching teacher ratings; (c) matching was gradually faded in four phases, with successively smaller numbers of students being required to match the teacher; and (d) students rated their own behavior and determined their own reinforcement independently of the matching criterion. Relative to the introduction of matching in the Santogrossi *et al.* (1973) study, this method avoided an abrupt shift in stimulus control by enabling the teachers to fade their roles gradually. Additionally, it provided an opportunity for an increased magnitude of reinforcement (bonuses). A 57% increase in academic performance and a 67% decrease in disruptive behavior relative to baseline were obtained under teacher-determined reinforcement for students with academic and behavioral problems. These changes in behavior were maintained throughout matching and fading, and finally were maintained by the students themselves. Additionally,

these behavioral changes generalized to control periods in which token reinforcement was not in effect, although student work received teacher praise.

Drabman *et al.* (1973) suggested several factors that may have contributed to the maintenance of appropriate behavior: (a) continuous teacher praise for appropriate student behavior may have become more reinforcing over the course of the study; (b) peer reinforcement for appropriate behavior also increased; (c) accurate self-evaluation was praised by the teacher and may have acquired conditioned reinforcing properties, thereby strengthening appropriate behavior; and (d) improved academic skills incompatible with inappropriate behavior were developed.

In a systematic replication and extension of this study, Turkewitz *et al.* (1975) worked with similar children in an after-school token reinforcement program. A 68% decrease in disruptive behavior relative to baseline was achieved with teacher-determined reinforcement. This low level of disruption was maintained while the evaluation and reinforcement procedures were transferred from the teacher to the students, using fading procedures like those of Drabman *et al.* (1973). In the final phase of the study, the students evaluated their own behavior without exchanging their points for back-up reinforcement. A 56% decrease in disruptive behavior, relative to an identical phase prior to teacher-determined reinforcement, was obtained. These results also generalized to no-token control periods, in which goals were assigned by the teacher. Because the assignment of goals was also included during token reinforcement, goals may have acquired conditioned reinforcing properties, thereby contributing to the maintenance. Unfortunately, disruptive behavior for these students in their home special education classroom did not differ from that of a control group, thereby suggesting limited generalizability of the effects of the self-control training procedure.

A variation of the fading procedures of Drab-

man *et al.* (1973) was developed by Robertson *et al.* (*in press*) to transfer evaluation and reinforcement functions from the teacher to the students. Disruptive behavior decreased by 70% during teacher-determined reinforcement, relative to baseline levels. A further decrease of 20% was obtained when the students evaluated their own behavior and delivered their own reinforcement. Token reinforcement was faded via an "inflation" period, during which the point costs for back-up reinforcers were doubled. This was followed by a removal of back-up reinforcement and a return to baseline. During this return-to-baseline phase, the students maintained disruptive behavior at a level 82% lower than during the initial baseline. Furthermore, instances of generalization to an afternoon period in the absence of the therapeutic procedure, to mornings when the training program was not in effect, and to the presence of different teachers were noted.

Working with second graders, Glynn *et al.* (1973) introduced self-control procedures by having students indicate whether or not their behavior was on-task when auditory signals were randomly presented. Each instance of on-task behavior could be self-reinforced. Prior teacher-determined reinforcement for the entire class being on-task resulted in an average 46% increase in on-task behavior relative to baseline levels. The self-control procedures were associated with a further increase of 20% in on-task behavior, in addition to producing more stable rates of responding. The change to self-control represented a change from group to individual contingencies, which may have contributed to the effectiveness of the self-control procedures.

Glynn and Thomas (1974) introduced self-control procedures for third graders without giving them prior exposure to externally determined reinforcement, and found a 41% increase in on-task behavior relative to baseline. A cueing device consisting of a chart specifying the on-task behaviors required for each lesson was introduced to eliminate confusion regarding what constituted on-task behavior. This proce-

dures resulted in a 79% increase in on-task behavior and more stable patterns of responding relative to a second baseline instituted after the initial self-control phase. These results were replicated by Thomas (1976), who demonstrated the effectiveness of similar self-control procedures for a longer period of time.

Conclusions

Based on the results of the studies in this section, we can suggest the following conclusions: (a) Self-control skills can effectively maintain desirable levels of behavior achieved under externally determined contingencies. Relative to baseline, target-behavior changes obtained in the studies in this section were of sufficient magnitude to have applied significance. Maintenance, in this sense, refers to enduring changes in target behaviors for target subjects in the therapeutic setting with the expressed continuation of some form of program contingencies. Enduring changes in target behaviors for target subjects in the therapeutic setting after all program contingencies have been removed (*i.e.*, a return to baseline conditions) are more appropriately referred to as time generalization (Drabman, Hammer, and Rosenbaum, *in press*). Whereas all the studies reviewed in this section addressed the issue of maintenance, only the Robertson *et al.* (*in press*) study addressed the issue of time generalization; this study found that self-control skills can effectively achieve this class of generalization. (b) With disruptive children, an abrupt transfer of control from the teacher to the students may result in high levels of undesirable behavior. (c) Introduction of a matching criterion, followed by fading of the matching procedures, may produce an effective transfer of control from an external agent to the student. (d) Fading back-up reinforcement may result in desirable behavior being maintained by students themselves after the self-control program has been removed (*i.e.*, time generalization). (e) Self-controlled reinforcement can initiate and maintain desirable changes in the absence of prior externally determined

reinforcement, at least with normal children in regular classrooms. (f) Finally, further research is needed to compare the effects of an abrupt and a gradual transfer of control over a variety of students. To be most effective, this type of research should be conducted across classrooms using a between-groups experimental design, and should measure long-term maintenance.

SELF-DETERMINED REINFORCEMENT *versus* RESPONSE COST

Although a wealth of research has focused on teaching students to determine their own reinforcement contingencies, only two studies could be found that focused on teaching students to determine their own punishment contingencies. In the first study (Kaufman and O'Leary, 1972), described in the previous section, students in a response-cost token-reinforcement classroom maintained disruptive behavior at a low level initially obtained during externally determined response cost, when instructed to determine the number of tokens they should lose. Unfortunately, the effects of self-imposed response cost were assessed only for a short period of time.

To investigate response cost further as a method of self-management, Humphrey *et al.* (Note 1) instructed second graders in a self-reward group to reinforce themselves contingent on accurate academic performance. Students in a self-imposed response-cost group were given the maximum number of tokens that could be earned on a particular day and were instructed to fine themselves contingent on inaccurate academic performance and failure to complete the daily assignment of reading papers. Following a return to baseline, the groups switched contingencies. The results showed that both self-control procedures improved academic performance (mean increase of 58%) relative to baseline, with self-reward producing greater increments than self-imposed response cost. The level of disruptive behavior decreased when either self-control procedure was in effect (mean

decrease of 34%), even though there were no specified contingencies for disruption. Inspection of the data, however, revealed considerable overlap of baseline and self-management results for both groups. Although this study may indicate that self-imposed response cost can effectively control classroom behavior, we feel that further research yielding more conclusive results (*i.e.*, greater magnitude in the differences between baseline and self-management phases) is needed before self-imposed response cost can be advocated for classroom use.

SELF-INSTRUCTIONAL TRAINING

A potentially important method for developing self-control is through self-instructional training, in which individuals are taught to make suggestions to themselves to guide their own behavior in a manner similar to being guided by another individual. The important role of "talking to oneself" in controlling behavior has been emphasized by several authors (*e.g.*, Meichenbaum, 1975, 1977; Meichenbaum and Cameron, 1974; Skinner, 1953). In laboratory settings, self-instructions have proven effective with discrimination training (Bem, 1967), finger-tapping (Meichenbaum and Goodman, 1969), resistance to temptation (Hartig and Kanfer, 1973), and instruction-following (Monahan and O'Leary, 1971; O'Leary, 1968).

Meichenbaum and Goodman (1971) worked with second graders who had behavior problems such as hyperactivity and poor self-control, and attempted to teach them self-control skills. A cognitive-training group received the following fading procedure: (a) an adult model performed a task while talking aloud (cognitive modeling); (b) the child performed the same task while being directed by the adult (overt external guidance); (c) the child performed the task while self-instructing aloud (overt self-guidance); (d) the child performed the task while whispering the instructions (faded, overt self-guidance); and (e) the child performed the task with guidance from private speech (covert self-

instruction). During training in the first stage, the adult modeled performance-relevant skills, such as problem definition, planning strategies, guidance, self-reinforcement, self-evaluation, and error correction. The child was trained to use self-instruction to control nonverbal behavior in a variety of tasks, ranging from simple sensorimotor tasks (*e.g.*, copying line figures) to more complex problem solving tasks. Additionally, the level of difficulty of the tasks increased over the training sessions, with the adult model demonstrating self-verbalizations for each task, and the child following the fading procedure. The results showed that the cognitive-training group had significantly improved performance on psychometric tests designed to measure behavioral and cognitive impulsivity (*e.g.*, Matching Familiar Figures, Porteus Maze Test) relative to two control groups. No significant differences, however, were found on two measures of appropriate behavior in the classroom, thereby bringing into question the applied significance of this self-instructional training procedure.

Working with kindergarten children in their classroom, Robin, Armel, and O'Leary (1975) provided feedback and social praise, in addition to a training procedure similar to that of Meichenbaum and Goodman (1971), to a self-instruction group. The results showed that this group performed significantly (69%) better on a writing task (printing different letters of the alphabet) than a no-treatment control group. The self-instruction group also significantly (28%) outperformed a direct-training group that received only feedback and praise on completion of each letter copied. The authors listed several limitations associated with self-instructional training: (a) higher rates of self-verbalizations after self-instructional training were not correlated with superior writing performance; (b) it was difficult to teach self-instructional responding; (c) some children self-instructed correctly but made incorrect writing responses; (d) the amount of time required to teach self-instruction decreased the amount of time avail-

able for writing practice; and (e) generalization from letters that were trained to letters not trained did not occur. Furthermore, the authors seriously questioned the feasibility of teaching self-instructional responding in applied settings to obtain only a 28% increase in performance relative to a more cost efficient direct-training procedure.

Bornstein and Quevillon (1976), working with disruptive preschool children, introduced a self-instructional training procedure similar to that of Meichenbaum and Goodman (1971) and presented reinforcement contingent on completing each step in the training sequence. The results showed that, relative to baseline, an average 65.3% increase in on-task behavior was obtained in the classroom following self-instructional training. Follow-up data collected 22.5 wk following initiation of baseline revealed an average increase of 59% in on-task behavior relative to that baseline. In a systematic replication of the Bornstein and Quevillon (1976) study, Friedling and O'Leary (1979) worked with hyperactive second and third graders and failed to obtain any systematic changes in on-task behavior related to self-instructional training. The subsequent application of token reinforcement resulted in increased on-task behavior.

In assessing each of four components of self-instructional training (instructions, overt modeling, self-instructional modeling, training in task-relevant speech) relative to arithmetic performance assessed by pre- and posttests, Wein and Nelson (Note 4) presented different combinations of these components to different groups of second graders. The results showed no significant differences among these groups or between them and a no-treatment control group on an arithmetic posttest.

Conclusions

The mixed results from the studies reviewed in this section lead us to conclude that the following future research on self-instructional training is needed: (a) further outcome research to demonstrate the applied significance, if any,

of self-instructional procedures, after which (b) a well-controlled component analysis separating the effects of each step in the self-instructional package; (c) an identification of those behaviors, settings, and populations for which self-instructional training may be most appropriate; and (d) an identification of those variables that would promote generalization of self-instructional training effects.

GENERALIZATION

Self-control training is a strategy often mentioned for promoting generalization of behavior changes. In their discussion of the technology of generalization, Stokes and Baer (1977) describe the possible mediational function of self-control skills in promoting generalization. The ease in transporting these skills should render them readily accessible in a variety of situations to facilitate appropriate responding. According to the conceptual analysis of generalization provided by Drabman *et al.* (*in press*), self-control studies conducted in classroom settings have investigated only 4 of 15 different classes of generalization. Time generalization has already been discussed and refers to changes in the target behavior of target subjects in the therapeutic setting that endure after the program contingencies have been withdrawn. Several studies have shown that self-control skills can produce time generalization (Bolstad and Johnson, 1972; Brownell *et al.*, 1977; Felixbrod and O'Leary, 1974; Glynn, 1970; Robertson *et al.*, *in press*). Additionally, laboratory studies on self-control have demonstrated time generalization with visual discrimination tasks (Johnson, 1970; Johnson and Martin, 1973; Kanfer and Duerfeldt, 1967) and with responding to a game-like apparatus (Weiner and Dubanoski, 1975). The time generalization effects associated with self-control have been attributed to the conditioned reinforcing properties acquired by the self-recording or self-evaluation procedures, which may continue on a covert level (self-monitoring) after the formal program contin-

gencies have been removed. Furthermore, the therapeutic setting itself may acquire discriminative stimulus properties and function as a cue for the continuation of behavior changes obtained under the formal training program.

Setting generalization has occurred when changes in target subjects' target behaviors obtained during an intervention transfer to a different setting, with program contingencies still in effect only in the therapeutic setting. The absence of the salient discriminative stimuli present in the therapeutic setting is the criterion for determining whether the new setting is different. Setting generalization associated with self-control training has been reported in several classroom studies (Drabman *et al.*, 1973; Robertson *et al.*, *in press*; Turkewitz *et al.*, 1975). In each of these studies, the salient discriminative stimuli absent in the new setting were the formal program contingencies. In the Drabman *et al.* (1973) study, it was not clear whether maintenance or setting generalization was obtained, since the teacher praised the students for doing their work in token and control periods. Teacher praise, therefore, was paired with token reinforcement and may have acquired conditioned reinforcing properties, thereby maintaining changes in target behaviors in the control periods. Some form of the program contingencies was present during the control periods, thereby resulting in the maintenance of changes in target behaviors, not setting generalization. This same issue is relevant to the Turkewitz *et al.* (1975) study in which goals assigned by the teacher were included in both token and control periods. Broden *et al.* (1971) failed to find setting generalization associated with self-monitoring.

Only one study reviewed in this paper investigated setting time generalization, which includes changes in target subjects' target behaviors that transfer to a different setting, when program contingencies are no longer in effect in the therapeutic setting. Bornstein and Quevillon (1976) found that the effects of self-instructional training transferred from the train-

ing setting to the classroom after training was completed, thereby providing support for setting time generalization. Unfortunately, these results have been difficult to replicate (Friedling and O'Leary, 1979).

Only two studies have investigated response generalization, which refers to changes in non-target behaviors of target subjects in the therapeutic setting during intervention. Both studies (Ballard and Glynn, 1975; Robin *et al.*, 1975) failed to find evidence for this class of generalization.

Conclusions

Based on the studies reviewed in this section, we can conclude that substantial evidence has been provided only for time generalization. According to Drabman *et al.* (*in press*), there are 14 additional classes of generalization. Therefore, it seems clear that further research is needed to identify those factors that can effectively promote generalization in a variety of classes, including setting, setting time, and response generalization. Additionally, a longer period of time for measurement of generalization in self-control studies is needed.

THE ROLE OF EXTERNAL CONTROL

Every study dealing with self-control in the classroom has included external variables prior to or concurrent with the introduction of self-control training. The presence of these external variables has led several authors (*e.g.*, Kazdin, 1975a; Morgan and Bass, 1973) to raise questions regarding the ability of self-control strategies, especially self-reinforcement, to modify and/or maintain behavior in the absence of external influence.

Theoretically, according to Jones, Nelson, and Kazdin (1977): "Self-reinforcement occurs when, in the relative absence of external controlling influences, an individual has full control over available reinforcers but freely imposes certain contingencies for the self-administration

of the reinforcing stimuli" (p. 151). Morgan and Bass (1973) add to this theoretical description: "It is therefore crucial that the subject understand and believe that he truly does have complete control over all contingencies and could, if he wished, 'cheat' or reward himself at any time without bringing about any other contingent external consequences of either a reinforcing or punishing nature" (p. 120).

Based on the research reviewed in previous sections, a disparity exists between theoretical self-reinforcement (and self-control) and that found in applied classroom settings. In fact, the sources of external control present in classroom studies investigating self-control strategies render theoretical self-reinforcement in the classroom undemonstrated to date. External control has been manifested by including the introduction of self-determined contingencies following some period of externally determined contingencies (Bolstad and Johnson, 1972; Drabman *et al.*, 1973; Frederiksen and Frederiksen, 1975; Glynn *et al.*, 1973; Kaufman and O'Leary, 1972; Lovitt and Curtiss, 1969; Robertson *et al.*, *in press*; Santogrossi *et al.*, 1973; Turkewitz *et al.*, 1975; Farnum *et al.*, Note 2); requiring students to match self-ratings of behavior with those of the teacher or a trained observer (Bolstad and Johnson, 1972; Drabman *et al.*, 1973; Robertson *et al.*, *in press*; Santogrossi *et al.*, 1973; Turkewitz *et al.*, 1975); and praising appropriate behavior combined with ignoring inappropriate behaviors (Brodén *et al.*, 1971; Drabman *et al.*, 1973; Santogrossi *et al.*, 1973; Turkewitz *et al.*, 1975). Additional evidence for external control has been provided in the limitation of the range of points that students could award themselves, determination of rules specifying how to apply contingencies, administration of reinforcement, checks on students' behaviors, specification of performance standards, modeling desirable behaviors, and cueing desirable behaviors.

Based on these findings, we can conclude that only a weak form of self-control has been demonstrated so far in these classroom studies. For

example, no one has yet been able to maintain appropriate behavior while allowing the pupils to partake of reinforcement when, where, and in amounts they desired. Although further research is needed which focuses on eliminating the need for as many sources of external control as possible, the issue of external influences on self-control in applied classroom settings can be resolved if self-control in these settings is "considered a matter of degree where external control is minimal or intermittent" (Kazdin, 1975a, p. 207). The purpose of self-control training in the classroom should be to enable students to manage as much of their own education as possible and to enable the teacher to devote time to teaching and supervising students' work without having to control disruptive behavior or to provide incentives constantly for academic performance.

EXPERIMENTAL DESIGN

The most frequently used designs in self-control studies in the classroom have been the within-subjects reversal and the between-subjects comparison designs. One problem associated with the reversal design is that reversing desirable behavior changes sometimes raises practical and ethical questions (Stolz, 1976). Although reversal designs provide important and scientifically valid information, they often may not be appropriate for self-control training.

In the Robertson *et al.* (*in press*) and Turkewitz *et al.* (1975) research, the lack of a reversal indicated the durability of the behavior changes obtained, although a causal interpretation of the results was difficult. These reports, in addition to that of Drabman *et al.* (1973), used an extended comparison design in which several different interventions were successively introduced to transfer control gradually from the teacher to the students. Even though this design may make the interpretation of the results difficult, we want to consider the reasons for its use. Ayllon and Rosenbaum (1977) mentioned that an important component contributing to the

success of classroom behavior modification is the cooperation of the teacher. Teachers are typically interested in maintaining academic performance and appropriate social behavior in their students. With extremely disruptive students, as in the Drabman *et al.* (1973), Robertson *et al.* (*in press*), and Turkewitz *et al.* (1975) studies, the teacher's goal was to decrease the level of disruption and increase academic performance. It would be difficult to convince a teacher of the importance of conducting a reversal to demonstrate experimental control, since this would include the possibility of students again becoming highly disruptive. Because of its methodological limitations, the extended comparison design should be used in combination with a control group, if possible. Criticisms similar to those stated above can also be made against using a control group, since nothing would be done to improve the academic or social behavior of students in that group. One possible solution to this problem would be to use either a multiple baseline across subjects or groups, in which the control subjects would receive the benefit of an effective intervention at a later temporal point than the treatment subjects.

Another methodological issue concerns isolating the effects of self-observation from those of other self-control components in packaged treatment approaches. Jeffrey (1974) has suggested the inclusion of a self-monitoring or self-evaluation phase following baseline and preceding additional self-control components within reversal or multiple baseline designs. This would enable an assessment of self-observational effects and their potential contribution to the entire treatment package.

CONCLUSIONS AND FUTURE DIRECTIONS

Self-control is a therapeutic goal that is advocated by almost all helping professionals, regardless of their discipline or theoretical orientation. The research reviewed in this article has

demonstrated that students can be taught to observe and record their own behavior, determine and administer their own contingencies, and provide instructions to guide their behavior. The results reviewed suggest that several steps should be followed to maximize the potential effectiveness of self-control training in the classroom: (a) students should be taught self-observational procedures; (b) future research may demonstrate that accurate self-observation will increase the efficiency of self-control training. In these situations, accurate self-observation can be prompted by initially requiring students to match their records with those of the teacher or a trained observer, followed by gradually fading the matching process; (c) once self-observation has been established, externally administered contingencies for desirable behavior change can be introduced; (d) the control of these contingencies can then be transferred to the students; (e) at the same time that self-determined contingencies are introduced, students can be taught to provide themselves with instructions and praise designed to guide their behavior; and (f) when the students are reliably controlling their academic and social behavior, explicit contingencies can be gradually withdrawn. This multi-component approach would maximize the probability of maintenance of self-control skills after the training program has been removed. It would also contribute to the potential generalization of these skills across different situations. Stokes and Baer (1977) have emphasized the necessity of specifically programming the occurrence of generalization, which implies that teachers must be prepared to train self-control skills in several different settings.

The effectiveness of applied behavioral change strategies is evaluated relative to their production of socially meaningful changes in behavior. In evaluating applied classroom research, target behavior changes are meaningful relative to the magnitude of change required for educational significance. Outcome studies restricted to increases in appropriate behaviors or

decreases in inappropriate behaviors reveal little regarding satisfaction of classroom and school curricula requirements. Therefore, the broader context of the educational significance of behavior changes in externally and self-controlled behavior modification programs needs to be addressed.

In the studies reviewed in this paper, only anecdotal evidence concerning the educational implications of target behavior changes has been reported (*e.g.*, self-control programs enable teachers to devote more time to individual students). This points to several areas of classroom research warranting further investigation in self-control studies:

1. Because studies investigating the socio-metric status of target children have indicated that desirable changes can be obtained from successful teacher-controlled behavior modification programs (Drabman and Lahey, 1974; Drabman, Spitalnik, and Spitalnik, 1974), those social changes that may be a function of self-control procedures should be studied.

2. The issue of under what circumstances the self-selection of reinforcers is differentially effective when compared with external selection of reinforcers must be studied.

3. Methods of identifying children for whom self-control is not an appropriate goal need to be developed.

4. How children in unsuccessful self-control programs are affected should be studied.

5. The effectiveness of self-control procedures needs to be assessed by comparing results from the initial baseline with those from a final return to baseline. If target-behavior changes are under the control of the students themselves, then those changes should be maintained after all program contingencies have been removed. To date, only one study has included this type of comparison (*i.e.*, Robertson *et al.*, *in press*).

6. The social validity of behavior changes obtained with self-control procedures needs to be demonstrated. In addition to demonstrating a statistically significant improvement in be-

havior, independent subjective evaluation of this behavior change by the teacher, parents, and peers is needed. When self-control training is conducted to improve the behavior of only a few students, then data are needed on the behavior of well-behaved peers.

7. Standardized data collection procedures are needed to render different studies comparable.

8. Parametric comparative research focused on the advantages and disadvantages resulting from self-control *versus* external control techniques along such dimensions as program effectiveness, social validity, acceptance by teachers and students, and ease of implementation, is warranted.

Laboratory research from the developmental literature has suggested several variables that may influence self-control. For example, Masters and Santrock (1976) suggest that cognitive and affective events associated with a task can affect subsequent performance of that task. These authors found that preschoolers instructed to think of pleasant events or to emit positive verbalizations worked significantly longer at a motor task than children instructed to think of unpleasant events or to emit negative verbalizations, or children in a control group. Switzky and Haywood (1974) found that children's motivational orientations (*i.e.*, externally or intrinsically motivated) can affect their on-task performance. Intrinsically motivated children performed significantly more wheel-turning responses than externally motivated children under self-reinforcement conditions. Opposite results were obtained under external reinforcement conditions. Although the results of these studies have little, if any, applied significance, the variables studied may have an effect on self-control training in applied settings and do, therefore, warrant further investigation.

One important area in which self-control may prove useful is the transfer of positive behavior changes from one academic year to the next. Typically, the beginning of each academic year

consists of teachers reviewing material supposedly learned during the previous year. Children often have difficulty recalling this material because they have not used it during the summer months. With the development of self-control skills, children could be encouraged to review material during the summer vacation.

Self-control is a relatively new area of classroom research, yet there is already a substantial literature. The studies reported here represent only the most rudimentary attempts to achieve this important goal. We hope that this review leads to a redoubling of research attempts. If this happens, a technology for teaching most pupils to be responsible for maintaining high levels of appropriate behaviors seems achievable.

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