Effects of Video Self-Modeling on Eliminating Public Undressing by Elementary-Aged Students with Developmental Disabilities During Urination

Yoshihisa Ohtake
Okayama University
Ai Takeuchi and Kentaro Watanabe
Special School Affiliated with the Faculty of Education at Okayama University

Abstract: This study investigated the effectiveness of video self-modeling (VSM) for eliminating the public undressing of two elementary-aged students with developmental disabilities during urination. A multiple-probe design across participants revealed that the degree of exposed body parts decreased immediately after introduction of VSM. However, exposure of buttocks was not eliminated for one student until a component of hero modeling was added to the VSM. The mechanism of eliminating public undressing by use of VSM and video self and hero modeling is discussed within a framework of motivating operation.

Some individuals with developmental disabilities engage in public undressing. A national survey conducted by Ward, Trigler, and Pfeiffer (2001) revealed that the majority of the community agencies served individuals with developmental disabilities who exhibited inappropriate sexual behaviors in public situations, in which public undressing was included as part of the behaviors. Public undressing is defined as inappropriately exposing a private body part in public. This behavior is problematic, especially for older individuals (e.g., adolescents), as it may stigmatize the individual as an eternal child and make it difficult for parents and teachers to bring him or her out in public. Worse still, it may cause police attention for indecent exposure. For these reasons, such behavior should be eliminated as early as possible, at the latest by the time of puberty.

Some people engage in such behavior in any public place; others do so in specific places. From a behavior-analytic point of view, public undressing is maintained in the process of positive or negative reinforcement (Carlson, Luiselli, Slyman, & Markowski, 2008). For example, some people undress in public because it helps them attract public attention, which is valuable to them. Others do so because it helps them avoid or escape from feeling hot or uncomfortable due to certain textures of clothing.

Recently, behavior analysts have recommended that functional assessment be used to identify the consequences that maintain the problem behavior and that intervention plans be developed on the basis of the information derived from such assessment (Carr et al., 1999).

In previous research addressing public undressing (Carlson et al., 2008; Foxx, 1976; Lombana & Cuvo, 1980), only Carlson et al. developed an intervention plan to eliminate such behavior on the basis of the information from functional assessment. In their study, interview and direct observation were used to hypothesize the maintaining reinforcer. Thus, they hypothesized that gaining access to new and more preferred clothes was the consequence that maintained the behavior. On the basis of that hypothesis, they gave two children with autism access to new and more preferred clothes noncontingently (five times a day) to
reduce the value of the maintaining reinforcer. The hypothesized-driven approach was successful in eliminating public undressing.

One of the theories proposed in applied behavior analysis to explain why noncontingent reinforcement is effective is a motivating operation (Lang, O’Reilly, et al., 2009; McGinnis, Houchins-Juarez, McDaniel, & Kennedy, 2010). A motivating operation is defined as an antecedent event that changes the reinforcing value of the consequence contingent on engaging in a target behavior (Laraway, Snyckerski, Michael, & Poling, 2003).

When the motivating operation reduces the reinforcing value of the consequence following a target behavior, it is called an abolishing operation. In contrast, when the motivating operation increases the reinforcing value of the consequence following a behavior, it is referred to as an establishing operation. In Carlson et al. (2008), the motivating operation was used as an abolishing operation because noncontingent access to more preferred clothes reduced the reinforcing value of the consequence (i.e., access to more preferred clothes) contingent on engaging in public undressing. Theoretically, it is possible to use an antecedent event as an establishing operation to eliminate public undressing. If the antecedent event increases the value of the consequence contingent on engaging in a behavior that is incompatible with public undressing (i.e., covering private parts) to the extent that it exceeds the reinforcing value of the consequence (i.e., access to more preferred clothes) contingent on engaging in public undressing could be eliminated. The possible consequences following covering private parts may include, but are not limited to, avoiding negative social reactions and acquiring verbal praise from a teacher or a parent. However, this may not be highly valuable to individuals with developmental disabilities, in particular, those with autism spectrum disorders, who have difficulty in connecting emotionally and socially to others and in understanding other persons’ perspectives (Trevarthen, Aitken, Papoudi, & Robarts, 1998).

One of the antecedent events that could serve as a type of establishing operation is video self-modeling (hereafter referred to as VSM; Buggey, 2009). In VSM, an individual watches a video showing the person himself exhibiting a target behavior before encountering a situation requiring use of the target behavior. The theory underlying the practice is social learning theory (Bandura, 1977). According to social learning theory, we are more likely to imitate models who are similar in age, gender, ethnicity, or other characteristics to ourselves and are slightly more skillful than we are. The model shown in VSM is oneself. However, the model is shown as slightly more skillful than the actual self because it always engages in the target behavior correctly, whereas the actual self does not always exhibit the target behavior or engages in only a part of the behavior. Thus, showing the individual a video in which he engages in a target behavior is likely to motivate him to exhibit the behavior.

The argument from social learning theory may be translated into behavioral terms as follows. When VSM is used, a newly valued consequence contingent on engaging in the target behavior may emerge; that is, “being like the model.” Therefore, VSM can be considered as a motivating operation—in the current study, the antecedent event increases the value of the consequence contingent on covering the private parts in the pants in a way that adds “being like the model” as a newly valued consequence to the original ones (e.g., social praise, avoidance of negative social reactions). If an individual values being like the model more than the consequence following public undressing, showing a video in which the person herself covers a private part in public is more likely to motivate her to cover her private part in public, which in turn eliminates public undressing. It is unknown, however, if this works in the real world.

Previous studies have demonstrated that VSM was effective in improving a variety of target behaviors exhibited by individuals with developmental disabilities, including emotional regulation (Buggey, 2005), social interactions (Bellini, Akullian, & Hopf, 2007; Buggey, Toombs, Gardener, & Cervetti, 1999; Buggey, 2005; Buggey, Hoomes, & Sherberger, & Williams, 2011; Sherer et al., 2001; Wert & Neisworth, 2003), letter reading (Marcus & Wilder, 2009), recital of classroom rules.
(Lang et al., 2009), written language performance (Delano, 2007), and use of copy or fax machine (Cihak & Schrader, 2008). However, existing research has not examined the effectiveness of VSM in eliminating public undressing.

Research is needed to identify more evidence-based practices for eliminating public undressing. In addition, research is needed to extend the application of VSM to unaddressed target behaviors. The purpose of the present study was to address these issues by investigating the effectiveness of VSM in eliminating public undressing. Thus, the study extended Carlson et al. (2008) by examining the effectiveness of using an antecedent event as an establishing operation instead of an abolishing operation to eliminate public undressing. As such, it also extended previous VSM studies in investigating the effectiveness of VSM in an unaddressed target behavior (i.e., public undressing).

Method

Participants

Two elementary-aged students, who were enrolled in a special school for students with intellectual disabilities, participated in the study. These participants were diagnosed with autistic disorder by neuro-pediatricians according to the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000). They belonged to the same homeroom with two special education teachers in charge and four classmates with developmental disabilities (e.g., Downs syndrome, autism).

Sota was a first-grade male student with autism. His cognitive level was on the Stage III-1 (around 2 years and 6 months in developmental age), according to the Language Decoding Test – Revised (Ohta & Nagai, 1992). This test is used in Japan to indicate the level of cognitive development for a child with autism. He frequently initiated social interactions with teachers and peers for requesting and commenting, using a two or three-word utterance. However, when teachers or peers did something in ways that were different from his own rules, he perseverated on making them follow his rules. If they did not follow his rules, he was irritated and occasionally engaged in a temper tantrum. His special interest was dinosaurs—he collected a variety of dinosaur objects and often included mention of dinosaurs in his conversations and plays.

Kohei was a second-grade male student with autism. His developmental age was 3 years, as measured by the Kyoto Scale of Developmental Profiles (KSPD; Ikusawa, Matsushita, & Nakase, 2002). The measure commonly is used in Japan to provide estimates of developmental age of the children with disabilities. Although his pronunciations of many words were unintelligible, he actively initiated conversations with teachers and peers, using gestures, objects, and pictures, about events and feelings from the past, present, and future. However, he repeated the same request or comment despite the listener showed acknowledgement of his communication.

Both students were able to work for 30 minutes on independent tasks with occasional teacher interactions without extensive off-task behaviors. They were reported to be attentive to a video or slide show including themselves, their peers, or teachers. When watching a video, they frequently shared what they saw with their teachers or peers.

Neither student had previously been exposed to the VSM strategy. While the primary investigator’s institute does not have an institutional review board and it, therefore, cannot officially be verified that the study complied with ethical standards, informed consent was obtained from participants’ parents during a meeting of the individualized instructional plan team, indicating that they agreed to the use of video to observe their sons’ toileting behaviors and to use VSM as an intervention.

Target Behavior

“Putting the buttocks in the pants during urination” was selected as the target behavior by referring to the students’ instructional objectives in their individualized instructional plan, which was developed by the homeroom teachers with consent from the parents. Among the instructional objectives, a behavior for which the instructional strategies currently used by the teachers were not effective was selected as a target. As a result, pulling down only the
front part of the pants for urination in a bathroom was selected as the target behavior.

Since the beginning of the school year, when urinating in a bathroom, Sota and Kohei had been pulling their pants down to their ankles or knees, thus exposing their buttocks. Their parents and teachers were concerned about this behavior because it would stigmatize the student as an eternal child. Before implementing this study, the teachers used verbal prompts, peer modeling, and visual instruction. (Physical prompts were not used because they were considered too intrusive and participants showed aversive reactions to them; e.g., expelling teacher’s hand.) For example, the teachers said, “[student’s name], Can you put your buttocks in the pants,” or “Showing your buttocks is embarrassing,” as part of verbal prompts. In peer modeling, the teachers praised a peer who covered his buttocks in his pants to encourage the participant to imitate the peer. In visual instruction, pictures depicting an appropriate urinating style with a “Yes” sign and an inappropriate urinating style with a “No” sign was posted on the wall at the height of the children’s eyes. Those strategies never evoked correct responses. At home, the parents did not teach the target behavior.

Functional Assessment

Before starting baseline assessment, using each participant’s teacher as an informant, functional assessment interview was conducted (O’Neill et al., 1997). In addition, direct observation was implemented during baseline assessment, in which information regarding events prior to and following the occurrence of public undressing was collected. On the basis of the information gathered, it was hypothesized that the public undressing was maintained by automatic reinforcer. Social attention was not considered as the maintaining reinforcer because the two students’ public undressing was evoked regardless of teacher presence.

It seemed that pulling the pants down far below the buttocks was more comfortable than pulling down only the front part of the pants because no physical pressure is provided to their private part and no effort was needed to keep the position of the pants stable. Avoiding uncomfortable pressure of the pants, therefore, was hypothesized as having a reinforcing effect on public undressing during urination.

Setting

The bathroom closest to the participants’ homeroom was used as an observation setting. The room was used by 18 students who were enrolled in the elementary division of the school. The space was approximately 4m by 2.5m, including three toilets and two bowls. Typically, two or three other students and one teacher were present with the study participant.

Materials

Self-modeling video. All self-modeling videos were developed by the first author, and were edited for approximately one hour. A Sony HandyCam was used to videotape the target behaviors, and Corel Video Studio 12 was used to edit the video footage.

The two students’ teachers agreed to use physical support to videotape a scene where the students covered the buttocks in their pants during urination. In the first baseline session, the target behavior was evoked by the teacher pulling the back side of the pants up to cover the buttocks during urination. The lead author videotaped the students urinating with teacher support from 1m behind them. The video was subsequently edited by cutting the teacher and other irrelevant scenes (e.g., repelling teacher’s hand) to make a video clip in which the participants looked as if they urinated with the buttocks covered by the pants.

Freeze frames depicting the students’ best performance were inserted at the beginning and the end of the video. Both parts lasted approximately 10 seconds each. A subtitle of “Yes, I can (target behavior)!“ at the beginning and a subtitle of “Yes, I did (target behavior)!“ at the end were overlapped on the freeze frames. Background music was inserted throughout the video clip to promote students’ attention to the video. The duration of the tape was around 1 minute. Each participant’s teacher was asked to determine if the video delineated the target behaviors and did
not include any irrelevant or inappropriate behaviors. The teachers agreed that the video met the criteria. As a result, it was subsequently used as the intervention.

**Self and hero modeling video.** For Sota, who failed to exhibit any correct responses during the VSM sessions (see the Results section), a self and hero modeling video was developed. The camera and video editing software used were identical to those in VSM.

In this video, it looked as if Sota’s hero, tyrannosaurus, stood next to him urinating with the buttocks covered by his pants. To develop the video, the lead author videotaped a realistic figure of tyrannosaurus with its buttocks covered by the pants with a blue background. The pants were made by colored clay. The image was then placed on top of the original self-modeling video in which Sota urinated with his buttocks covered by his pants in the bathroom, removing the blue screen by the Chroma Key technique. The Chroma Key compositing is “a technique for compositing two images or frames together in which a color (or a small color range) from one image is removed (or made transparent), revealing another image behind it” (Wikipedia, 2011). The position of the tyrannosaurus was changed as the time went on in the video, so that it looked as if the tyrannosaurus walked toward Sota and stood next to him to urinate in the toilet.

**Video Watching**

Each participant’s homeroom teacher was responsible for showing the video. Sota and Kohei watched the video in their homeroom. Usually, a few classmates were also present in the same room.

In preparation for watching the video, the teacher typically invited the target student to a table where a laptop computer was placed. The teacher clicked the icon of the self-modeling video to start the video. During the video watching, the teacher was allowed to praise (e.g., “You are doing well”), give a comment (e.g., “You are putting your buttocks in the pants”), and prompt for attention to the video, as she deemed appropriate.

The self-modeling video was shown to the students two or three times a week, for three weeks for Sota and two weeks for Kohei. The self and hero modeling video was shown to Sota two or three times a week for six weeks. Generally, the video was presented only once on a given day. However, when the student asked the teacher to watch the video again, the request was honored (two times were the maximum).

**Data Collection**

The lead author and a trained graduate research assistant videotaped the students’ urination in the bathroom once a day, twice a week for twelve weeks for Sota and five weeks for Kohei, after the third class period of the day. In addition, the lead author videotaped participants’ watching self-modeling videos for an average of 20% of the video watching sessions. Sota and Kohei sometimes caught a glimpse of the observer when he entered the bathroom. During video watching, they rarely looked at the observer or the camera.

**Target behavior.** A discrete categorization was used to detect a change of students’ performance. If they pulled their pants down to the ankles, a 0 was assigned. If they pulled their pants down to the knees, a 1 was assigned. If they pulled their pants down just under the buttocks, a 2 was scored. Finally, if they pulled only the front part of the pants down and did not show their buttocks, a 3 was assigned. These scores were assigned even when verbal prompts were provided. Starting with buttocks covered and pants eventually sliding down to the ankles (this happened to Sota one time) was recorded as 0. Similarly, dropping pants to the ankles first and then picking them up was recorded as 0.

**Teacher behavior in the bathroom.** In addition to scoring the target behavior, teacher prompts and feedback were counted to check any differences in the teacher interactions across baseline, VSM, video self and hero modeling (VSHM), and maintenance conditions. Prompt was defined as any verbal or gestural behavior provided by the teacher before the participant started urinating to encourage him to exhibit a correct response (e.g., saying, “Can you put the buttocks in the pants?”). Feedback was defined as any verbal behaviors delineating what the participant was
doing or did during urination (e.g., “You exposed the buttocks,” “You did it”). For teacher prompts and feedbacks, if the teacher behavior was observed, occurrence was noted. If not, nonoccurrence was noted.

Ancillary behavior in the bathroom. Any comments and gestures made by participants during urination were transcribed if they seemed relevant to the content of the video. For example, if the participant said, “I am doing well,” or pointed to the poster of visual instruction, that would be transcribed because that implies the participant had an image of correct response.

Attentiveness to the video. A 5-second momentary time-sampling procedure was used to quantify the degree of participants’ attentiveness toward the self-modeling videos. If the eye gaze was directed toward the video at the end of the 5-second interval, Attentive was assigned for the interval on a rating sheet. If the eye gaze was not directed toward the video, Non-Attentive was assigned for the interval. The percentage of intervals when Attentive was assigned was computed.

Teacher behavior during video watching. In addition to recording participants’ attentiveness to the video, teacher interactions were recorded. Teacher interactions included any verbal or non-verbal behavior that prompted the participant to attend to the video (e.g., “Look,” pointing to the display) and any verbal behavior that delineated what the participant was doing in the video (e.g., “You conceal your buttocks”). A 5-second partial interval recording procedure was used to quantify the amount of teacher interactions during video watching.

All data were recorded by the first author.

Procedure

Baseline. The teachers were asked to use the same strategies that were used before this study was initiated in the baseline conditions. Visual instructions specifying appropriate toileting behavior were always posted on the wall over the toilet.

Video self-modeling (VSM). The procedures used in VSM were identical to those used in baseline, with the exception of watching the self-modeling video with occasional teacher’s interactions. After stabilization of the baseline data was observed, the VSM was implemented for the baseline.

Baseline 2. This condition was implemented only for Sota. After implementation of the first VSM intervention, partial improvement was detected in his pulling his pants down. However, the intervention failed to evoke a correct response over the four weeks before the summer break. The VSM intervention was withdrawn during the summer break (40 days) and the first week of the new semester.

Video self and hero modeling (VSHM). This condition was implemented only for Sota. After determining that Sota’s performance had not improved in the second baseline condition, the VSHM intervention was introduced. In the video of the second intervention, a hero’s model was overlaid on the self-modeling video. In the revised video, a realistic-looking tyrannosaurus doll was seen walking up to the toilet next to Sota and urinating with his buttocks covered by his pants (see Materials).

Maintenance. The VSM or VSHM intervention was withdrawn when the target behavior occurred for four consecutive sessions. However, if the participant requested to watch the video, the intervention was continued. This situation occurred in Kohei’s case. In addition, if the participant refused the teacher’s request for video watching, the intervention was discontinued even when he did not meet the criterion (i.e., four consecutive correct responses). This situation occurred in Sota’s case. The condition in maintenance was identical to in baseline. This condition lasted for three months for Sota and five months for Kohei.

Experimental Design

A multiple-probe design across two participants (Kazdin, 1981) was used to measure the effectiveness of the VSM strategy in evoking urination with the buttocks covered by pants. In addition, for Sota, an ABAC design was used, with watching a self-modeling video in the B phase and watching a self- and hero-modeling video in the C phase, to detect the impact of hero modeling on eliminating public undressing in a bathroom.
Reliability

Target behavior. To check the reliability of the data recorded by the first rater (first author), the second rater (a graduate student) independently recorded 100% of the target behavior in the bathroom across participants and conditions. An agreement between raters was defined as two observers independently and simultaneously marking the same category for the same session. A point-by-point agreement was computed by dividing the number of agreements by the total number of agreements and disagreements and multiplying by 100. The interobserver reliability for Sota and Kohei across conditions was 89% and 94% respectively.

Teacher behavior in the bathroom. Agreements for teacher prompts and feedbacks were similarly defined; that is, two observers recording the same category (i.e., occurrence or nonoccurrence) for the same session. Interobserver agreement of prompts and feedback was computed by dividing the number of agreements by the total number of agreements and disagreements and multiplying by 100. The mean interobserver reliability of prompts and feedback across conditions for Sota was 96% and 85% respectively, and for Kohei was 75% and 81% respectively.

Ancillary behavior in the bathroom. An agreement between raters was defined as two observers independently and simultaneously transcribing the same verbal or gestural behavior for the same session. A point-by-point agreement was computed by dividing the number of agreements by the total number of agreements and disagreements and multiplying by 100. The interobserver reliability across conditions for Sota and Kohei was 75% and 85% respectively.

Attentiveness to the video. An agreement for attentiveness to the video was defined as two observers marking the same category for the same interval. A point-by-point agreement was computed by dividing the number of agreements by the total number of agreements and disagreements and multiplying by 100. The interobserver reliability for Sota and Kohei was 92% and 92% respectively.

Teacher behavior during video watching. Agreements for teacher interactions were similarly defined; that is, two observers marking the same category for the same interval. A point-by-point agreement was computed by dividing the number of agreements by the total number of agreements and disagreements and multiplying by 100. The interobserver reliability for teacher interactions with Sota and Kohei was 85% and 79% respectively.

Procedural fidelity. Each participant’s teacher was asked to record when video presentation was implemented. The first author independently checked the date and time when the video-watching session was implemented with 20% for Sota and 15% for Kohei. An agreement was defined as the teacher and the first author recording the same date and time. The procedural fidelity across participants was 100%.

Results

Target Behavior and Ancillary Behavior in the Bathroom

The performance of the two students is presented in Figure 1. As illustrated, Sota (upper panel) pulled his pants down at the ankles (i.e., level 0) across all baseline sessions. According to his teacher, a similar pattern was observed before this study was implemented. After introducing VSM, his performance improved to some extent. During the condition, Sota stopped pulling his pants down at the knees (i.e., level 1) for two sessions and just below the buttocks (i.e., level 2) for three sessions. Although 0 was recorded in the last three sessions because the trousers were pulled down at the knees, his underpants were pulled down just below the buttocks in two out of the three sessions. However, he never put his buttocks in the pants during urination in the intervention sessions. Sota watched the video 5 times in the VSM conditions.

After withdrawing VSM, Sota’s performance levels were 0 and 2. Although only two data points were collected during the second baseline condition, his teacher indicated that his performance was between levels 0 and 2 during the remaining sessions in which the first author did not videotape. The teachers showed a willingness to start VSHM as soon as possible because they believed that the content of the video was very attractive to Sota and that he would be motivated to imitate the

Teacher Behavior during Video Watching

Agreements for teacher interactions were similarly defined; that is, two observers marking the same category for the same interval. A point-by-point agreement was computed by dividing the number of agreements by the total number of agreements and disagreements and multiplying by 100. The interobserver reliability for teacher interactions with Sota and Kohei was 85% and 79% respectively.
target behavior engaged in by the tyrannosaurus. The VSHM sessions, therefore, were implemented.

Immediately after introducing VSHM, Sota’s performance improved dramatically. He kept the pants just below his buttocks for the first two sessions (i.e., session 19 and 20). According to the transcript in session 20, Sota said, “I am doing well,” to his peer who said, “I am doing well” to Sota, during uri-

Figure 1. Level of performance of the behavior of putting buttocks in pants. There was a month between sessions 16 and 17 (winter break), sessions 28 and 29, and sessions 29 and 30. 0 = pulling pants down at the ankles, 1 = pulling pants down at the knees, 2 = pulling pants down below the buttocks, 3 = pulling down the front part of the pants with covering the buttocks in the pants. BL = baseline, VSM = video self-modeling, VSHM = video self and hero modeling, MN = maintenance.
nation. Following the comment, Sota pulled his pants up a couple of inches, covering the small part of the buttocks. In the third session after introducing VSHM, Sota put his buttocks in the pants during urination for the first time. In this session, Sota said, “I am doing well,” pointing to the poster during urination, following his peer exhibiting the same behaviors. Additionally, after washing his hands, he said to his teacher, “I did it,” for the first time.

In the fourth session, Sota’s performance was recorded as level 2. According to the transcript of the session, he tried to adjust the position of his pants by trying to put his buttocks in the pants after urinating with his buttocks exposed. However, he failed to cover the buttocks because his underpants got entangled. From the fifth session, he exhibited level 3 performance for three consecutive sessions. In the fifth session, when the teacher provided Sota with verbal praise, he said to the teacher, “I am tyranno.” Although Sota’s performance was not perfectly stable, the VSHM intervention was stopped because he refused to watch the video. After withdrawing VSHM, Sota maintained correct responses for three months.

During baseline, Kohei (bottom panel) did not show any correct responses (i.e., level 3). He pulled his pants down at the knees (i.e., level 1) for two out of three sessions. According to his teacher, a similar pattern was observed before this study was implemented.

Immediately after implementation of VSM, Kohei’s performance reached level 3, meaning that he put his buttocks in the pants during urination. According to the transcripts, in six out of nine intervention sessions, Kohei first pulled his pants down to the position at which the upper part of the buttocks was slightly exposed for a second. He then adjusted the position of his pants just before starting urination to cover his buttocks. Additionally, in the fifth intervention session, Kohei pointed to Sota, who was exposing his buttocks during urination, with a vocalization, “Ah.” In the VSM condition, Kohei watched the video five times. After withdrawing the VSM intervention, Kohei stayed at level 3 for five months.

**Teacher Behavior in the Bathroom**

During the first baseline condition for Sota, the teacher provided verbal prompts for three out of four sessions (e.g., “Can you put your buttocks in your pants?”). Feedback was provided for one session (e.g., “You show your buttocks”). During VSM, the teacher provided verbal prompts for two out of ten sessions. Feedback was provided for one session. During the second baseline condition, verbal prompts were provided for one out of two sessions, but no feedback was provided. During VSHM, verbal prompts were provided for one out of nine sessions, and feedback (e.g., “You did it”) was provided for two sessions.

During baseline for Kohei, the teacher provided verbal prompts (e.g., “Put your buttocks in the pants”) and feedback (e.g., “It’s embarrassing”) for two out of three sessions. During VSM, the teacher provided Kohei with verbal prompts and feedback (e.g., “You did it”) for four out of nine sessions. During maintenance, neither prompts nor feedback was provided.

In sum, teacher prompts and feedbacks were less likely to be used in VSM or VSHM sessions than in the first baseline sessions.

**Attentiveness to the Video**

The average percentage of Sota’s attentiveness to the video was 89.3% in the self-modeling video and 77.6% in the self- and hero-modeling video. Sota’s attentiveness to the self- and hero-modeling video was lower because he looked at his teacher to talk about the tyrannosaurus featured in the video. The percentage of Kohei’s attentiveness to the self-modeling video was 100%.

**Teacher Behavior during Video Watching**

For Sota, teacher interactions were observed for an average of 65.1% of the intervals during VSM and 51.2% during VSHM. For Kohei, teacher feedback was observed for 57.1% of the intervals during VSM.

**Discussion**

This study examined the effects of VSM on public undressing in a bathroom by elemen-
tary-aged students with developmental disabilities. According to a visual inspection, the public undressing behavior of the two students decreased when VSM was introduced. However, for one of the participants (Sota), the public undressing failed to reach the acceptable level until hero modeling was added to the VSM.

To eliminate public undressing, previous research used an abolishing operation (Carlson et al., 2008), which reduces the value of the consequence contingent on engaging in public undressing. In contrast, the present study used an establishing operation, which increases the value of the consequence contingent on engaging in an alternative behavior incompatible with public disrobing (i.e., putting buttocks in pants).

We hypothesized that VSM would function as an establishing operation on the basis of Bandura’s (1977) social learning theory, implying that using self as a model is more likely to encourage imitation of the behavior of the model than having others serve as models. When VSM is used, being like the model emerges as a consequence contingent on engaging in the target behavior. If the reinforcing value of being like the model exceeds the reinforcing value of the consequence contingent on exposing the buttocks, the participant may put the buttocks in the pants during urination.

In this study, Kohei put his buttocks in the pants during urination immediately after watching the self-modeling video. Thus, it can be concluded that VSM increased the value of the consequence contingent on putting the buttocks in the pants to the extent that it exceeded the value of the consequence contingent on pulling the pants down below the buttocks. Stated differently, being like the model became more valuable to Kohei than avoiding the pressure of the pants, which is a hypothesized maintaining reinforcer.

In contrast, Sota continued to expose his buttocks in public during VSM. However, compared to baseline, in which Sota pulled his pants down all the way to his ankles, he regulated the position of his pants on the knees or just below the buttocks in five out of ten VSM sessions. This finding implies that presenting the self-modeling video to Sota increased the value of the consequence contingent on covering his body parts, but did not to the extent that it exceeded the value of the consequence contingent on exposing the buttocks.

After adding a hero as a model to the self-modeling video, Sota finally put his buttocks in the pants. Interestingly, in the first session of the condition, we observed him say, “I am doing well,” pointing to a poster of visual instructions during urination, even though he exposed his buttocks at level 2. This may be evidence that being like the model, which was thought of as a consequence contingent on putting the buttocks in the pants, was more valued than it was during the VSM interventions. In addition, in the sixth session of the condition, in which Sota showed the correct response, he said, “I am tyranno,” just before completing his urination. This utterance can be interpreted as meaning, “I did in the same way as the tyrannosaur did.” This implies that the value of being like the model, which is thought of as a consequence contingent on putting the buttocks in the pants, finally exceeded the value of the consequence contingent on exposing the buttocks in public.

In addition, it can be hypothesized that being like the tyrannosaurus (his hero) was much more valuable to Sota than being like the self. During the self and hero video watching, Sota exhibited utterances related to tyrannosaurus. For example, according to the transcript of the first day of the video watching, he said, “Tyranno, I am scared of tyranno. Where is the tyranno? Is he here? I go find the tyranno.” This implies that Sota focused on the hero as a model rather than on himself as a model in the video watching.

In sum, VSHM, especially a component of hero modeling, functioned as an establishing operation so as to increase the value of being like the model, a consequence contingent on putting buttocks in pants, to the extent that exceeded the value of the sensory pleasure, a consequence contingent on exposing the buttocks in public.

It is unknown why VSM was effective for Kohei but not for Sota. Thus, this study did not determine which factors discriminated between the two participants in terms of the effectiveness of the VSM interventions. It is safe to conclude, however, that for some students with developmental disabilities, using
self as a model in video may not increase the value of being like the model, which is thought as a consequence contingent on engaging in the target behavior, to the extent that evokes the target behavior. If using self as a model in video failed to increase the value of being like the model as much as evoking the target behavior, using one of the student’s heroes as the model may be an option to be pursued.

According to the transcripts, Kohei adjusted the position of his pants to cover his buttocks before starting urination in six out of nine intervention sessions. This finding implies that the following four processes occurred just before he started urinating: (a) he retrieved a clear image of the target behavior, (b) he compared his performance to the image, (c) he realized the discrepancy between his performance and the image before starting urination, and (d) he adjusted the position of his pants. In addition, according to a transcription in the third intervention session, Kohei pointed to the buttocks of Sota, who was using the bathroom at the same time, vocalizing, “Ah.” This finding implies that Kohei was keeping the rule (i.e., put the buttocks in the pants during urination) in mind.

Several limitations apply to this study. First, the study applied VSM to public undressing exhibited by two students with developmental disabilities and maintained by automatic reinforcers. Therefore, extension of the results to public undressing maintained by other functions (e.g., social attention) and exhibited by students with other types of disabilities should be done with caution. Second, the study examined the effectiveness of a package of VSM or VSHM interventions in eliminating public undressing. The package includes showing a self-modeling video, providing feedback during video watching, and presenting verbal praise contingent on engaging in a correct response in the bathroom. The effects of VSM or VSHM alone were not detected. Third, a multiple-probe design was used only for VSM interventions, not for VSHM. Although Sota’s behavior improved dramatically after VSHM was implemented, the dramatic change contingent on introducing VSHM appeared only once due to the irreversible nature of the target behavior. This is not strong evidence of a functional relationship between VSHM and acquiring the target behavior. Fourth, the study failed to determine whether both self- and hero-modeling components were needed or if only hero modeling was needed in the video to eliminate public undressing. Fifth, no direct observations were conducted on public undressing at home or community settings. However, the parents of the both participants reported that the two boys put their buttocks in the pants at home and in the community immediately after they exhibited the correct response at school.

Despite these limitations, this study extended previous research in the following areas. First, the study suggested the possibility of using an establishing operation for eliminating public disrobing. In previous research, only punishment (Foxx, 1976), differential reinforcement of other behaviors (DRO) plus punishment (Lombana & Cuvo, 1980), and abolishing operation (Carlson et al., 2008) were demonstrated as effective strategies for eliminating public undressing.

Second, this study applied VSM to eliminating public undressing, a behavior that had not previously received attention in VSM research. The results of the present study indicate that VSM may be a worthwhile option for eliminating public undressing that may be maintained in the process of automatic reinforcement.

Third, the study added a component of hero modeling to VSM to explore if this would contribute to eliminating public undressing. Previous research has examined the effectiveness of using a hero as a model in following a social rule (Angell, Nicholson, Watts, & Blum, 2011; Davis, Boon, Gihak, & Fore, 2010; Keelings, Myles, Gagnon, & Simpson, 2003). The strategy, called a power card, has mainly been used for individuals with autism spectrum disorders. However, no research has explored if a video in which a participant engages in a target behavior with his hero engaging in the same behavior could encourage the participant to exhibit the target behavior in natural settings. The unique content of the video in the current study was developed using the Chroma Key compositing technique, which is available in ordinary video editing software. It took less than 1 hour to videotape the dinosaur and overlay the video clip on the original self-modeling video and it was simple enough so a novice can develop this type of video. In
sum, the results of the present study suggest that the VSHM intervention may be an option if VSM is not effective.

In conclusion, this study applied VSM to two students with developmental disabilities to eliminate public undressing. Although VSM contributed to improving their behaviors, the intervention failed to achieve full elimination of public undressing for one student. Adding a component of hero modeling boosted the effects of the VSM to the extent that eliminated the student’s public undressing. Future research needs to apply VSM to more students with developmental disabilities who exhibit public undressing and to additional types of functions maintaining the behavior. In addition, rigorous procedures need to be used in future research to investigate the effectiveness of VSHM in improving performance.

References


an institutionalized profoundly mentally retarded woman. *Mental Retardation, 18*, 185–188.


Received: 1 May 2012

Initial Acceptance: 16 July 2012

Final Acceptance: 20 September 2012