Self-monitoring: Are Young Adults with MR and Autism able to Utilize Cognitive Strategies Independently?

Jennifer B. Ganz
University of Texas at San Antonio

Jeff Sigafoos
University of Texas at Austin

Abstract: Effectiveness of a self-monitoring procedure was evaluated for increasing work task completion and verbal requesting in two young adult men with autism and severe mental retardation. The study was conducted in a vocational training program at times when the men were expected to complete vocational tasks independently. A changing criterion design was used to evaluate the procedure on number of required tasks completed and number of verbal requests. When the self-monitoring procedure was applied to task completion and verbal requests for help, performance increased systematically and in line with the changing criteria design for each participant. Results suggest that individuals with autism and severe mental retardation can be taught to use a self-monitoring procedure to increase independent task completion and verbal requesting in a vocational training program.

Self-management, or management of one’s own behavior, is considered to be a “pivotal behavior,” a technique that potentially will have a widespread impact on areas of intervention for individuals with autism spectrum disorders (ASD) (Koegel, Koegel, & McNerney, 2001). Koegel, Koegel, and Carter (1999) suggest that when individuals with autism are taught to self-manage, they may generalize that skill to a variety of settings and behaviors, requiring fewer resources, such as educational practitioners, to monitor them. In addition, self-monitoring is a positive intervention that is “teacher-friendly.” That is, the process of teaching individuals to self-monitor is rewarding to those individuals, requires little training for practitioners, requires few materials that are not already available in the classroom, and demands only a small amount of the teacher’s time once the student gains independence. Thus, self-monitoring may be useful for promoting greater independence among individuals with ASD.

Self-monitoring is a cognitive-behavioral strategy that falls under the umbrella of self-management. It is a method of changing someone’s thinking or private verbal behavior to impact his or her overt behavior (Rankin & Reid, 1995). This strategy is designed to increase or decrease an individual’s behavior by having that person become cognizant of his or her own behavior, then observe and record that behavior (Maag, 2004). Students who self-monitor may then learn to assess and change their performances and reward themselves when they meet preset criteria. Rankin and Reid delineated the following steps for implementing self-monitoring procedures in school settings.

First, choose the behavior you wish to impact. This must be a specific and measurable behavior (e.g., asking for a food item at lunch by first saying, “please”). Second, baseline data must be collected to determine that individual’s current rate of performance. Third, motivate and teach the student to use the self-monitoring system. This involves explaining to the student the value of using the system (e.g., getting to class on time leads to more free time at the end of class). Fourth, teach the student to use the system (e.g., making tally marks, receiving tokens) and provide modeling and practice. If the system is effective, the final step is to fade teacher monitoring. Initially, the student and teacher will take data at the same time, then compare and reflect on each session’s data. The teacher will then fade
his or her monitoring (e.g., first collect data at every other session, then every fourth, then periodically).

Self-monitoring has been used with a wide variety of individuals; however, much of the research on self-monitoring has been conducted with typically developing individuals and those with mild disabilities (Rankin & Reid, 1995). Few published studies have included participants with severe cognitive impairments or autism. Studies investigating self-monitoring in individuals with moderate to severe mental retardation in school settings have demonstrated improvement in (a) social interactions with general education peers (Hughes et al., 2002), (b) task completion in both general education classrooms (Hughes et al.) and self-contained special education settings (Hughes & Boyle, 1991), (c) on-task behavior (Hughes & Boyle), (d) general education “classroom survival skills” (e.g., arriving on time, looking at the teacher when spoken to) (Gilberts, Agran, Hughes, & Wehmeyer, 2001), and (e) reduction of echolalia (Dipipi, Jitendra, & Miller, 2001).

The majority of research involving use of self-monitoring and self-management with children with autism has focused on social skills, including improvements in (a) play behaviors with typically developing preschool peers (Shearer, Kohler, Buchan, & McCullough, 1996; Strain, Kohler, Storey, & Danko, 1994), (b) conversation skills in adolescents (Newman, Buffington, & Hemmes, 1996), (c) interactions with peers, and (d) sharing (Reinecke, Newman, & Meinberg, 1999). Studies have also found that self-monitoring can lead to reductions in (a) stereotypic behaviors (Koegel & Koegel, 1990), (b) echolalia (Mancina, Tankersley, Kamps, Kravits, & Parrett, 2000), and (c) other inappropriate behaviors (Koegel, Koegel, Hurley, & Frea, 1992). Additionally, a few studies have demonstrated improvement in individuals with autism and similar characteristics in academic and functional skills, including progress in following written (Newman et al., 1995) and picture (Pierce & Schreibman, 1994) schedules, and staying on-task (O’Reilly et al., 2002; Tabor, Seltzer, Heflin, & Alberto, 1999) as a result of teaching self-monitoring skills.

Given this literature, self-monitoring would appear to be promising for improving a variety of behaviors in individuals with developmental disabilities. There is a need for extending this research to adults in vocational training settings. In some vocational settings individuals might be expected to work independently and there may be limited staff resources for supervision (Holloway & Sigafoos, 1999). As a result, self-monitoring may be needed to assist individuals with independent completion of required vocational tasks. The present study investigated effectiveness of a self-monitoring procedure for increasing independent vocational work and verbal requests for help in two adult men with autism and severe mental retardation.

**Method**

**Participants**

The first participant, Alex, was a 20-year-old Caucasian with a diagnosis of autism. According to school records, Alex met special education eligibility under the categories of autism, mental retardation, and speech/language impairment. In addition, Alex was legally blind and relied on glasses, large print/use of visuals, and close proximity to materials. His physician had noted “abnormal responses” at 2 months of age, attributing it to prenatal brain damage that may have been related to a viral infection during pregnancy. No recent IQ tests had been administered; however, eight years earlier he was assessed as having an IQ of 20. At the time of the study, Alex received an adaptive behavior age equivalent of 2 years, 6 months on the Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 1985). Relative strengths on the VABS included motor skills (age equivalent, 3-10) and daily living skills (age equivalent, 3-1) while Alex displayed weaknesses in communication (age equivalent, 1-4) and socialization (age equivalent, 1-8). As noted in Alex’s school records and observed by the first author, Alex had no verbal language and had limited use of gestures and a communication book with pictures of wants, needs, and emotions. School records also noted severe aberrant behaviors including, tantrums, “stop and drop” to the floor, non-compliance, pushing and pulling others, and biting his own hand so that he caused tissue damage. Alex was included in
this study to increase independent work completion. Prior to the study, it was reported by staff that Alex would not complete any work without a staff member’s continual prompting.

The second participant, Troy, was a 19-year-old Mexican-American who received special education eligibility under the categories of mental retardation and other health impairment, due to seizures. At 2 years, 10 months, a school district comprehensive evaluation attributed Troy’s disabilities to meningitis and a stroke at 7 months of age, resulting in significantly decreased use of his right side, lack of speech, aberrant behaviors, and short attention span. At the time of the study, Troy was taking medications for attention, mood disorder, and seizures; however, he was reportedly seizure-free at the time. No recent IQ tests had been administered; however, six years earlier he was assessed as having an IQ of 34. At the time of the study, Troy received an adaptive behavior age equivalent of 4 years, 1 month on the VABS (Sparrow et al., 1985). Relative strengths on the VABS included motor skills (age equivalent, above 5-11) and daily living skills (age equivalent, 5-10) while relative weaknesses were in communication (age equivalent, 2-5) and socialization (age equivalent, 3-2). As reported by Troy’s classroom teacher and observed by the first author, he could speak, but infrequently did so spontaneously. He also reportedly displayed aberrant behaviors including disrobing, throwing his shoes, biting others, and hiding under his desk. Troy was included in this study to increase spontaneous speech, specifically, asking for help during work sessions. Though he was capable of intelligible, spontaneous speech, he rarely initiated requests for items or actions or made comments.

Settings and Materials

Data collection and self-monitoring training took place in the participants’ classroom in a self-contained vocational public school for students with disabilities. Both Alex and Troy were in a class for young adults that focused on transitional skills (e.g., functional communication, self-help, work skills). Data collection and training were administered during vocational tasks. For example, Alex completed tasks involving placing small objects (e.g., coins) into containers and sorting two objects by color. Troy completed tasks including sorting up to six items by color and shape, and sorting brochures and filling envelopes.

Self-monitoring materials were individualized. Alex’s materials included 3 cm square tokens, a small plastic container containing the number of tokens he was to earn before he received his reward, and a laminated sheet of paper (approximately 20 × 13 cm) that included line drawings (approximately 3 cm square) indicating “do work” and the reward he was to earn (see Figure 1 for an example). Rewards that Alex earned for completion of work included time on the computer, a spinning toy that lit up, and a spinning toy that played music. When he completed the set amount of work, he was allowed to choose which of these activity rewards he wanted and was allowed to engage in that activity for five minutes. Troy also had a small container that contained 3 cm blocks that snapped together. Line drawings attached to the container indicated that he should ask for “help” and the reward he was to earn (see Figure 2 for an example of Troy’s self-monitoring system). Troy’s rewards included listening to a cassette tape with headphones, a tube that sounded like thunder when shook, and a pencil with a fake spider on the end. When he completed the set amount of work, he was allowed to choose which of these activity rewards he wanted and was allowed to engage in that activity for five minutes.

Response Definitions

Target behaviors were defined individually for each participant in consultation with the classroom teacher. Alex’s target behavior was to complete a task within five minutes. He was initially required to complete one task within the time limit, but this was gradually increased to four by the completion of the study. Each task consisted of sorting 10 to 20 items or placing 10 to 20 items in a container. Troy’s target behavior was to verbally request help (e.g., “help,” stating the name of a specific item needed) when tasks were sabotaged by necessary items being removed (e.g., sets of items to be sorted). Troy was originally required to make two requests for help within
the five minute period in response to two instances of sabotage, but this was increased gradually to six requests for help in response to six instances of sabotage.

Data Collection

Data were collected on occurrence of target behaviors during each session. For Alex, an occurrence was counted each time he completed a task within the five minute session. For Troy, an occurrence was counted if he asked for help when it was needed in response to the task being sabotaged. All verbal requests for help were recorded within the five minute work session, regardless of number of instances of sabotage (e.g., periodically, Troy asked for help two times after one instance of sabotage and both instances were recorded). Data were collected using event recording of the presence of each participant’s target behavior (e.g., number of tasks completed, number of requests for help) and instances of independent use of the token systems during each work session. Sessions were a maximum of five minutes long, but ended when a participant reached the current criterion for his target behavior.

As the project progressed, it was noted anecdotally that participants often failed to use their token systems. Thus, data were collected regarding the necessity of prompts (yes/no) for each participant to take the token once it had been earned.

Procedure

Data were collected in five minute sessions. Sessions occurred 1-2 times per day and 3-5 days per week. A changing criterion design was used to demonstrate collateral changes in target behaviors in relation to changes in task requirements (Hartmann & Hall, 1976).

Baseline. Baseline sessions were conducted under typical classroom conditions. Students...
sat at study carrels with work in front of them and the teacher instructed the student to do his work. They were not offered rewards for work completion (Alex’s target behavior) or verbal requests for help (Troy’s target behavior), but the teacher did use verbal and gestural prompts (e.g., pointing to pencils to be sorted and the container they should be placed in) to remind them to complete their work.

Assessment of preferred items. Prior to self-monitoring training, we assessed each participant’s preferences regarding rewards. Based on teacher input, a variety of items were collected (e.g., cassette tape player with headphones, spinning toys with lights and music, squishy balls). Sets of five or six items were placed in front of each participant and data collected on which items were selected most frequently. Items selected most frequently were identified as preferred and delivered contingent upon target behaviors during subsequent phases of the study. Alex’s reinforcing included time on the computer and two handheld spinning toys with lights and music. Troy’s preferred items were a cassette tape player with headphones, a tube that made sound like thunder when shaken, and a pencil with a fake spider on the end.

Self-monitoring training. The first step in self-monitoring training with each participant was to offer one of the preferred items. Each participant was shown a few pictures (approximately 3 cm square) of preferred items to choose from and asked what he wished to work for. He would then indicate which item he preferred. Alex pointed or picked up the picture of the item he wanted, while Troy pointed and/or verbally named the item. The participant would then place the picture on
the token system (see Figures 1 and 2). Specifically, Alex would place it on a laminated sheet of paper (approximately 20 × 13 cm) that included a line drawing stating “do work” and pieces of Velcro to receive the tokens he would earn. Troy placed his reward picture on a small plastic box containing the snap blocks he was to earn and which had a line drawing attached indicating, “help.” The experimenter would then give a verbal reminder of the behavior required to earn the reward (e.g., “first, finish work [pointing to the picture indicating “do work”], then get computer [pointing to the photo of the computer],” or “ask for help [pointing to the picture indicating “help”], then get headphones [pointing to the picture of the headphones]”).

At the beginning of training, both participants were shown how to use the token systems. Specifically, Alex was shown and told how to take a token from the container as he completed each task and place it on the laminated sheet. When he had taken all tokens out of the container, he was instructed to take the picture of the reward and go to his reward, most often the computer. The token container only held the number of tokens corresponding with the number of tasks he was required to complete during that work session. Troy was shown how to take a snap block out of the container each time he verbally requested help. His container also held only the number of blocks corresponding with the number of times he was to request help during that work session. Once he had earned and snapped together all the blocks, he would show blocks to the teacher or experimenter to receive his reward, most frequently the headphones. Any prompts necessary for the successful use of the token system were given, including hand-over-hand, pointing, and verbal reminders. As during baseline, sessions lasted for a maximum of five minutes and ended once the participant had earned his reward. Criteria to earn rewards increased once the participant demonstrated stability at the current level by meeting or exceeding the set criteria for two to three consecutive sessions. Thus, Alex was required to complete one task for the first four training sessions, two tasks for eight sessions, three tasks for five sessions, and four tasks for the last three sessions. Troy was required to make two requests for help for two sessions to earn his reward, four requests for the next fourteen sessions, five requests for three sessions, and six requests for the last three sessions.

Self-monitoring booster sessions. We noted anecdotally that during the first two phases of self-monitoring training, participants were not using the token systems independently; thus, at that time, we collected data establishing baselines for independent use of the token systems. We then implemented booster sessions to provide repeated practice using the systems. This occurred at the criteria of two tasks completed for Alex and four requests required for Troy, thus prolonging those phases for each participant, allowing for collection of baseline and treatment data regarding independent use of the token systems. Alex’s eight booster sessions took place over two days, while Troy’s 10 booster sessions all occurred in one day. Alex received fewer per day due to the appearance of self-injurious behavior, biting his own arm, after four sessions back-to-back. Booster sessions for Alex consisted of presenting him with shortened tasks. For example, a task involving sorting different colored straws included approximately 1/3 of the previous number. Tasks were presented and completed rapidly, followed by delayed prompting to teach him to use his tokens. If he did not take a token after five seconds, he was prompted to take it and place it on the token sheet. During the first day of booster sessions, he completed two tasks at each session before receiving his reinforcer; this was increased to three the second day, after which he received two minutes access to his reinforcer. Troy’s booster sessions involved sitting at his study carrel without the presence of a task and telling him he needed to, “ask for help to earn a block.” Each time he verbally asked for help, he received a block. Delayed prompting was utilized for Troy as well. Once he had earned four blocks, he received two minutes access to his reinforcer. Troy’s booster sessions involved sitting at his study carrel without the presence of a task and telling him he needed to, “ask for help to earn a block.” Each time he verbally asked for help, he received a block. Delayed prompting was utilized for Troy as well. Once he had earned four blocks, he received two minutes access to his reinforcer. Once participants were independently using their token systems the majority of the time, booster sessions were discontinued. Subsequent to booster sessions, the delayed prompting technique remained in place for their use of the token systems.
Inter-Observer Agreement

Inter-observer agreement was assessed on Alex’s target behavior, task completion, for 61% of the sessions and was assessed on his independent use of the token system for 40% of possible sessions. Troy’s target behavior, verbal requesting, was measured by two observers for 64% of his sessions and for independent use of his token system, for 52% of possible sessions. Inter-observer agreement was calculated by dividing the smaller number of responses recorded by an observer by the larger number of responses recorded by the other observer (Richards, Taylor, Ramasamy, & Richards, 1999). Mean inter-observer agreement for Alex was calculated at 100% for task completion data and 92% (range 50 to 100%) for independent use of the token system data, and for Troy was calculated at 98% (range 57 to 100%) for requesting data and 94% (range 60 to 100%) for independent use of the token system data.

Results

Figure 3 shows number of tasks completed and number of tokens taken independently during each session by Alex. Figure 4 shows number of requests for help and number of tokens taken independently during each session by Troy.

During baseline, Alex did not complete any tasks and Troy did not make any verbal requests for help. After self-monitoring training, both students showed increases in their target behaviors. Alex increased number of tasks completed in response to changes in required number of tasks. That is to say, each time the required number of tasks increased from one to two, then three, then four, Alex met that requirement and earned his reward. Similarly, Troy increased his verbal requests for help in response to number of times the task was sabotaged. That is to say that he met or exceeded his requirement (i.e., two requests, then four, then five, then six) during all but two sessions during the intervention phases. On instances where he exceeded the requirement, he chose to continue working once he had earned his reinforcer, usually headphones, or he made multiple, repeated requests for help when the teacher did not respond quickly.

Data on whether students took their earned token independently were collected beginning with Session 9 for Alex and Session 14 for Troy. Prior to booster training neither Alex (Sessions 9-11) nor Troy (Sessions 14-16) took any tokens independently. After booster train-
Discussion

This study investigated effects of self-monitoring with two young adult males with mental retardation and autism. Specifically, this research sought to determine if self-monitoring would increase target behaviors, if such students could learn to use the self-monitoring/token system independently, and what modifications, if any, would be needed to increase their independence. Initially, participants demonstrated no occurrences of their target behaviors. Use of prompts (e.g., verbal and gestural cues) was not sufficient to increase task completion or verbal requests for help. However, results indicate that the intervention was effective in systematically increasing responding for both participants' target behaviors. Collateral effects were noted anecdotally for each participant, including increased willingness to complete work and increased verbal interactions outside of training sessions.

Initial training, which was associated with an increase in target behaviors, was not sufficient to ensure students would take tokens they earned. Consequently, additional training was implemented to establish independent selection of earned tokens. With this additional intervention, each participant learned to independently use his token system the majority of the time, with the supplementation of intensive booster session training and a delayed prompting procedure. Independent use of the token systems was not always high, however. While booster sessions and prompt delay strategy were effective in increasing number of times participants took their earned tokens independently, even after the booster sessions, they continued to require prompting during several sessions (see Figure 3, Session 21 and Figure 4, Sessions 27-30, 33 and 35). Further research replicating and extending this study could determine if, given more time, the prompt delay strategy...
would result in complete independence with the token system or if there is another strategy that would be more effective and efficient.

Results contribute to research on self-monitoring in several ways. First, it adds to and is in agreement with previous, though limited, research on use of self-monitoring and self-management to improve social and academic performance in students with severe disabilities, including moderate to severe mental retardation and autism. Current results are consistent with previous research that self-monitoring may increase on-task behavior (O’Reilly et al., 2002; Pierce & Schreibman, 1994; Tabor et al., 1999) in individuals with autism. Current findings also extend previous research on implementation of self-monitoring and self-management with individuals with moderate to severe mental retardation by considering its impact on social interactions. Specifically, this study demonstrated that Troy’s spontaneous verbal requests for help were increased during training sessions and it was noted anecdotally by the classroom staff that Troy increased other types of spontaneous verbal interactions outside of training, including bids for attention (e.g., “Teacher, come here!”) upon completion of work.

There are a few limitations that necessitate discussion. One limitation was absence of maintenance data. The study was completed approximately one week prior to the end of the school year, thus, no time remained to determine if the intervention would be maintained. Additionally, generalization data regarding use of self-monitoring on additional behaviors for each participant might have been valuable, given more time. Generalization was also not assessed under additional conditions, such as in additional settings or with practitioners other than the classroom teacher and first author. Despite these limitations, several strengths must be noted. First, this research took place in a real classroom setting, as opposed to a clinic. Participant gains were observed quickly and were of clinical significance. Finally, as a result of self-monitoring training, students required less intervention (e.g., fewer prompts, fewer redirects) from classroom staff.

There are also several implications for future research. Replication of this research with additional young adults with severe disabilities is necessary. Such replications would lend more support for use of self-monitoring with the targeted population. Further research may also consider the necessity of additional modifications in training individuals with severe disabilities to use self-monitoring strategies.

Outcomes of the self-monitoring interventions with these participants have positive implications for practitioners working with young adults with autism and mental retardation. First, self-monitoring is a teacher-friendly intervention. This technique requires little training for the practitioner. Most teachers are already familiar with token systems, thus, will need only to transfer control of the system to the student. Self-monitoring requires little to no time to implement once the student has been trained to use a token system. Additionally, it requires few materials outside of those already available in the classroom (e.g., access to favorite activities, such as computer; snap blocks or tokens). Finally, self-monitoring has the potential to lead to more independent functioning (Koegel et al., 1999). This is especially important for young adult individuals with disabilities who will soon leave school and transition to the adult world. As suggested by Pierce and Schreibman (1994), self-management may easily be generalized to novel skills and situations, requiring little effort from practitioners and resulting in decreased reliance on caregivers and teachers.

References


Received: 25 September 2003
Initial Acceptance: 25 November 2003
Final Acceptance: 1 March 2004