A Comparison of Self-Monitoring With and Without Reinforcement to Improve On-Task Classroom Behavior

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Abstract

In this study we analyzed the effects of a self-monitoring and self-monitoring plus reinforcement intervention on classroom behavior. A typically-developing high school student demonstrating difficulty staying on-task during classroom instruction was observed in three classroom settings associated with high levels of off-task behavior. During baseline, the participant was observed during typical classroom activities. Next, the participant was taught to self-monitor his on-task classroom behavior, but no additional reinforcement was provided. Finally, self-monitoring plus reinforcement was implemented, in which tangible reinforcement was provided for on-task behavior. A multiple baseline across settings design was implemented. Findings suggest that only the self-monitoring plus reinforcement intervention had a marked effect on on-task behavior.

Keywords: Self-monitoring, self-monitoring plus reinforcement, on-task, classroom behavior

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School counselors are often called upon to assist teachers and administrators in addressing student academic, emotional, and behavior problems (Jackson, 2000; Stickel & Satchwell, 1991). Therefore, they must be knowledgeable of effective and efficient interventions to address these concerns. Teaching self-management techniques may be one such intervention choice.

Self-management is an encompassing term which refers to techniques in which the student takes responsibilities for some or all components of an intervention. Self-monitoring is a commonly utilized self-management approach in which one systematically observes and records one's own behavior (Reid, Trout, & Schartz, 2005). Self-monitoring has been utilized to increase adaptive behaviors and decrease maladaptive behaviors (e.g., Broden, Hall, & Mitts, 1971; Joseph & Eveleigh, 2001; Reid et al., 2005).

The majority self-monitoring research has targeted children with disabilities (Wood, Murdock, Cronin, Dawson, & Kirby, 1998). Briesch and Chafouleas (2009) found that 90% of self-monitoring studies targeted students with a disability, most frequently students with a learning disability, and the mean age of participants was 11 years. These studies ignore a growing population that could benefit from self-management interventions: adolescents in general education. Needless to say, the need for positive behavior management techniques is not limited to elementary students receiving special education. A recent survey reports that 62% of experienced teachers encountered an increase in general education students with behaviors that hinder

teaching since they began teaching in their current school (Scholastic & Bill & Melinda Gates Foundation, 2012).

Within educational settings two methods of self-monitoring have emerged: self-monitoring of attention and self-monitoring of performance (Harris, Graham, Reid, McElroy, & Hamby, 1994). Though neither approach has yet emerged as a dominant best practice (Reid & Harris, 1993), Briesch and Chafouleas (2009) found that most self-management research has measured the effects of self-monitoring of attention. This may be particularly fitting for high school students. Teachers rated distractibility and hyperactivity the most common externalizing behavior problem in the high school general education classroom. In fact, distractibility was more frequently cited as a concern among teachers than following directions and task accuracy (Harrison, Vannest, Davis, & Reynolds, 2012). Moreover, increased attentiveness to tasks is linked to improved academic outcomes (Doolittle, Horner, Bradley, Sugai, & Vincent, 2007).

Student involvement may vary greatly among self-monitoring practices. The student may be involved to various extents in many of the components of a self-monitoring intervention (e.g., selection of the target behavior and goal, selection of reinforcers, recording behavior). Although Fantuzzo and Polite (1990) found that the amount of student involvement and the effectiveness of self-management interventions are positively correlated, a meta-analysis by Briesch and Chafouleas (2009), who reviewed self-management studies promoting appropriate classroom behaviors from 1988-2008, found that only 3% of reviewed studies made the student responsible for selecting the target behavior. Higher rates of student involvement merit further research and may be more realistic among older students.

Finally, although self-monitoring may be used is isolation, it is frequently accompanied by additional components, such as positive reinforcement, to reach or maintain the target behavior goal (Briesch & Chafouleas, 2009; Cole & Bambara, 1992; Cooper et al., 2007; Joseph & Eveleigh, 2012). The varied combination of techniques among the existing literature makes it difficult to determine which components are critical for success. Direct comparison of specific self-management components may begin to uncover which components are essential.

The purpose of this study was to evaluate the effectiveness of self-monitoring in isolation and self-monitoring plus reinforcement intervention on a self-selected target behavior of a general education, 10th grade student, without a diagnosed disability. This study addresses gaps in the literature. First, a typically developing student in a general education classroom was recruited. Second, the participant was highly involved in the self-management process as compared to previous research. Third, self-monitoring with and without an additional reinforcement program were directly compared.

Method

The following study was approved by the Baylor University IRB committee. Parental consent of the participant was obtained prior to beginning the study, but additionally, the participant in this study had specifically requested assistance from his school counselor and behavior specialist regarding his on-task behavior in the classroom.

Participants and Setting

Jace, (whose name has been changed to protect his identity) the singular participant in this study, is a 15 year-old Caucasian male with no diagnosed disability. At

the time of the study, Jace's communication, academic, and social skills were typical of his age; he was an A/B student. Jace was selected to participate in this study because he requested assistance in staying on-task in class from his school's behavior specialist. Teachers confirmed that Jace was frequently off-task. Jace previously received several interventions, including the use of headphones and preferential seating, but they had no discernible success. Jace has no diagnosed disability and no history of use of psychotropic medication.

Although a single participant was targeted in this study, the use of a multiple baseline across settings design allowed for experimental control to be maintained with a single participant. A multiple baseline design is one of several single-subject research designs (Kennedy, 2005). Jace was the only participant selected for this study because at the time of the study, he was the only student on this particular campus whose behavior goals and needs (based on self- and teacher-report) were in need of this particular type of intervention.

During the course of the study, Jace attended a public charter school. All sessions were conducted in Jace's typical classroom setting. He was observed in world history, health, and English classes. All observations took place during the first 20 minutes of class and were scheduled every day of the week, with the exception of days in which the campus schedule was altered or formal testing was being conducted. No alterations were made to the classroom setting. Each class had one classroom teacher and approximately 15 other students present. Classroom lessons and activities were selected by the teacher and included lecture, group work, independent work, and student presentations.

Response Measurement and Reliability

On-task classroom behavior served as the dependent measure due to it being self-selected by the participant. Additionally, it was deemed appropriate to measure on-task behavior as opposed to grades. Jace was an A/B student and both Jace and his teachers reported satisfaction with his grades because Jace was an A/B student. In other words, although Jace and his teachers clearly perceived his inattentiveness as bothersome, it did not appear to have a significant effect on this academic performance. However, Jace's teachers confirmed that his off-task behavior was obviously more frequent than that of peers, disruptive to the class, and generally socially unacceptable.

On-task behavior was defined in three components: (a) eye gaze toward teacher, whiteboard, or work (as appropriate); (b) work material on desk (when applicable), and (c) tip of writing utensil touching paper (when applicable). For example, if given a worksheet, Jace would be considered on-task if his eye gaze was towards the paper placed on his desk, and the tip of his pen was touching the paper. He would not be considered on task if his eye gaze was toward the paper placed on the floor and he had no writing utensil in his hand. He would also be considered on task if when given a reading assignment, his eye gaze was towards his book placed on this desk. He would not be considered on task if his book was on his desk, but his eye gaze was in the direction of a peer.

Data were recorded by advanced graduate students who made observations in the classroom. On-task classroom behavior was recorded using a 10-second partial interval recording method (Kennedy, 2005). Each 20-minute observation was divided into 10-second intervals. If during any part of the 10-second interval, on-task classroom

behavior was recorded, it was noted. Data were then summarized as a percent of 10-second intervals in which on-task classroom behavior occurred.

Interobserver agreement (IOA), a measure of the consistency between the two experimenters collecting data, was calculated using an interval agreement (Kennedy, 2005). The number of intervals in which both observers agreed (occurrence plus nonoccurrence) was divided by the total number of intervals (agreements plus disagreements) and multiplied by 100%. According to Kennedy (2005), the current standard is that IOA is conducted for at least 20% of sessions, but 33% is preferred. In this study, IOA was conducted on 40% of sessions. Additionally, the current standard for applied research is a minimum mean of 80% IOA. In this study, the mean IOA for on-task behavior was 93% (ranged 83% to 99%).

Procedures and Experimental Design

Three conditions were implemented: (a) baseline, (b) self-monitoring, and (c) self-monitoring plus reinforcement. Classroom lessons and activities were selected by the teacher and included lecture, group work, independent work, and student presentations. Due to the fact that observation took place during regular general education classes, it was impossible, nor in the best interest of the students, to control for course content or activities. However, observations did not take place during quiz or tests. A multiple baseline design was used to demonstrate experimental control (Kennedy, 2005).

Baseline. During baseline, class was conducted as normal. During baseline sessions, Jace was not informed that he was being observed. Experimenters sat in a back corner of the room as not to disturb the class or alert Jace to their purpose. Due to

the fact that Jace attended a charter school with strong ties to a local university, it was not unusual for observers to be present in the classroom. The class was told that the experimenters were observing the classrooms and teachers as part of a university project.

Self-monitoring. During the self-monitoring phase, Jace used a one-minute momentary time sampling recording system to document his on-task behavior. Jace was given a VibraLITE 3™ wristwatch, which was programmed to vibrate on one-minute intervals. The vibration was momentary and then Jace spent approximately two seconds recording behavior. Normal classroom activities took place during the remaining 57 seconds between vibration intervals; no other interventions were in place.

Jace would retrieve the watch from the school counselor's office prior to class. Jace's data collection forms were kept in a folder in each classroom. All self-monitoring data forms were printed on white paper and were approximately 4 by 10 inches. He returned the completed form to the folder after class. See the Appendix for a sample of the self-monitoring instrument.

In order to measure IOA between Jace and the experimenter, data collection intervals were synced using a pre-selected hand signal to begin momentary time sampling simultaneously. During the self-monitoring phase, no other components (e.g., reinforcement contingency) were implemented. To limit its potential influence, no feedback was given regarding the agreement between the experimenter and Jace's monitoring during this phase.

Prior to beginning self-monitoring, Jace was trained to use to the aforementioned self-monitoring protocol. Training occurred after school and was conducted by the

school behavior specialist and the first author. Training consisted of verbal explanation, modeling, and role play. Training was terminated when IOA between Jace and the first author was at least 90% across a minimum of three five-minute role play sessions. During training, Jace was reported to be enthusiastic about the self-monitoring program.

Self-monitoring plus reinforcement. The self-monitoring plus reinforcement condition was identical to the self-monitoring phase with one exception; a token economy was implemented in which Jace could earn up to two tokens per session for meeting pre-determined performance criteria. He could earn one token for each class session in which he recorded himself on-task at least 80% of the 20 one-minute intervals. This criterion was adapted from Rhode, Morgan & Young's (1983) rating scale where appropriate behavior displayed 80% of the time was deemed average within a general education classroom. He could earn one additional token for each session in which IOA between his self-recorded data and the experimenter's data was at least 80%. IOA was calculated using an interval agreement; the number of intervals with agreements (both for occurrence and nonoccurrence of on-task behavior) was divided by the total number of intervals (Kennedy, 2005). All self-monitoring plus reinforcement data sheets were identical to self-monitoring data sheets, except they were printed on blue paper, in order to signal to Jace which classroom sessions were associated with self-monitoring protocol versus self-monitoring plus reinforcement protocol.

At the end of each day, an experimenter calculated the number of tokens Jace earned and emailed this information to Jace and the school counselor, who kept a record of Jace's tokens. When Jace earned five tokens, he was given a small value gift card to a coffee shop. Tokens could be accumulated across days and earning

opportunities, so that if Jace did not earn a token in any particular class, it did not affect his token balance.

Jace was allowed to select his reward, but it was required to follow school protocol which did not allow for the use of food rewards consumed on campus. A list of suggestions including gift cards to other stores and access to on-campus preferred activities were provided to Jace.

Prior to beginning the self-monitoring plus reinforcement phase, a second training was conducted after school by the school behavior specialist and first author, which consisted of explanation of the token system. When Jace confirmed that he clearly understood the self-monitoring plus reinforcement procedures, the training was terminated.

Treatment Fidelity

Treatment fidelity was measured across the self-monitoring and self-monitoring plus reinforcement phases using a four-item checklist. The experimenter noted whether or not Jace completed the following steps of the intervention: (a) retrieved self-monitoring form from folder, (b) placed watch on wrist, (c) placed marks on self-monitoring form during first 20 minutes of class, and (d) returned completed self-monitoring form to folder at the end of class. Treatment fidelity was measured during 30% of self-monitoring and self-monitoring plus reinforcement sessions. Adherence to all steps occurred 100% of sessions.

Results

The results of on-task classroom behavior during baseline, self-monitoring, and self-monitoring plus reinforcement are presented in Figure 1. During baseline sessions,

Jace's mean on-task behavior was 62% of intervals (range, 24 to 91%). Specifically, during baseline sessions in World History Jace was on-task a mean of 60% of intervals. During baseline sessions in Health he was on-task a mean of 56% of intervals. Finally, during baseline sessions in English Jace was on-task a mean of 68% of intervals.

Jace's on-task behavior slightly increased during the self-monitoring phase. During self-monitoring sessions, Jace was on-task a mean of 69% of intervals (range, 27 to 90%). Specifically, during self-monitoring sessions in world history Jace was on-task a mean of 72% of intervals, a slight increase relative to baseline. During self-monitoring sessions in health he was on-task a mean of 60% of intervals, also a slight increase relative to baseline. Finally, during self-monitoring sessions in English, Jace was on-task a mean of 75% of intervals, also an increase relative to baseline.

Jace's on-task behavior reflected the highest increase during the self-monitoring plus reinforcement condition; Jace was on-task a mean of 91% of intervals (range, 83 to 99%). Specifically, during self-monitoring plus reinforcement sessions in world history Jace was on-task a mean of 91% of intervals, a 31% increase relative to baseline. During self-monitoring plus reinforcement sessions in health he was on-task a mean of 87% of intervals, also a 31% increase relative to baseline. Finally, in English Jace was on-task a mean of 94% of intervals, a 32% increase relative to baseline.

The IOA between his self-recorded data and the experimenter was also higher during self-monitoring plus reinforcement sessions. IOA between Jace and an

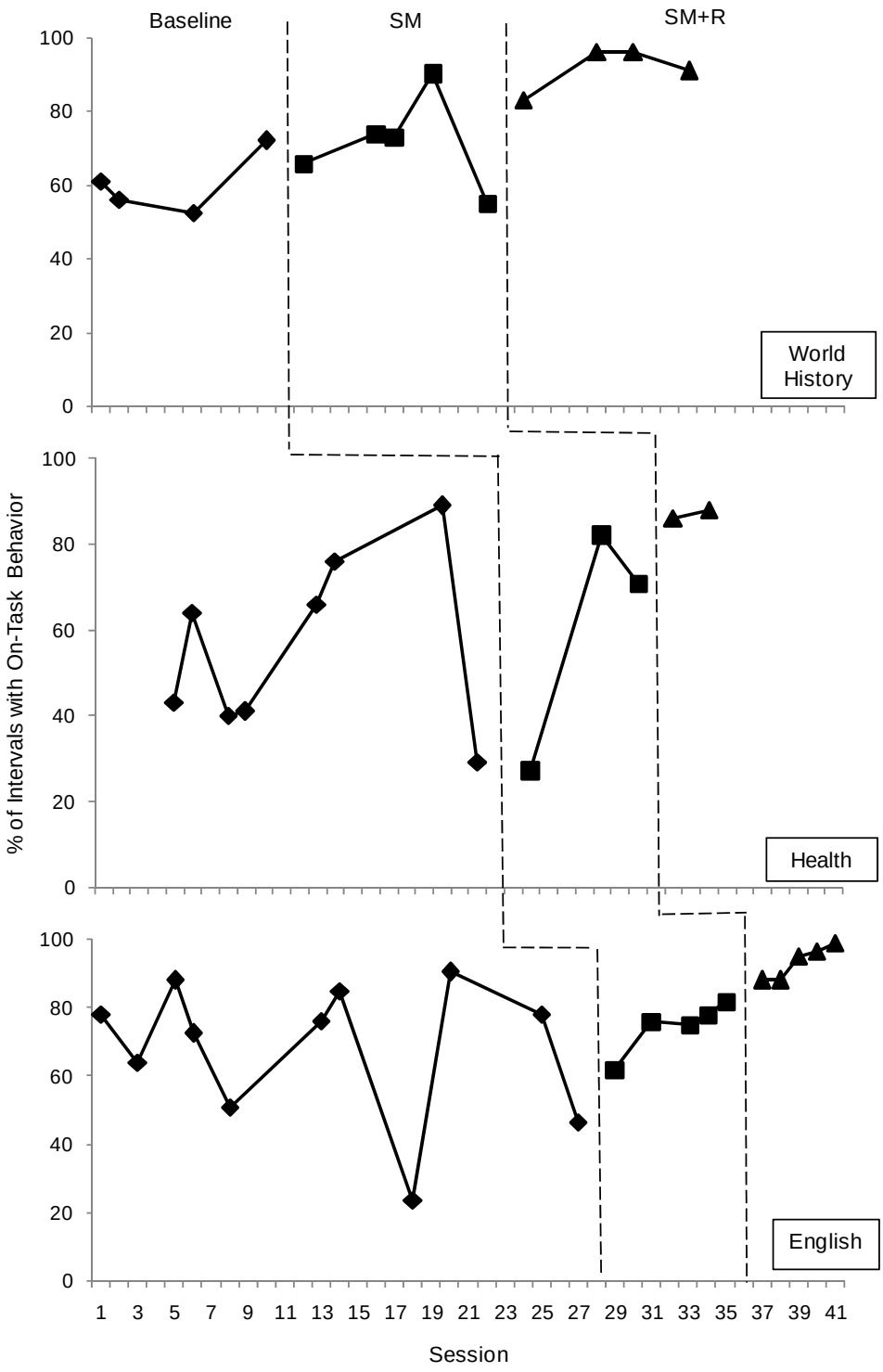

Figure 1. Percent of intervals with on-task behavior across baseline, self-monitoring(SM), and self-monitoring plus reinforcement (SM+R) conditions.

experimenter was collected for 38% of self-monitoring sessions and 75% of self-monitoring plus reinforcement sessions. During self-monitoring sessions, mean IOA was 54% of intervals (range, 23 to 80%). During self-monitoring plus reinforcement sessions, mean IOA was 90% (range, 80 to 100%). It is worth noting that improvements are not likely to be the result of prolonged experience because Jace was required to demonstrate success in measuring IOA during training sessions prior to implementation of self-monitoring. In other words, he previously demonstrated his ability to successfully measure IOA, but did not do so in the classroom until the self-monitoring plus reinforcement phase.

Social validity was measured via interview. Jace, one classroom teacher, the school counselor, and the school behavior specialists were asked their opinion of the program. Jace reported being pleased with the program and asked if he could continue to use the watch to self-monitor after the termination of the research project. The classroom teacher reported that she was pleased with both phases of intervention. She believed that Jace improved his ability to stay on-task and reported that the intervention was not a disruption to her class or daily schedule. The counselor was pleased with the positive effects of self-monitoring plus reinforcement and expressed her joy of participating in the intervention program. She also suggested a plan to fade to a thinner reinforcement schedule that she aimed to implement after the completion of this study. Finally, the behavior specialist reported being impressed with the changes Jace made in the classroom and reported highly favorable opinions of the self-monitoring and self-monitoring plus reinforcement interventions.

Discussion

The results of this study demonstrate that both self-monitoring in isolation and self-monitoring plus reinforcement had a positive effect on the participant's on-task behavior; however, in comparison, self-monitoring plus reinforcement resulted in a greater increase in on-task behavior. While some previous research has found self-monitoring in isolation sufficient to change target behaviors (e.g., Amato-Zech, Hoff, & Doepke, 2006; Reid & Harris, 1993), others have found only slight changes in target behavior or mixed results (e.g., Levendoski & Cartledge, 2000; Wolfe, Heron, & Goddard, 2000). The results of this study are more closely aligned with the results of the latter studies, in which self-monitoring in isolation had only a minimal impact on on-task behavior.

This study contains several strengths and expands the self-monitoring literature in many ways. First, the inclusion of a typically-developing, high school student fills a void in the research. Moreover, the study represents a controlled, but highly applied investigation of self-monitoring as it was conducted in the participant's natural classroom environment with no changes to the content or structure of the classroom. Second, this study represents one of very few demonstrations of self-monitoring in which the student selected the target behavior. The targeted behavior was clearly socially-significant to the participant as evidenced by his selection, and was verified by multiple teachers and the school's behavior specialist as being a noticeable area of need. Finally, this study provides a direct comparison of self-monitoring and self-monitoring plus reinforcement.

While several theories exist to explain why self-monitoring in isolation can be successful, one theory is that self-monitoring evokes covert self-evaluative statements that serve as reinforcement or punishment (Cautela, 1971; Cooper et al., 2007). For example, when the student self-monitors and is made aware that his behavior improved, he may think to himself that he did a good job and such covert behaviors may serve as reinforcement. Conversely, if his behavior worsened, a sense of guilt may serve as punishment. This theory of covert self-evaluation would seem to hold more credibility under circumstances in which the student, rather than the teacher, had selected the target behavior and/or criterion. The selection of the target behavior expresses an initial desire to change the behavior, which may result in feelings of pride or guilt as a result of behavior changes identified via self-monitoring. Yet, in this study the participant self-selected the goal, but demonstrated only slight improvement of on-task behavior during the self-monitoring condition.

It is unclear exactly why self-monitoring did not result in as notable a change in on-task behavior relative to self-monitoring plus reinforcement. These results are somewhat contradictory to previous research which demonstrated that increased student involvement is related to better results (Briesch & Chafouleas, 2009). Implications of this research suggest that a desire to change targeted behavior does not necessarily set the foundation for a successful self-monitoring intervention.

In this study, self-monitoring plus token economy reinforcement was the most effective intervention at reducing problem behavior; however, it had limitations of its own. First, the use of a one-minute momentary time sampling procedure required Jace to attend to self-monitoring once every minute, which may be problematic considering

his target behavior was to increase on-task behavior. However, Jace spent approximately two seconds recording his behavior each minute. In other words, 3.3% of each minute, Jace was essentially off-task to self-monitor; however, this is markedly less time than he was off-task during baseline. Therefore, during this study it was deemed appropriate to utilize a one-minute time sampling measure due to the frequency in which Jace was off-task during baseline. The success of the intervention confirmed this was a wise decision. However, it would be beneficial to begin fading the frequency of self-monitoring checks during future use of this program. Other limitations include the additional resources, most notably time and money, required to implement the token economy during the self-monitoring plus reinforcement phase. This component would require the active participation of a school professional, likely the classroom teacher. It also requires the purchase of tangible rewards (i.e., coffee shop gift cards); however, the use of naturally available rewards could be implemented, such as free time on a school computer, when such resources are unavailable. However, school professionals must take this into consideration and determine if the potential outcomes are worth the investment of resources.

Some limitations are associated with this investigation. First, the effects of the token economy in isolation were not measured. It is possible that this reinforcement contingency in isolation would have been equally as effective without the self-monitoring component. However, even if a teacher-monitored token economy would have had similar effects, benefits of the self-monitoring methodology (e.g., less demanding for classroom teacher) may make it a more appealing option. Second, the duration of the self-monitoring was limited to the first 20 minutes of class, rather than the duration of

the class period. Therefore, it is unknown if the effects of self-monitoring or self-monitoring plus reinforcement are evident through the duration of the class period. Finally, due to the school year ending, we were not able to gather data regarding generalization and maintenance, nor were we able to measure the effects of fading the reinforcement contingency. Ideally, the reinforcement contingency would be slowly faded to a thinner schedule, either increasing the number of tokens needed to exchange for reward, reducing the magnitude of the reward, or both. For example, the system could have been faded to require 10 tokens (rather than five) to earn a $3 gift card (rather than $5).

Future research should continue expanding the self-monitoring literature. With conflicting results across the current literature, future research should begin to uncover student and methodological characteristics most likely to be associated with a successful self-management intervention. For example, perhaps certain characteristics of students are associated with successful self-management, such as younger students or students with specific disabilities. Similarly, perhaps certain behaviors respond more successfully to self-monitoring, for example, behaviors that may be considered more overt or noticeable, such as getting out of one's seat or talking out of turn as opposed to daydreaming.

Further research should also continue to identify which self-management components are critical for success. Briesch and Chafouleas (2009) identified 11 components of a behavior intervention in which a student can self-manage (e.g., select target behavior, selection of reinforcers, recording his own behavior). With 11 components that can be managed by the teacher or student, endless combinations of

teacher- versus student-managed can be created. It is necessary that future research continue to compare different types self-managed intervention programs to determine what combination of teacher- and student-managed components is the most successful.

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Appendix

Sample of self-monitoring instrument used to track on-task behavior

Class: _____

Date: _____

Min.		
1	On Task	Off Task
2	On Task	Off Task
3	On Task	Off Task
4	On Task	Off Task
5	On Task	Off Task
6	On Task	Off Task
7	On Task	Off Task
8	On Task	Off Task
9	On Task	Off Task
10	On Task	Off Task
11	On Task	Off Task
12	On Task	Off Task
13	On Task	Off Task
14	On Task	Off Task
15	On Task	Off Task
16	On Task	Off Task
17	On Task	Off Task
18	On Task	Off Task
19	On Task	Off Task
20	On Task	Off Task