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Teaching Preschool Children Recycling Behaviors: An Evaluation of Behavioral Components Within Public Service Announcements

by

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Abstract

This study examines the effects of different behavioral components imbedded within public-service-announcement-style (PSA-style) videos on preschool-aged children's recycling behaviors. Nineteen children, ages 3.5 to 6 years were the participants. The dependent variable was measured using a four-level scoring system with higher scores being given to more accurate recycling behaviors. Four video independent variables were examined, each including a different behavioral component: information, instructions, modeling, and modeling-plus-feedback. Whereas certain video content (instructions and modeling-plus-feedback) produced higher but inconsistent recycling scores, a fifth independent variable, in situ prompting and feedback, was required to produce consistent recycling. Possible implications of demographic and other variables are discussed and suggestions for future research are made.

Table of Contents

List of Tables

List of Figures

Teaching Preschool Children Recycling Behaviors:
An Evaluation of Behavioral Components Within Public Service Announcements

A majority of scientists studying the earth's atmosphere believe global warming is occurring and co-varies with increases in levels of heat-trapping greenhouse gasses (Climate Change and the Integrity of Science, 2010; Thompson, 2010; Union of Concerned Scientists, 1990). An extensive body of evidence has identified "humans as the main driver of global warming" (Union of Concerned Scientists, 2006, pp. 2), and suggests that addressing a solution is within humans' collective power. One of the many ways to contribute to a reduction in man-made greenhouse gasses is recycling (Union of Concerned Scientists, 2007).

Written antecedent and consequent independent variables have been shown to increase people's recycling behaviors in residential settings (Keller, 1991/2010). But in order to effectively increase environmental reform, we need empirical evidence of how media affects public opinion (Biglan, 1995) and individuals' behaviors. The resource conservation literature calls for clear definitions of "communities" and suggests a focus on institutions rather than communities (Agrawal & Gibson, 1999). Additionally, Refsgaard and Magnussen (2008) suggest people's recycling behaviors depend on both the technical and organizational aspects of the environment and on the operations of established institutions (organizational bodies already in place in society).

The Nielsen Company (The Nielsen Company, 2012), the company which tracks television viewing practices, reports that as of spring 2011, 96.7% of American households owned television sets (Stelter, 2011). That is down from 98.2% in 2006 (United States Census, 2009). The company cites two reasons for the decline: 1) poverty,

and 2) the switch to computer devices to access programs developed for television (Stelter, 2011). However, in the same report, Nielsen stated that, across all media platforms, Americans are watching more video content (Stelter, 2011). Because television remains a widely-used medium in our society, it is an existing modality capable of reaching large numbers of people at one time, especially children. The children's program Sesame Street, for example, will celebrate its 43rd anniversary this year and has aired in more than 140 countries. Sesame Workshop, the non-profit organization behind the television show, states in its mission statement that it is committed to the principle that children deserve to "better understand the world" (Sesame Workshop, 2010). This can be taken as an argument for using television and like media as tools for teaching environmentally-responsible behaviors, including recycling.

As suggested by The Nielsen Company, television programs and television-like programs are also accessible on the internet. Home computer and internet use is increasing. In the United Kingdom alone, home computer ownership rose from 67 to 72 percent of households between 2006 and 2008. The percentage of homes with internet connections was 66% in 2008 (Office for National Statistics, 2010). In the United States, 76.6% of households with children ages 3-17 years had internet access in 2009 (U.S. Census Bureau, 2009). Placing public service announcements (PSAs) and/or video training on internet sites aimed at children could be another way to use mass media to impact children's behaviors. In the United States, school districts are now turning to evidence-based, online programs to improve student performance (The Journal, 2009; Reuters.com, 2008).

To be effective, mass-media campaigns need to be produced and executed using empirically supported protocols (Nolan, Schultz, & Knowles, 2009). Nolan and colleagues (2009) demonstrated that PSAs which followed empirically supported script compositions were more effective in changing participants' self-reported intentions of potential future behaviors than those which did not follow empirically supported scripts. Similarly, results from Keys, Morant, and Stroman (2009) found that manipulating variables within PSAs can prompt attitude changes. These studies used self-reporting to measure attitudes and behavioral intentions in hypothetical situations as unfortunately few studies have measured actual behavior that occurred following participants' exposure to PSAs.

Research within social psychology demonstrates that social norms play influential roles in individuals' behaviors (Cialdini, 2003; Cialdini & Goldstein, 2004; Cialdini, Kallgren, & Reno, 1991; Terry & Hoag, 2001). Social psychologists generally define normative influence as social influences that affect an individual's behavior due to the individual's desire to be a normal member of a group or the desire to be accepted by other members of a community or society (Gray, 2011). In relation to PSAs, a social norm can influence an individual's behavior by suggesting that when other people typically engage in a particular behavior, that behavior is normal. Cialdini's (2003) study involving PSAs depicting adults engaging in recycling behavior as a social norm, and which included depictions of potentially aversive social consequences for the one person not engaging in that normal behavior of recycling, resulted in a 25% increase in household recycling. The PSAs were aired on both television and radio in four Arizona media markets.

Much of the other published research on media exposure is correlational with behavior change focused on reducing unwanted, unhealthy, or risky behaviors. For example, experiments in the health field have demonstrated mass media to be effective in increasing awareness of the harmful effects of smoking (Flay, 1987) and decreasing self-reported smoking (Bauman, LaPrelle, Brow, Koch, & Padgett, 1991; Flay, 1987) and alcohol consumption (Barber, Bradshaw, & Walsh, 1989). Health research also finds mass media interventions used in collaboration with schools to be effective in reducing self-reported engagement in behaviors harmful to human health among minors (Flynn, Worden, Secker-Walker, Badger, Geller, & Costanza, 1992). Child psychology research has shown the viewing of specially targeted television productions can change behaviors and perceptions of behaviors among individuals in small social units (Sanders, Montgomery, & Brechman-Toussaint, 2000).

Bandura, Ross, and Ross (1963) demonstrated that children who watched adult models performing aggressive acts on film then imitated the models when presented with the same stimulus. Bandura (1965) also demonstrated children are less likely to imitate actions of filmed models who received admonishment than those who received praise or no social consequence for their behaviors. Whereas video modeling has been shown to lead to behavior change, several different factors can impact the outcome.

In using video modeling for staff training, Catania and colleagues (Catania, Almeida, Liu-Constant, & Digennaro-Reed, 2009) demonstrated video modeling produced improved performance of discrete trial teaching instructions. Moore and Fisher (2007) found that larger numbers of exemplars contained in video modeling affected participants' performances more than smaller numbers of exemplars. Nosik and

Williams (2011) demonstrated that for participants who had not reached 100% performance on teaching tasks, observing video models receiving feedback boosted performance. The observed feedback consisted of a model incorrectly performing steps and being given specific corrective feedback. Charlop and Milstein (1989) demonstrated that video modeling of conversations can affect the conversation behaviors of children with autism; and Reeve and colleagues (Reeve, Reeve, Townsend, & Poulson, 2007) found that video modeling affected helping behaviors of children with autism. Neilsen, Simcock, and Jenkins, (2008), found that 24-month-old participants were more likely to imitate live, in-person models than video models, and more likely to imitate live on-video models who had two-way communication with the participants than video models without live, two-way communication. Winett, Kramer, Walker, Malone & Lane (1988) found that video modeling in combination with written feedback on participants' behaviors affected behavior more than did video modeling without written feedback.

Public service announcements currently aired on television and available on the internet typically contain one or more of five components which, for the purposes of this study, we classify as information, instructions, modeling, rule-giving, and feedback. In an effort to determine the extent to which PSAs utilize these components, we coded PSAs recorded from public television and accessed online. "Information" was defined as a statement or statements of any knowledge that pertains to the behavior which the PSA was targeting (e.g., "On January 25th, a massive earthquake ravaged Haiti."; Ad Council, 2010). We defined "instructions" as any statement which told viewers what to do (e.g., "So please, join the Clinton Bush Haiti Fund and other organizations as we answer the call to help Haiti build back better."; Ad Council, 2010); "modeling" as any visual and/or

auditory demonstration of a person or character engaging in the behavior the PSA was promoting; "rule-giving" as any stated or implied rule (e.g., "Give now and lives will be saved."; Ad Council, 2010); and "feedback" as any person or character receiving any kind of feedback from another person or character after engaging in (modeling) the target behavior.

We did not independently code for the presence or presentation of social norms in these PSAs. Because the "modeling" and "feedback" components include people engaging in the target behavior, they can be considered to include, to some degree, the establishment of the target behavior as a social norm. We did not code the presence or absence of social norms in the PSAs which included "information," "instructions," or "rule-giving."

Of 27 PSAs coded, 96.2% contained instructions, 25.9% contained information, 25.9% contained modeling, 14.8% contained blatant rule-giving, and 3.7% contained feedback (see Figure 1). A second observer simultaneously and independently coded the occurrence or non-occurrence of behavioral components for 24 (88.9%) of the PSAs. Interobserver agreement was calculated by dividing the total number of agreements by the total number of agreements plus disagreements then multiplying by 100. Agreement for instructions was 91.7%, agreement for information was 66.6%, agreement for modeling was 100%, agreement for rule-giving was 100%, and agreement for feedback was 100%. The 66.6% agreement for information occurred because two of the six videos the videos containing information also contained instructions and the second observer recorded in the data in a hierarchical manner, meaning he assumed that because he recorded instructions as being present it was assumed that information was present.

The purpose of the present study is to compare any possible relative effects of different behavioral components within PSA-style videos for promoting recycling behaviors in preschool-aged children. The results of this study may help answer the question of whether PSAs are effective for changing preschool aged children's behaviors. They may also point toward a more effective way for audio-video media outlets to train preschool-aged children to consistently recycle.

Method

Participants & Settings

Participants were typically-developing children ages three-and-a-half to six years who were enrolled in three different classrooms (sites) at two private preschools in the city of Reno, Nevada. Twenty-two participants began the study; three participants left their respective preschools before conclusion of baseline data were collected and were excluded from the study, leaving 19 participants. At Site A, there were one female (age 5 years) and five males (ages 5, 5.5, 5.5, 6, and 6 years). At Site B, there were three females (ages 3.5, 4, 4.5) and one male (age 4). At Site C, there were five females (ages 4.5, 4.5, 4.5, 4.5, and 5) and four males (4, 4.5, 5, and 5.5).

None of the three classrooms had recycling programs in place prior to the study. All of the sites had garbage/trash cans but no recycling bins in the classrooms prior to the study. Before baseline began, the researcher placed three bins in each classroom, one for recycling paper, one for recycling plastic/aluminum/glass, and one for non-recyclables or trash with corresponding labels on each (see Figure 2).

Two of the classrooms (Sites A and B) had lunchtime protocols in place prior to the study which included clean-up of disposable materials and proper storage of lunch

boxes/bags and hand-raising to receive permission to leave the table. The other classroom (Site C) did not have a lunchtime protocol in place prior to the study but initiated a lunchtime protocol mid-way through the study. This change was an unplanned intervention and not under control of the researcher. However, the rules of the unplanned lunch protocol intervention at Site C, like the protocols in Sites A and B included clean-up of disposable material, proper storage of lunch boxes/bags and hand-raising to receive permission to leave the table. A week prior to this unplanned intervention, the lunch tables and the trash and recycling bin were moved from one end of the room to the other. This, too, was an unplanned intervention not under control of the researcher. The trash and recycling bins were the same distance from the tables as they were prior to the move.

Dependent Variables & Units of Measure

The dependent variable was a response class including behaviors of any topography that resulted in recyclable paper and/or drink, fruit, or pudding containers coming to rest inside the designated recycle bins. A scoring system used during firearm safety training (Himle, Miltenberger, Flessner, & Gatheridge, 2004; Himle, Miltenberger, Gatheridge, & Flessner, 2004; Miltenberger et al. 2005) was adapted to suit recycling behaviors. The participants' performances were given number values: 0 = did not dispose of the item, 1 = disposed of the item in the trash, 2 = disposed of the item in the wrong recycle bin, 3 = disposed of the item in the correct recycle bin.

"Recyclable paper" was defined as any paper or cardboard not coated with wax or plastic. "Recyclable drink, fruit, or pudding containers" were defined as plastic, glass, or aluminum containers which had the "recycle" symbol (♻) either stamped or molded into

the surface of the container, printed on the surface of the container or printed on a label affixed to the container.

Participants' target behaviors were directly observed and recorded by trained observers present in the children's classrooms. Observation periods were defined as starting when the first lunch was presented to any child in the classroom until the time that all children in the classroom were finished with lunch clean-up. Researchers watched the participants' actions and recorded the occurrence, non-occurrence, or no opportunity for the occurrence of the target behaviors for each participant. No opportunity for the occurrence of the target behavior was scored if the participant was not present or the participant was present but did not have recyclable paper or a recyclable drink, fruit, fruit or pudding container during the observation period. Occasionally, participants had more than one opportunity to recycle in the same session but this happened rarely; data were recorded for all opportunities. Data were recorded on data-collection sheets (Appendix 1) then entered into an Excel® spreadsheet and graphs were generated for visual inspection.

Observers were the investigator and four university student research assistants earning class credit for participation in conducting research. During the training process, the investigator explained to the research assistants the operational definition of the class of target behaviors and how to code occurrences and non-occurrences of the behaviors. The investigator then acted out exemplars and non-exemplars while the observers practiced recording. Once proficiency was reached, observers then practiced in a day center with rooms similar to those in which the actual data collection occurred. Once proficiency was reached, baseline data collection began. "Proficiency" was defined as

100% agreement with the true record during five consecutive trials. The primary researcher's record served as the primary record. Interobserver data collection took place during 35.178% of sessions across all conditions. Interobserver agreement was scored by dividing agreements by agreements plus disagreements then multiplying by 100.

Each participant was identified on a data sheet by a letter-number code only. Participants were identified by non-corresponding, fictional names for public reporting of data. Names of any other people involved in anecdotal or antecedent/consequence reporting have been fictionalized as well.

A secondary dependent measure was recorded in the form of a "recycling quiz" taken on paper and saved in the form of a permanent product (Appendix 2). Participants took the quiz at the beginning of baseline and again at the conclusion of the video presentations but before the in situ training. This was designed to determine whether or not the participants gained semantic knowledge of recycling independent of their recycling performance. The quiz had two parts. The first had images of nine items (an aluminum can, a battery, a banana peel, a stack of office paper, rotting strawberries, a glass bottle, an apple core, a plastic bottle, and chicken bones) and participants were instructed to "circle each one you can recycle." The second part of the quiz had images of three symbols (a "woman" bathroom symbol, the recycling symbol, and a yield symbol); the participants were instructed to "circle the sign that means 'recycle.'" The instructions were both written on the quiz and read to the participants.

Independent Variables

Independent variables were PSA-style videos, each featuring a different behavioral component or combination of components, including information (called

"information"), information plus instructions (called "instructions"), information plus modeling (called "modeling"), information, modeling plus observed feedback (called "modeling-plus-feedback"). The videos were 30-seconds in duration and followed scripts similar to PSAs currently airing on local and regional television networks and available online (New ENERGY STAR PSA Campaign, 2010; Appendix 3). The script for the "information" video is in Appendix 4, Appendix 5 for the "instructions" video, Appendix 6 for the "modeling" video, and Appendix 7 for the "modeling-plus-feedback" video. Actors in the videos were three females, ages 8, 9, and 10 years, who had medium to dark skin tone and came from middle class families.

Classroom teachers played the scheduled videos using digital video discs (DVDs) and television sets in each classroom during the participants' regularly scheduled video/television times. The regularly scheduled video/television times at all three sites were directly prior to lunchtime. At Sites A and B, the participants continued to watch other video programs for approximately ten minutes after the recycling videos played and before beginning lunch. At Site C, the video was played when the children sat down at their lunch tables before their lunches were presented. Teachers were instructed to play the video once each day. Because the PSA-style videos were pre-recorded and replayed from the same digital source, consistency of content was preserved.

In an effort to provide social validity and ensure the children have the necessary recycling behaviors in their repertoires at the conclusion of the study, those who did not meet target behavior criteria (did not score a "3" during three consecutive sessions) during video assessment phases received in situ training. Before in situ sessions began, the investigator explained recycling to the students, including what items could and could

not be recycled and in which bins they should be place. The in situ sessions began exactly like the assessments following previous PSA phases. If the child did not engage in the target behavior, the experimenter or classroom teacher addressed the child, pointed out the item that was not recycled or recycled improperly, instructed the participant to place the item in the proper bin, and praised the participant for doing so.

Demographic information was collected on a voluntary basis from the participants' parents regarding the participants' potential exposure to recycling behaviors at home. The questions included in the "Family Questionnaire" can be seen in Appendix 8). When possible, data collectors also made note of antecedents or consequences to participants' opportunities to engage in recycling behaviors. Antecedents included the actions of the participant moments before an opportunity to recycle (e.g., finished drink), social interactions with peers (e.g., peer stated, "You can recycle that."), social interactions with adults (e.g., "Darlow, please clean up."), or any social interactions initiated by the participant (e.g., "Miss Deborah, can you recycle this?" Miss Deborah pretended to not hear the question). This was done to allow the ability to examine any events or interactions that may exert control over the target behavior.

Experimental Design

Interventions were implemented in a multiple baseline across grouped participants design, with modified counterbalancing for potential sequencing effects. This means there were three groups of participants grouped by site; all participants in a given group were exposed to the same independent variables at the same times (see Figure 3). This grouping was necessary because the independent variables were presented within the typical schedule of participants' respective classrooms. The multiple baseline design

allows for comparison of the effectiveness of each condition (Cooper, Heron, & Heward, 2007). Because there were only three groups of participants, a true counterbalancing of all four video conditions was impossible, so the investigator made sure no one video intervention condition followed the same condition in two groups. Once baseline levels were stable, the first PSA condition was implemented across all participants at that site. Which of the four PSA videos was presented was determined by flipping a coin.

For Site A, researchers collected baseline data for 16 sessions then the modeling-plus-feedback video was presented. Due to unstable responding, Site A remained in the modeling-plus-feedback phase for 26 sessions when the in situ phase was initiated. Eight in situ sessions were conducted. For Site B, 21 baseline sessions were conducted, followed by seven instructions sessions, four information sessions, nine modeling sessions, 12 modeling plus feedback sessions, and five in situ sessions. For Site C, 20 baseline sessions were conducted, followed by 14 information sessions, 15 modeling-plus-feedback sessions, eight modeling sessions, 12 instructions sessions, and seven in situ sessions. Despite attempts by the researchers to prevent it, one participant was moved back and forth between Sites A and B. She was primarily in Site B. A second participant from Site B was permanently moved to Site A after Site B's fourth in situ session and her follow-up probes were conducted in Site A.

In an effort to control threats to internal validity, teachers, aides, and all other adults at the preschools were instructed not to initiate conversations with children about recycling. Adults were given a script to follow should students ask questions about recycling (Appendix 9). Adults were also asked to refrain from prompting children to recycle at any time and refrain from giving any feedback after any children engaged or

failed to engage in the target behavior. They were also asked to dispose of any trash or recyclables of their own in another room out of the participants' sight. There was only one recorded instance of a teacher breaking protocol.

For Sites A and B, follow-up probes two, four, and eight weeks after completion of "in situ" sessions were conducted to test for behavior maintenance. Site C concluded in situ sessions less than two weeks ago. Probes for Site C will be conducted one-and-a-half, four, and seven weeks after completion of the in situ sessions.

Data Analyses

Data from the data sheets were entered into an Excel® spreadsheet and graphed for visual inspection. The primary type of display is a line graph showing sessions along the abscissa and the recycling score (0-3) on the ordinate. Demographic information for each participant was organized into a table and correlations using Pearson's Correlation Coefficient were calculated.

Results

Site A

Results for participants in Site A are shown in Figures 5-10. Only the first opportunities to recycle per observation session are graphed as the second and third opportunities occurred rarely. Participants at this site included one girl and five boys who ranged in age from five to six years old. No participant in Site A scored above a "1" during baseline, meaning when they disposed of recyclables, they disposed of them in the trash bin but not in any recycling bins. Each participant scored at least one "3" during the video intervention phase, but no one reached the passing criteria of three "3" scores in a row. One participant, Davey, stopped attending the preschool during the video

intervention phase. During the in situ phase, three participants reached the passing criterion, one had only two opportunities to recycle and one did not reach the passing criterion. The behavior was not maintained consistently through the three follow-up probes. The demographics (see Table 1) in this group indicate at-home recycling practices ranged from never to always, socio-economic status ranged from lower-middle to middle class, and family education ranged from high school to post-graduate. Pre-quiz scores ranged from 5 to 8, and of the post-quizzes taken, scores range from 6 to 9. The following are individual results for the participants at Site A.

Anna, a five-year-old female, had six opportunities during baseline, and scored a "1" on each of them (see Figure 4); she had six opportunities during the video intervention phase and scored a "3" on the third and fifth opportunities and a "1" on the others. During the in situ phase, she had five opportunities and scored a "3" on the second, third, and fifth opportunities, and "1" on the first and fourth. At the two-week follow-up, Anna scored "3," but on each of the four- and eight-week follow-ups she scored "1." Results from the "Family Questionnaire" indicate Anna's family sometimes recycled bottles and cans, rarely recycled paper, and never recycled non-bottle plastics at home. Her family considered themselves middle class and the highest level of education of any adult in the household was college. Her score on the recycling pre-quiz (before any interventions) was 5; her score on the post-quiz (after video but before in situ) was 6.

Donovan, a five-year-old male, had four opportunities to recycle during baseline and scored "1" on each of them (see Figure 5). He had eleven opportunities during the video intervention phase and scored a "3" on the third opportunity but a "1" on each of the others. During the in situ phase, Donovan had only two opportunities to recycling; on

the first, he scored “1” and on the second, he scored “3.” He had no opportunities during the follow-up probes. Results from the “Family Questionnaire” indicate Donovan’s family sometimes recycled bottles, rarely recycled cans and paper, but often recycled non-bottle plastics at home. His family members considered themselves lower-middle class and the highest level of education of any adult in the household was high school. Donovan scored a 5 on the pre-quiz and was not present when the post-quiz was administered.

Lance, a five-and-a-half-year-old boy, had three opportunities to recycle during baseline; he scored a “0,” “1” and “1,” respectively (see Figure 6). During the video intervention phase, he had 12 opportunities to recycle; he scored a “3” on the third and eighth opportunities and “1s” on all others. During the in situ phase he had four opportunities on which he scored a “1” and three “3s,” respectively. On the two- and four-week follow-up probes, Lance scored “1s;” he did not have an opportunity to recycle during the eight-week probe. Results from the “Family Questionnaire” indicate Lance’s family never recycled any items at home. They considered themselves middle class and the highest level of education of any adult in the household was college. Lance scored an 8 on the pre-quiz and was not present when the post-quiz was administered.

Craig, a five-and-a-half-year-old boy, had eleven opportunities to recycle during baseline and scored a “1” on each of them (see Figure 7). During the video intervention phase, he had 12 opportunities and scored a “1” on the first ten, a “3” on the eleventh, and a “1” on the twelfth. During the in situ phase he had three opportunities on which he scored a “1” and three “3s” respectively. Craig had an opportunity to recycle on only the eight-week follow-up probe and scored a “3.” According to the “Family Questionnaire,”

Craig's family often recycled bottles and cans, never recycled paper, and often recycled non-bottle plastics. His family members considered themselves middle class and the highest level of education in the home was post-graduate. Craig scored a 7 on the pre-quiz and was not present when the post-quiz was administered.

Eugene, a six-year-old boy, had eight opportunities to recycle during baseline and scored a "1" on each of them (see Figure 8). During the video intervention phase, he had 15 opportunities and scored a "3" on the tenth, 12th and 13th opportunities and a "1" on every other opportunity. He had six opportunities to recycle during the in situ phase and scored a "3" on the first two and last three, and a "1" on the third. On the two- and four-week follow-up probes, Eugene scored "1s." He did not have an opportunity to recycle during the eight-week probe. According to the "Family Questionnaire," Eugene's family rarely recycled bottles and cans, sometimes recycled paper, and never recycled non-bottle plastics. His family members considered themselves middle class, and the highest level of education in the home was college. Eugene scored a 6 on the pre-quiz and a 9 on the post-quiz.

Davey, a six-year-old boy, had ten opportunities to recycle during baseline and scored a "1" on each of them (see Figure 9). He had 12 opportunities to recycle during the video intervention phase and scored a "1" on the first eleven. He scored a "3" on the 12th opportunity, directly after which he stopped attending the preschool. According to the "Family Questionnaire," Davey's family often recycled bottles and cans, rarely recycled paper, and often recycled non-bottle plastics. His family members considered themselves middle class and the highest level of education in the home was college.

Site B

Two participants remained in Site B throughout all phases. Only the first opportunities to recycle per observation session are graphed as the second and third opportunities occurred rarely. One of the participants was a three-and-a-half year old girl and the other was a four-year old boy. Neither participant scored higher than a "1" on any recycling opportunity during baseline or any of the video phases; both scored "3s" during the in situ phase but scored "1s" on the follow-up probes. Recycling practices of the participants' family members ranged from always to never. Both families reported they were middle class and the highest level of education was college (see Table 1). The following are individual results for participants consistently in Site B.

Aimee, a three-and-a-half-year old girl, had 16 opportunities to recycle during baseline; she scored a "0" on the second and eleventh opportunities and a "1" on all others (see Figure 10). Aimee had seven opportunities to recycle during the instruction video intervention and scored a "1" on each of them; she had three opportunities during the information phase and scored a "1" on each of them. Aimee only had one opportunity to recycle during the modeling phase and scored a "1." She did not have any opportunities to recycle during the modeling-plus-feedback phase. During the in situ phase she scored a "3" on both opportunities she had to recycle. On each of the two-week and eight-week follow-up probes, she scored a "1." According to the "Family Questionnaire," Aimee's family always recycled bottles, sometimes recycled cans, rarely recycled paper, and sometimes recycled non-bottle plastics. Her family members considered themselves middle class and the highest level of education in the home was college. Aimee scored a 0 on the pre-quiz and 4 on the post-quiz.

Mason, a four-year-old boy, had seven opportunities to recycle during baseline and scored a "1" on each of them (see Figure 11). He had two opportunities to recycle during the instructions video phase on which he scored "1s;" he had one opportunity during each of the information and modeling phases on which he scored "1s." Mason had five opportunities to recycle during the modeling-plus-feedback phase and scored a "1" on each of them. On the first of the two opportunities to recycle during the in situ phase, he scored a "1" and on the second he scored a "3." He scored "1s" on each of the two-week and four-week follow-up probes and did not have an opportunity to recycle on the eight-week probe. According to the "Family Questionnaire," Mason's family rarely recycled bottles and cans, sometimes recycled paper, and never recycled non-bottle plastics. His family members considered themselves middle class, and the highest level of education in the home was college. Mason scored a 0 on the pre-quiz and an 8 on the post-quiz.

Results for the two participants who were primarily in Site B but occasionally in Site A are shown in Figures 12 and 13. Only the first opportunities to recycle per observation session are graphed as the second and third opportunities occurred rarely. Azelia, a four-year-old girl, had three opportunities to recycle during baseline and scored "1" on each of them (Figure 12). She had no opportunities during either instructions or information phases and only one, on which she scored a "1," during the modeling phase. During the modeling-plus-feedback phase, she had six opportunities to recycle before she was moved to Site A; she scored "1s" on the first three, "3s" on the next two, and "1" on her last opportunity. When she moved, Site A was in the in situ phase. Azelia had two opportunities to recycle and scored "3" on each of them. At the two-week follow-up

probe she scored a “3,” and on the eight-week probe she scored a “1.” She had no opportunity during the four-week probe. According the “Family Questionnaire,” Azelia’s family sometimes recycled bottles and cans, rarely recycled paper, and never recycled non-bottle plastics. Her family members considered themselves middle-class and the highest level of education in the home was college. Azelia was not present during either administration of the quiz (see Table 1).

Victoria, a four-and-a-half year old girl, had nine opportunities to recycle during baseline and scored a “1” on each of them (see Figure 13). At that point, she was moved to Site A for one modeling-plus-feedback session, back to Site B for one instructions session, and back to Site A for one modeling-plus-feedback session; during each of these, she scored a “1” on her recycling opportunities. She was then moved back to Site B for the remainder of Site B’s instructions sessions during which she had four opportunities, on each of which she scored a “1.” She remained in Site B for its first information session, during which she scored a “1.” At that point she was moved back to Site A for two modeling-plus-feedback sessions, during which she scored “1s.” She was then moved back to Site B for the remainder of Site B’s observation. Site B was in the modeling video phase for four sessions but Victoria had no opportunities to recycle during that time. During the modeling-plus-feedback sessions in Site B, Victoria had four opportunities to recycle and scored “1” on each of them. In the in situ sessions, she had three opportunities and scored a “3” on each of them. She had opportunities to recycle during all three follow-up probes and scored “3,” “3,” and “1” respectively. According to the “Family Questionnaire,” Victoria’s family always recycled bottles and cans, sometimes recycled paper, and rarely recycled non-bottle plastics. They considered

themselves lower-middle class and the highest level of education in the home was college (see Table 1).

Site C

Results for participants in Site C are shown in Figures 15-23. Only the first opportunities to recycle per observation session are graphed as the second and third opportunities occurred rarely. There were five girls and four boys, ranging in age from four to five-and-a-half years. One boy stopped attending the preschool during the second video phase. During baseline, three participants scored a "2" or higher on at least one opportunity but no participant reached passing criterion. During the first video intervention phase, information, four participants scored a "2" or higher but no participant reached the passing criterion. During the second video phase, modeling-plus-feedback, five participants scored a "2" or higher on at least one opportunity but no one reached the passing criterion. During the third video phase, modeling, two participants scored a "2" or higher on at least one opportunity but no one reached the passing criterion. During the last video phase, instructions, five participants scored a "2" or higher on at least one opportunity but no one reached the passing criterion. During the in situ phase, all participants who had recycling opportunities scored "3s," and all participants who had at least three opportunities reached the passing criterion. Follow-up probes have not yet been conducted. Demographics results show at-home recycling habits range from never to always, socio-economic status reports range from lower-middle to upper-middle class, and the education levels of family members range from high school to post-graduate. The pre-quiz scores ranged from 4 to 6, and post-quiz

scores ranged from 4 to 10 (see Table 1). The following are participants' individual results.

Darlow, a five-and-a-half year old boy, had 12 recycling opportunities to recycle during baseline (see Figure 14). He scored a "0" on seven of those opportunities, a "1" on four of them, and a "3" on the tenth opportunity. During the first video phase, information, he had five opportunities, scoring a "1" followed by four "0s." During the second video phase, modeling-plus-feedback, he had four recycling opportunities before he stopped attending the preschool; on those opportunities, he scored a "1," "2," "0," and "2." (Note: when Darlow scored a "3" during baseline, he put all of his disposable items in the recycling bin.) According to the "Family Questionnaire" results, Darlow's family never recycled bottles, cans, paper, or non-bottle plastics. Family members considered themselves middle class, and the highest level of education was college. Darlow scored a 4 on the pre-quiz and no longer attended the preschool when the post-quiz was administered.

Valerie, a four-and-a-half-year old girl, had four opportunities to recycle during baseline and scored a "0" followed by three "1s" (see Figure 15). During the information video phase she had three opportunities and scored a "1" on each of them. During the modeling-plus-feedback phase, she had seven opportunities, a "0" followed by six "1s." In the modeling phase, she had four opportunities, three "1s" followed by one "2." In the final video phase, instructions, she had four opportunities, a "1," "3," "1," and "1." Valerie had three opportunities to recycle during the in situ phase and scored a "3" on each of them. Valerie's family did not provide demographics information. She scored a 5 on the pre-quiz and a 6 on the post-quiz.

Bailey, a four-and-a-half-year-old girl, had four recycling opportunities during baseline and scored a “1,” “0,” “2,” and “1” (see Figure 16). During the information phase, Bailey had five opportunities to recycle and scored “0,” “3,” “0,” “1,” and “0.” During the modeling-plus-feedback phase, she had three opportunities, scoring “1,” “3,” and “1.” (Note: during this phase we had one instance of protocol break. A teacher was filling in and did not follow protocol. After Bailey scored a “3” on her second opportunity, the substitute teacher told her she made a good decision. The issue was addressed immediately with the teacher and she followed protocol for the rest of that day and the other two days she was in that classroom.) In each of the modeling and instructions phases Bailey had three opportunities and consistently scored “1s.” She had three more recycling opportunities during the in situ phase and scored a “3” on each of them. Bailey’s family members indicated they always recycle bottles and cans, never recycle paper, and always recycle non-bottle plastics. Family members considered themselves upper-middle class, and the highest education received was college. Bailey scored a 6 on the pre-quiz and a 4 on the post-quiz.

Paul, a five-year-old-male, had six recycling opportunities during baseline, scoring “2s” on the fourth and fifth opportunities and “1s” on all others (see Figure 17). During the information phase, he had five opportunities and scored “1,” “3,” “1,” “2,” and “1.” During the modeling-plus-feedback phase, his scores ranged from “0” to “2” in the following order: 2, 1, 0, 2, 2, 1, 1. (Note: when Paul scored a “2” on his first opportunity, he also threw non-recyclables in the recycle bin.) Paul had three opportunities during the modeling phase, scoring “1,” “3,” and “2.” During the instructions phase he had four opportunities, scoring a “3” then a “0” following by two

"1s." Paul only had two opportunities to recycling during the in situ phase but he scored a "3" on each of them. Paul's family reported that at home they always recycled bottles and cans, sometimes recycled paper, and always recycled non-bottle plastics. They considered themselves lower-middle class and the highest level of education was high school.

Ashley, a four-and-a-half-year old girl, had four recycling opportunities during baseline on which she scored a "1," and a "0," followed by two "1s" (see Figure 18). During the information phase, she had four opportunities, scoring two "1s" followed by two "2s." She only had one recycling opportunity during the modeling-plus-feedback phase and she scored "3." Ashley did not have any opportunities during the modeling phase, but she had three during the instructions phase, scoring two "3s" and a "1." On her one opportunity during in situ sessions, Ashley scored a "3." Results from the "Family Questionnaire" indicate her family always recycled bottles, cans, paper, and non-bottle plastics. They reported being lower-middle class and having a high school education. Ashley scored a 6 on the pre-quiz and a 4 on the post-quiz.

Janelle, a four-and-a-half-year old girl, had four recycling opportunities during baseline, scoring a "1" on each of them (see Figure 19). She had nine opportunities during the information phase, scoring a "2" on the first and fifth opportunity, a "0" on the sixth, and "1s" on all others. During the modeling-plus-feedback phase she only had two opportunities on which she scored "1s." She had no opportunities during the modeling phase and one, a "1," during the instructions phase. She also had only one opportunity during the in situ phase, scoring a "3." Janelle's family did not provide demographics information. Janelle scored a 4 on the pre-quiz and a 5 on the post-quiz.

Sammy, a four-and-a-half-year old boy, had eight recycling opportunities during baseline, scoring a "1" on the second and third opportunities and "0s" on all others (see Figure 20). During the information phase, he had four opportunities, scoring "0" on each of them. He had eight opportunities during the modeling-plus-feedback phase, scoring a "0" on the first, third, fourth, and sixth opportunities, a "3" on the second, and a "1" on the fifth, seventh, and eighth opportunities. During the modeling phase, Sammy scored "1s" on all three opportunities. During the instructions phase, he scored "0," "3," "0," and "1" on his four opportunities. He reached passing criterion on the last three of his four opportunities in the in situ phase. Results of the "Family Questionnaire" show Sammy's family sometimes recycled bottles and cans, and rarely recycled paper or non-bottle plastics at home. Family members reported being middle-class and having post-graduate education. Sammy scored a 5 on the pre-quiz and a 10 on the post-quiz.

Tess, a four-and-a-half-year old girl, had six recycling opportunities during baseline, scoring a "1" on the first, second, third, and sixth opportunities and "0s" on the fourth and fifth (see Figure 21). During the information phase, she had three "0s." During the modeling-plus-feedback phase, Tess had five opportunities on which she scored "0," "1," two "2s," and "3." She had three opportunities during the modeling phase and scored a "1" on each of them. During the instructions phase, she scored "2," "1," and "3" on her three opportunities. In the in situ phase she scored three consecutive "3s." (Note: On Tess's two "3" scores prior to in situ, she recycled target items properly but also threw non-recyclables into the recycling bin at the same time.) Results of the "Family Questionnaire" show Tess's family sometimes recycled bottles and cans, and rarely recycled paper or non-bottle plastics at home. Family members reported being

middle-class and having post-graduate education. Tess scored a 5 on the pre-quiz and was absent when the post-quiz was administered.

Murphy, a four-year-old-boy, had only one opportunity to recycle throughout the entire study. The opportunity occurred during baseline, and he scored a "1" (see Figure 22). Results from the "Family Questionnaire" indict Murphy's family rarely recycled bottles at home and never recycled cans, paper, or non-bottle plastics. Family members reported being middle class; the highest level of education was post-graduate. Murphy got a 4 on the pre-quiz and was absent when the post-quiz was administered.

Investigators examined the average quiz scores by site and found that the average quiz score gain from pre-quiz to post-quiz for participants in Site A was 2, for Site B was 4.33 and for Site C was 0.6. Researchers also compared the pre-quiz score, post-quiz score, and quiz-score gain to the demographics information provided by parents. Using Pearson's Correlation Coefficient, of the 17 participants who took the pre-quiz, there was a strong positive correlation ($r=0.69$) between the participants' ages and their pre-quiz scores, for the ten participants who took the post-quiz there was a mild positive correlation ($r=0.42$) between their ages and their post-quiz scores, and for the same ten participants there was a weak negative correlation ($r=-0.25$) between their ages and the quiz score gains. For the 15 participants who took the pre-quiz and whose families provided demographic information, there was a no meaningful correlation ($r=-0.02$) between socio-economic status and pre-quiz scores. For the eight participants who took the post-quiz and whose parents provided demographic information, there was no meaningful correlation ($r=0.06$). For the same eight participants there was a weak

positive correlation (r=0.15) between their family's socio-economic status and the change in their quiz score gains.

Researchers also looked at quiz scores and family education. For the 15 participants who took the pre-quiz and whose families provided demographic information, there was no meaningful correlations (r=0.06). For the eight participants who took the post-quiz and whose families provided demographic information, there was a positive correlation (r=0.67). For those same eight participants there was a positive correlation (r=0.54) between family education and quiz score gains (see Table 2).

Researchers also compared occurrence of recycling behavior during baseline and video conditions and during the follow-up probes with exposure to recycling at home. "Recycling at home" was defined as any level of recycling above "rarely" ("sometimes," "often," or "always") of any item on the questionnaire. A weak negative correlation (r=-0.19) was found between exposure to recycling at home and recycling during baseline. And weak negative correlation (r=-0.18) was also found between exposure to recycling at home and recycling during video conditions. A mild positive correlation (r=0.29) was found between exposure to recycling at home and engagement in recycling during follow-up probes. This correlation may or may not be confirmed or furthered when follow-up probes are conducted with the participants in Site C (see Table 3).

In an effort to determine which of the video conditions was more effective, researchers collapsed the data of participants who were exposed to all video conditions and analyzed the scores by totaling each of the four categories of scores per video condition and dividing by total number of opportunities in that condition. In the information condition, 28.9% of opportunities resulted in a score of "0," 52.6% in a score

of “1,” 13.1% in a score of “2,” and 5.2% in a score of “3.” For the instructions condition, 8.3% of opportunities resulted in a score of “0,” 72.2% in a score of “1,” 2.7% in a score of “2,” 16.6% in a score of “3.” In the modeling condition, 0% of opportunities resulted in a score of “0,” 82.3% in a score of “1,” 11.7% in as score of “2,” and 5.8% in a score of “3.” For the modeling-plus-feedback phase, 13.2% of opportunities resulted in a score of “0,” 67.9% in a score of “1,” 9.4% in a score of “2,” and 9.4% in a score of “3” (see Table 4).

Interobserver agreement was calculated by dividing the total number of agreements by the total number of agreements plus disagreements then multiplying by 100. Interobserver agreement across all phases was 97.7%.

Discussion

Results suggest children ages three to six years are not affected in any consistent way by any of the behavioral components within the PSA-style videos we produced. The in situ condition was the only condition which produced consistent, accurate recycling behaviors. This is consistent with findings that in situ sessions affect behavior change (Miltenberger et al., 2005). Of the four video conditions, the instructions video produced the greatest percentage of “3” scores (16.7%), followed by modeling-plus-feedback (9.4%). This suggests that when the medium is video, instructions may be more effective than modeling-plus-feedback in changing preschool-aged children’s behaviors, and both are more effective than either information or modeling alone. This also suggests that implicit norms displayed via video may increase recycling behaviors above baseline levels, supporting Cialdini (2003), but they are not as effective as instructions or live feedback, supporting Neilsen et al. (2008).

The presence of occasional, proper recycling behavior during the instructions and modeling-plus-feedback phases suggests that viewing PSA-style videos, which contain either instructions or a model engaging in the target behavior and receiving social feedback about the behavior, in combination with some other variable or variables may be effective. Other variables which may affect participants' recycling behaviors include social interactions (with adults and/or peers), exposure to recycling in other environments (e.g., the home), the similarity of the participants' recyclable items to the exemplars in the PSA-style video(s), rule-governance and/or history of disposal of items, and the amount of time elapsed between exposure to the video and opportunity to recycle. Each of these conclusions suggests a possible avenue for future research.

That all participants who had opportunities to recycle during the in situ phase scored at least one "3" supports the conclusion that in-person social interactions (specifically, corrective feedback and positive social reinforcement) affect recycling preschool-aged children's recycling behaviors. However, other types of social interactions, recorded as antecedent/consequence data, could contribute to behavioral affects. For example, during Anna's third opportunity to recycle during the modeling-plus-feedback condition, Anna approached the bins, turned to her teacher and said, "Miss Deborah, can I recycle this?" to which the teacher responded in a monotone voice, "I don't know," and turned away from Anna. Anna then recycled properly (scored a "3"), turned to another adult and said, "I'm recycling today." No adult responded directly or indirectly to Anna's comment, or even looked at her when she spoke. This could have put the recycling behavior on extinction.

In another instance, on Lance's seventh opportunity to recycle after the beginning of the modeling-plus-feedback phase, the children at Lance's table noticed he had an opportunity to recycle and began chanting in unison, "Recycle it! Recycle it!" When Lance threw the recyclable item in the trash bin (score of "1"), the other children booed. Lance did not appear to be emotionally affected by or even notice the other children's behavior. In a third case (Donovan's third opportunity after the start of the video), Donovan and Eugene went together to the bins, sat on the floor in front of them, and discussed in which bin the item should be placed. They decided together that it belonged in the plastic/glass/aluminum bin and Donovan properly recycled it. That was Donovan's only "3" score (of eleven first-time opportunities) during the video phase and the only noted interaction with a peer associated with any recycling opportunity.

The mild positive correlation between the occurrence of recycling behaviors during follow-up probes and the reported practices of family recycling at home suggests children whose parents recycle at home may be more likely to maintain recycling behaviors in a school setting. That the only participants who engaged in recycling during follow-up probes also had families which recycled at home also supports this possible conclusion (see Table 5). However this is independent of the occurrence of recycling behaviors during the baseline condition or any of the video conditions, suggesting that in situ training in combination with at-home recycling practices could lead to more sustained recycling behaviors among preschoolers.

How closely the participant's item matches the exemplar items displayed in the videos may play a role in recycling behavior. On the eighteenth modeling-plus-feedback observation in Site A, Donovan had two opportunities to recycle. His first item was not

an exact-identity match to the items in the video and he scored a "1;" his second item was an exact-identity match to an item in the video and he scored a "3." He then saw a non-exact-identity match item which another participant had properly recycled, picked it out of the recycling bin and placed it in the trash bin. This suggests that if a participant's item exactly matches an item in the video, the participant may be more likely to recycle.

Rule-governance and history of behaving in a given setting may also play an influential role in preschool-aged children's recycling behaviors. Because the participants in Sites A and B had lunch clean-up protocols in place before the beginning of the study, they each had a history of throwing all of their disposable items in one bin. The narrow ranges of variability in responding during baseline conditions ("0" to "1") supports the notion that history of responding in that setting may have affected recycling behaviors. The participants in Site C, however, did not have a history of consistently disposing of their trash and/or recyclables in any set manner as they had no lunchtime protocol in place at the start of the study. The greater ranges of responding during baseline ("0" to "3") in Site C support this suggestion.

Rule-governance, or rule-governance in combination with history of responding, may also affect recycling behaviors. While we did not take data on teachers' behaviors, anecdotal reports describe teachers in Sites A and B, before and during the study, referring to "rules," general rules of the classroom as well as rules specific to lunchtime. Teachers in Site C rarely referred to rules of any kind prior to the unplanned interventions of table-moving and new lunchtime rules. Participants in Sites A and B rarely scored "0s" and never scored "2s;" participants in Site C often scored "0s" and "2s." This supports the possibility that behaviors of participants in Sites A and B were more rule-

governed than were those of students in Site C. That the average quiz score gain was much lower in Site C than it was in either sites A or B may also support this conclusion.

Duration between participants' exposure to the video and their opportunities to recycle may have played a role either independent of or in conjunction with rule-governance. The participants in Sites A and B watched the video, continued to watch other video for about ten minutes, then sat down to eat lunch, during which opportunities to recycle occurred. The participants in Site C sat down at their lunch tables, the video was played and then lunch was presented. That the PSA-style videos were the last video the Site C participants saw before any opportunity to recycle could explain the difference in responding between the participants in Sites A and B and those in Site C.

Limitations

There are a number of limitations to the present study which need addressing. Data collection procedures allowed for no measure of participants' level of attention to the videos. The method was unable to control for potential confounding effects of independent variables outside of the preschool settings (for example, parental influence and other sources of media/recycling exposure). There was one breach of protocol by a substitute teacher at Site C; the teacher gave Bailey in situ feedback for correct recycling during the modeling-plus-feedback phase. This, however, did not appear to affect Bailey's performance as she subsequently scored "1s" on all other opportunities during the video phases. Due to the grouping of students, researchers were occasionally forced to move on to the next condition before one or more participants had opportunities to recycle.

The data collectors were within sight of the participants and may have affected behavior, although effort was made to account for this through long baselines and requiring stable responding in baseline before intervention. Data collectors were at risk of biased behavior themselves because they knew when the participants had and had not been exposed to videos, however, only the investigator knew which videos contained which components. All of these issues could be controlled in future research by conducting studies in laboratory settings. The videos had only females in them which could affect who learns from them or who imitates them. This could be remedied with a casting call for actors.

Further limitations posed by conducting research in the natural setting are significant. Teachers in Sites A and B moved participants from one site to another, posing the risk of a participant imparting information about recycling learned in one site to the participants at the other site. Although in this case there is nothing in the data to suggest this occurred, we cannot say that it did not occur. Teachers in Site C moved furniture and changed classroom rules which pose potential confounds. Bailey's data set suggests the new classroom rules may have affected recycling behavior. Prior to the new rules, Bailey's scores ranged from "0" to "3" but once the rules were in place, she only scored "1s" during the video phases and only "3s" during the in situ phase. These data also suggest rule-governance may play a role in recycling behavior.

Data for several participants are missing which poses difficulty in conducting complete analyses. Two participants stopped attending the preschool before conclusion of data collection. An additional six participants went at least one entire video condition with no opportunity to recycle, and of the participants who have had follow-up

observation sessions, one had no opportunities to recycle during any of the three follow-up sessions. The nine participants in Site C have no follow-up data collected yet due to the extension of the modeling-plus-feedback condition (during which teachers moved tables and instituted new rules necessitating the experimental condition to remain unchanged for longer than planned) and extension of the in situ condition to accommodate weekdays when the site was closed. These limitations could be controlled for in laboratory settings.

Because of the critical timing of the pre- and post-quizzes, nine participants did not take one or both of them due to absences; and because providing demographic information was voluntary, two participants are missing information about any recycling behaviors they might be exposed to outside of the preschool. These two limitations could be prevented in future research by making participation contingent upon completion of quizzes and demographic information.

While conducting this research in the field poses serious threats to internal validity, external validity is an important component of lines of research. The advantage of this study lies in the setting. Examining the effects of these PSA-style videos in the natural classroom setting allows investigators to see the potential influences other variables could have on recycling behavior and what refined avenues of research may be most beneficial to pursue. Bringing participants into a laboratory, a novel setting, may facilitate behavior change in the laboratory but not transfer to the participants' daily classrooms, the natural settings. By conducting research in the field, the data collected point to variables that may affect behavior in that natural setting. Analyses of these data

point to possible future research which could examine more powerful independent variables.

Future Research

One potentially promising line of research suggested by the present study is an examination of rule-governance. Different repertoires of participants, rule-following versus no rule-following, may play a role in learning. That participants in Sites A and B scored "3s" but did not score any "2s" and seven participants in Site C scored a "2" on at least one opportunity suggests that a rule-following or instruction-following repertoire may be a prerequisite to learning correct recycling behavior after viewing recycling videos. Future research could use a measure of children's rule-following ability as an independent variable in a group design comparing the affects of PSA-style videos on children with strong rule-following skills to children with low rule-following skills.

Another variable to examine in future research is the time-lapse between presentation of video and opportunity to recycle. In this study the participants who viewed other-than-recycling video between exposure to the intervention videos and the opportunity to recycle did not engage in any incorrect attempts at recycling (score of "2"), while participants who saw no other video between viewing the intervention videos and the opportunity to recycling did engage in incorrect attempts at recycling. Future research could compare interval duration between exposure to video and opportunity to recycle, or it could keep the interval duration consistent but add other video between exposure to the video and opportunity to recycle.

In conclusion, because television and the internet are such broadly-accessed media, videos which are aired/accessed through these media could impact a huge number

of children in a brief period of time and with very little monetary investment. While retail companies market a product by aiming advertising at children and relying on children to get parents to buy the product, most “causes” which use PSAs do not have a product to offer, rather, they are promoting behavior changes without immediate pay-offs. These kinds of behavior change must be “sold” in a different way. The present study suggests videos which include instructions and/or modeling-plus-feedback in conjunction with other variables may affect recycling behaviors, however, in situ interactions (in-person feedback) are more effective in producing behavior change. Future research needs to be conducted in further investigate the effects of PSA-style videos on children’s recycling behaviors.

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Tables

Table 1.

Quiz Scores and Demographics

Participant			Quiz Scores			Recycling				Family	
Name/ Site	Sex	Age	Pre	Post	Gain	Bottles	Cans	Paper	N-B Plast.	SES	Fam. Ed.
Anna/A	F	5	5	6	1	Sometimes	Always	Never	Never	Lo-Mid	College
Donovan/A	M	5	5			Sometimes	Rarely	Rarely	Often	Lo-Mid	High Sch
Lance/A	M	5.5	8			Never	Never	Never	Never	Middle	College
Craig/A	M	5.5	7			Often	Often	Never	Often	Middle	Post-Grad
Eugene/A	M	6	6	9	3	Rarely	Rarely	Sometimes	Never	Middle	College
Davey/A	M	6				Often	Often	Rarely	Often	Middle	College
Aimee/B	F	3.5	0	4	4	Always	Sometimes	Rarely	Sometimes	Middle	College
Mason/B	M	4	0	8	8	Rarely	Rarely	Sometimes	Never	Middle	College
Azelia/B$_{then}$A	F	4				Sometimes	Sometimes	Rarely	Never	Middle	College
Victoria/B&A	F	4.5	5	6	1	Always	Always	Sometimes	Rarely	Lo-Mid	College
Darlow/C	M	5.5	4			Never	Never	Never	Never	Middle	College
Valerie/C	F	4.5	5	6	1						
Bailey/C	F	4.5	6	4	-2	Always	Always	Never	Always	Up-Mid	College
Paul/C	M	5	4			Always	Always	Sometimes	Always	Lo-Mid	High Sch
Ashley/C	F	4.5	6	4	-2	Always	Always	Always	Always	Lo-Mid	High Sch
Janelle/C	F	4.5	4	5	1						
Sammy/C	M	4.5	5	10	5	Sometimes	Sometimes	Rarely	Rarely	Middle	Post-Grad
Tess/C	F	4.5	5			Sometimes	Sometimes	Rarely	Rarely	Middle	Post-Grad
Murphy/C	M	4	4			Rarely	Never	Never	Never	Middle	Post-Grad

Table 2.

Quiz Score Correlations

	Age	SES	At-Home Recycling
Pre-Quiz	0.69	-0.02	0.06
Post-Quiz	0.42	0.06	0.67
Quiz Score Gain	-0.25	0.15	0.54

Table 3.

Recycling Behavior Correlations with At-Home Recycling

	At-Home Recycling
Recycling in Baseline	0.19
Recycling in Video Conditions	-0.18
Recycling in Follow-up	0.29

Table 4.

Percentage of Total Opportunities per Phase

	"0" Score	"1" Score	"2" Score	"3"Score
Information	28.9	52.6	13.2	5.2
Instructions	8.3	72.2	2.8	16.7
Modeling	0	82.4	11.8	5.8
Modeling+Feedback	13.2	67.9	9.4	9.4

Table 5.

Recycling behaviors, quiz score gains and at-home recycling

Participant			Recycling Behaviors				Quiz	Demographics
Name/Site	Sex	Age	In Baseline	In Video Phases	Number of "2s"	In Follow-up	Score Gain	At-Home Recycling
Anna/A	F	5	No	Yes	0	NO (0 of 2)	1	Yes
Donovan/A	M	5	No	Yes	0	Not measured	Not measured	Yes
Lance/A	M	5.5	No	Yes	0	NO (0 of 2)	Not measured	NO
Craig/A	M	5.5	No	Yes	0	1 of 1	Not measured	Yes
Eugene/A	M	6	No	Yes	0	NO (0 of 2)	3	Yes
Davey/A	M	6	No	Yes	0	Not measured	Not measured	Yes
Aimee/B	F	3.5	No	No	0	NO (0 of 2)	4	Yes
Mason/B	M	4	No	No	0	NO (0 of 2)	8	Yes
Azelia/B$_{then}$A	F	4	No	Yes	0	1 of 2	Not measured	Yes
Victoria/B&A	F	4.5	No	No	0	2 of 3	1	Yes
Darlow/C	M	5.5	Yes	Yes	2	Not yet measured	Not measured	NO
Valerie/C	F	4.5	No	Yes	1	Not yet measured	1	Not measured
Bailey/C	F	4.5	Yes	Yes	1	Not yet measured	-2	Yes
Paul/C	M	5	Yes	Yes	7	Not yet measured	Not measured	Yes
Ashley/C	F	4.5	No	Yes	2	Not yet measured	-2	Yes
Janelle/C	F	4.5	No	Yes	2	Not yet measured	1	Not measured
Sammy/C	M	4.5	No	Yes	0	Not yet measured	5	Yes
Tess/C	F	4.5	No	Yes	3	Not yet measured	Not measured	Yes
Murphy/C	M	4	No	No opp.	0	Not yet measured	Not measured	NO

Figures

Figure 1.

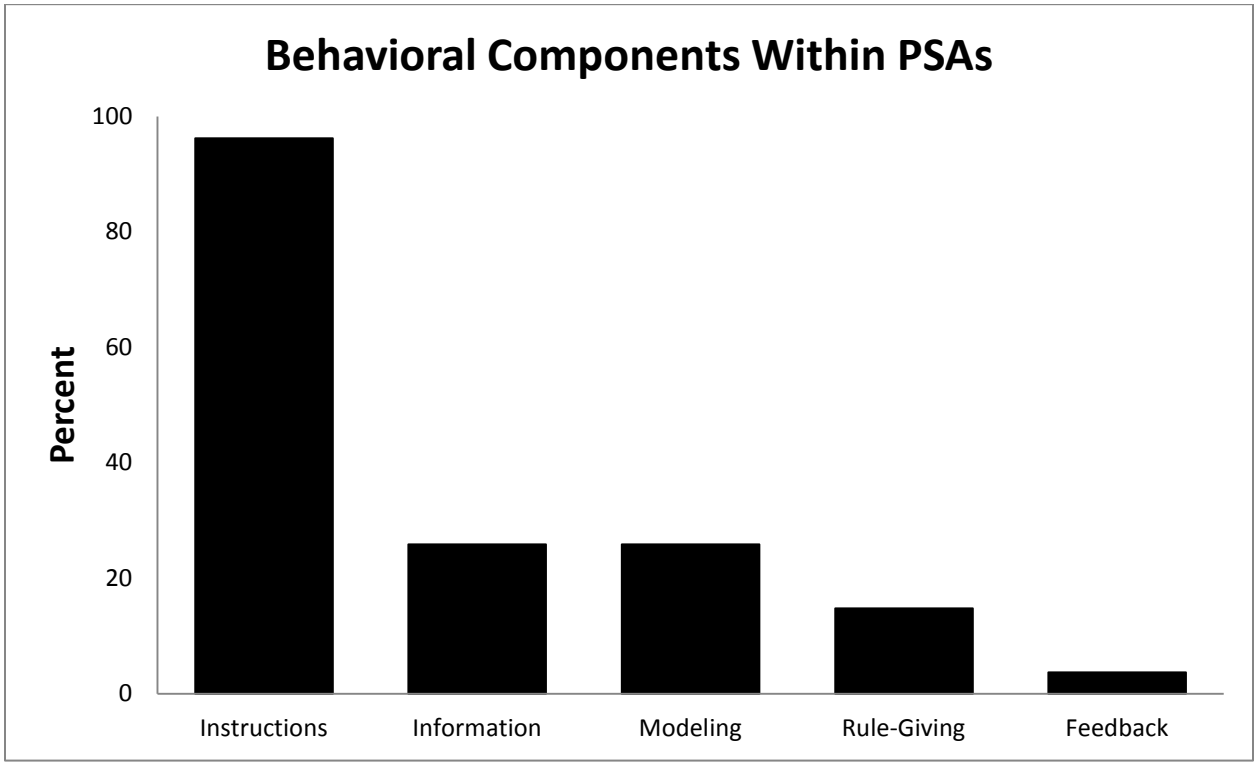


Figure 2.

Figure 3.

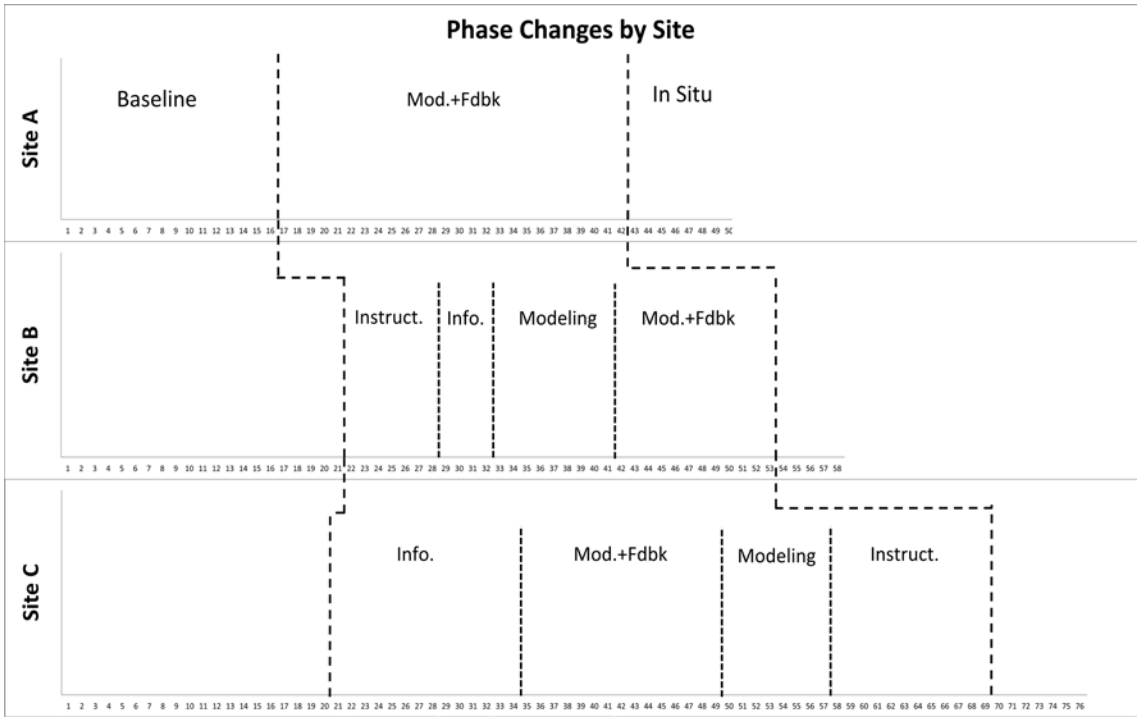
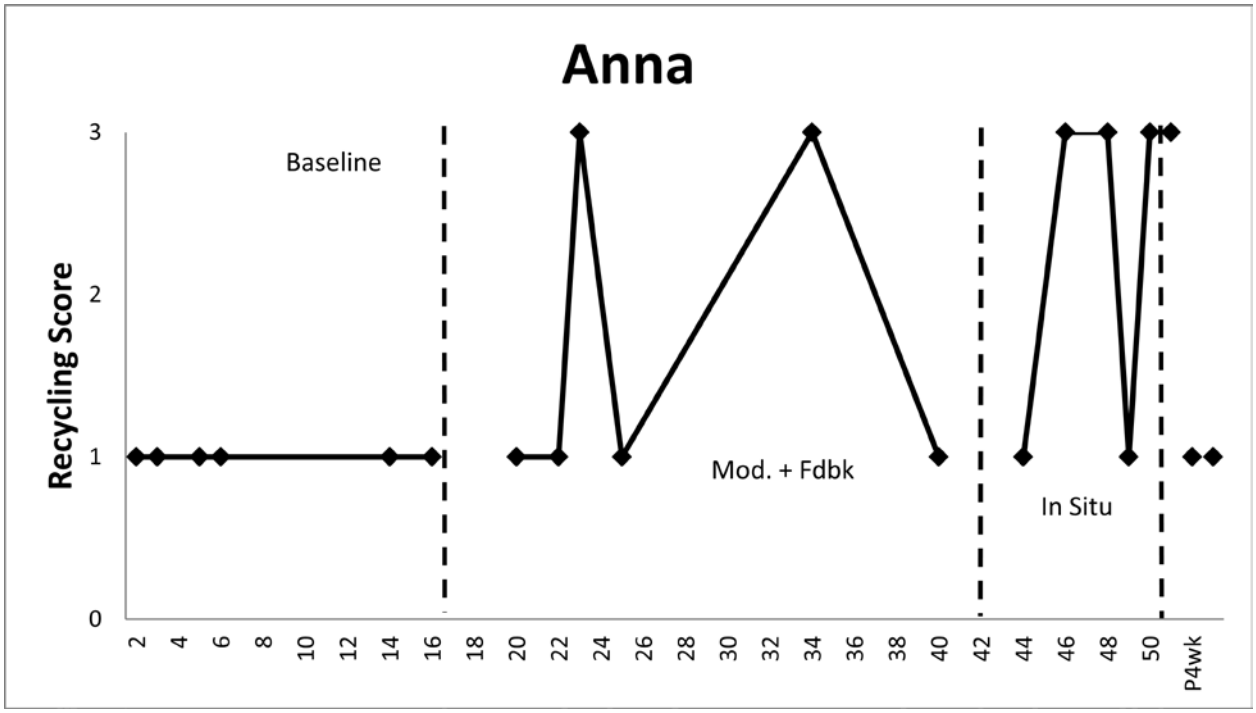

Phase Changes by Site
Site A
Baseline
Mod.+Fdbk
In Situ
Site B
Instruct.
Info.
Modeling
Mod.+Fdbk
Site C
Info.
Mod.+Fdbk
Modeling
Instruct.

Figure 4.



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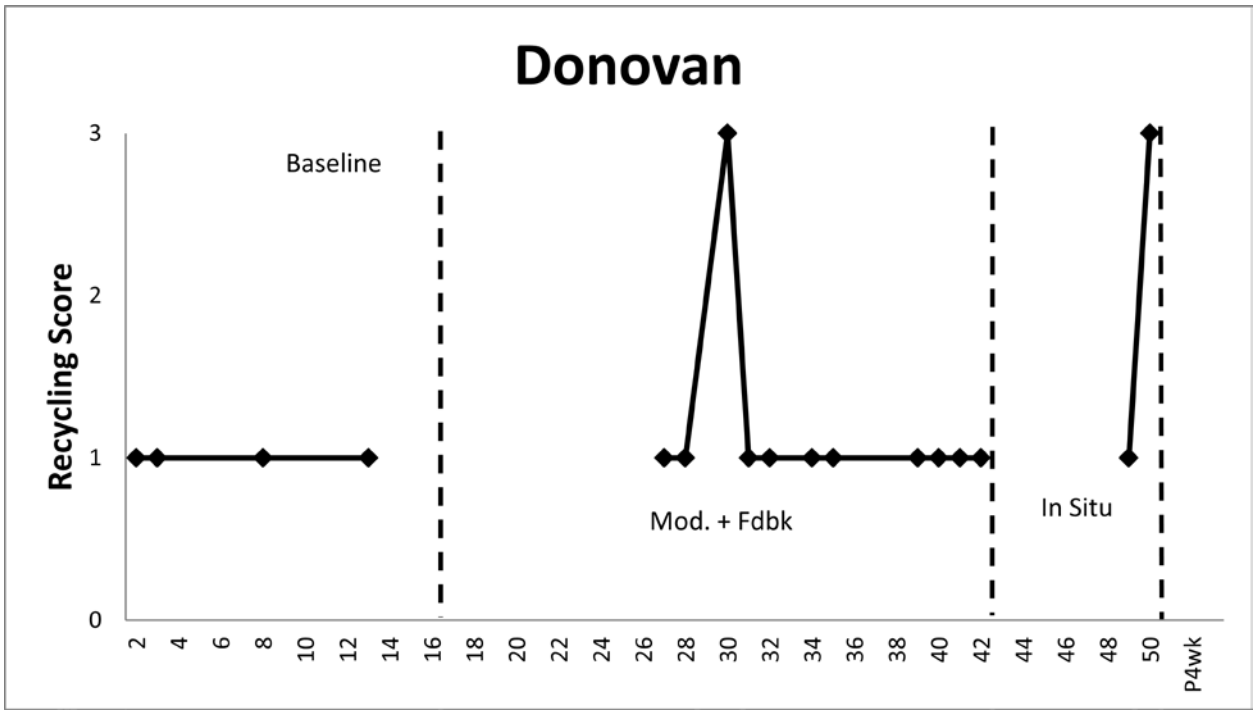

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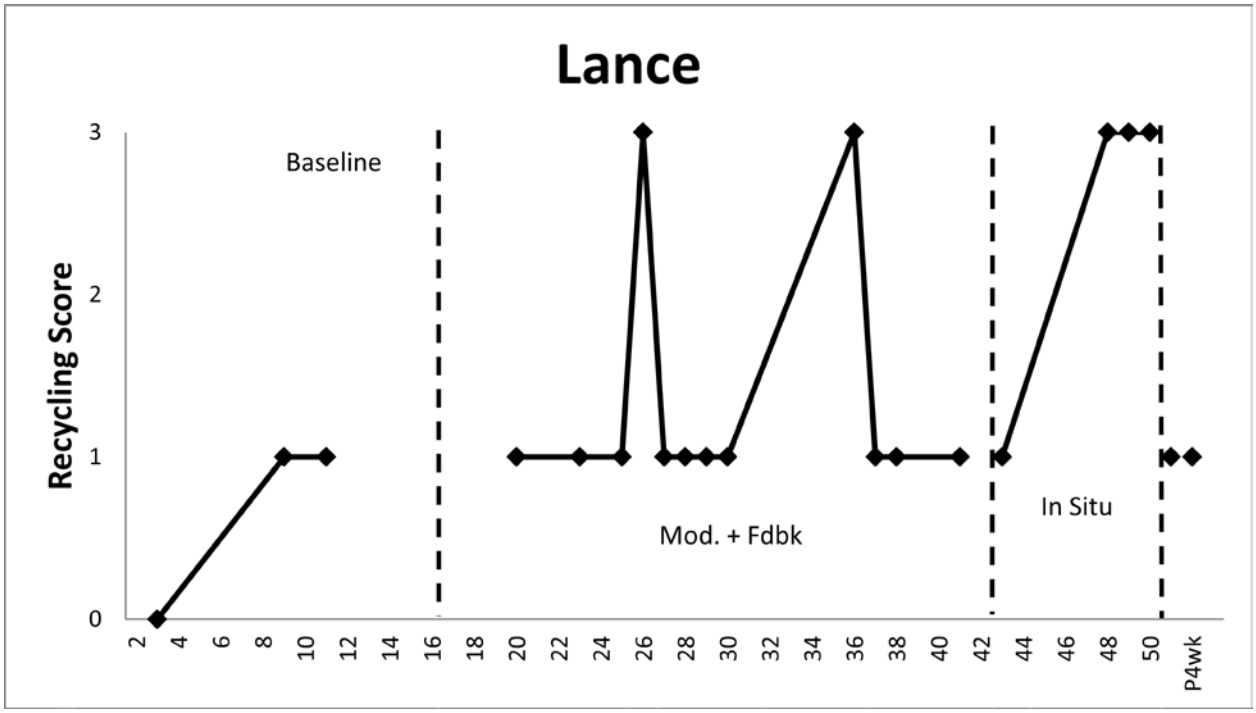

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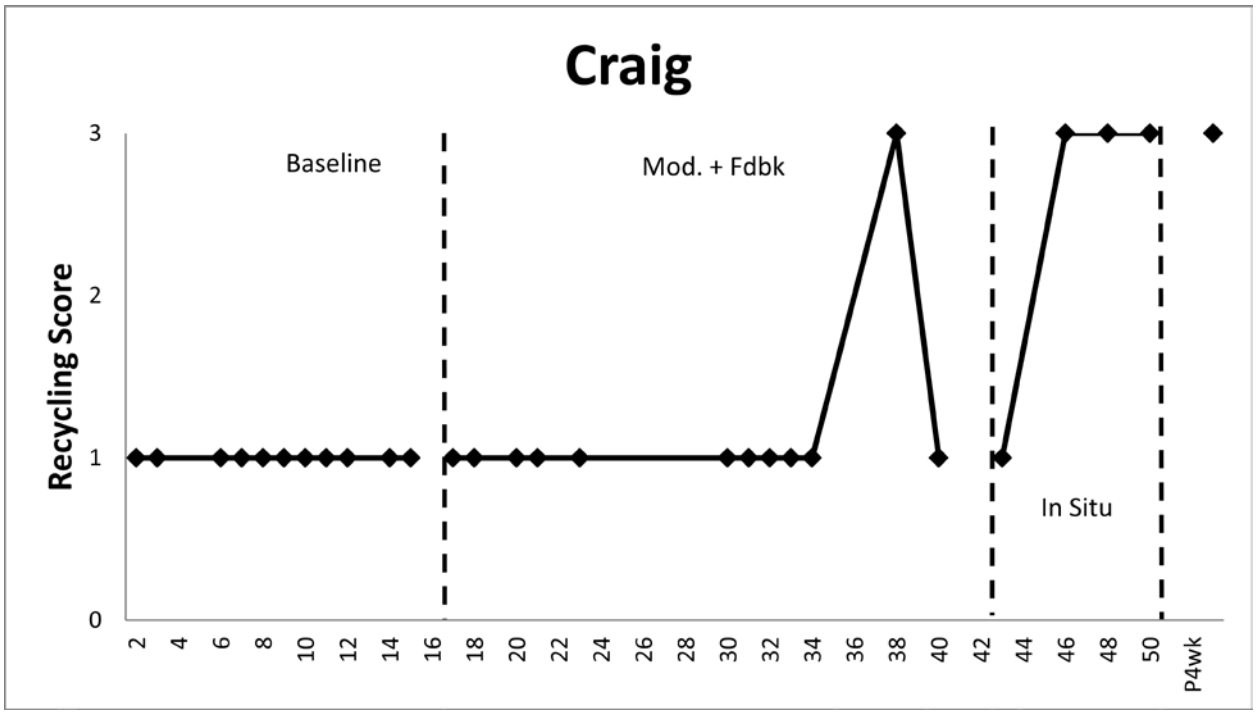

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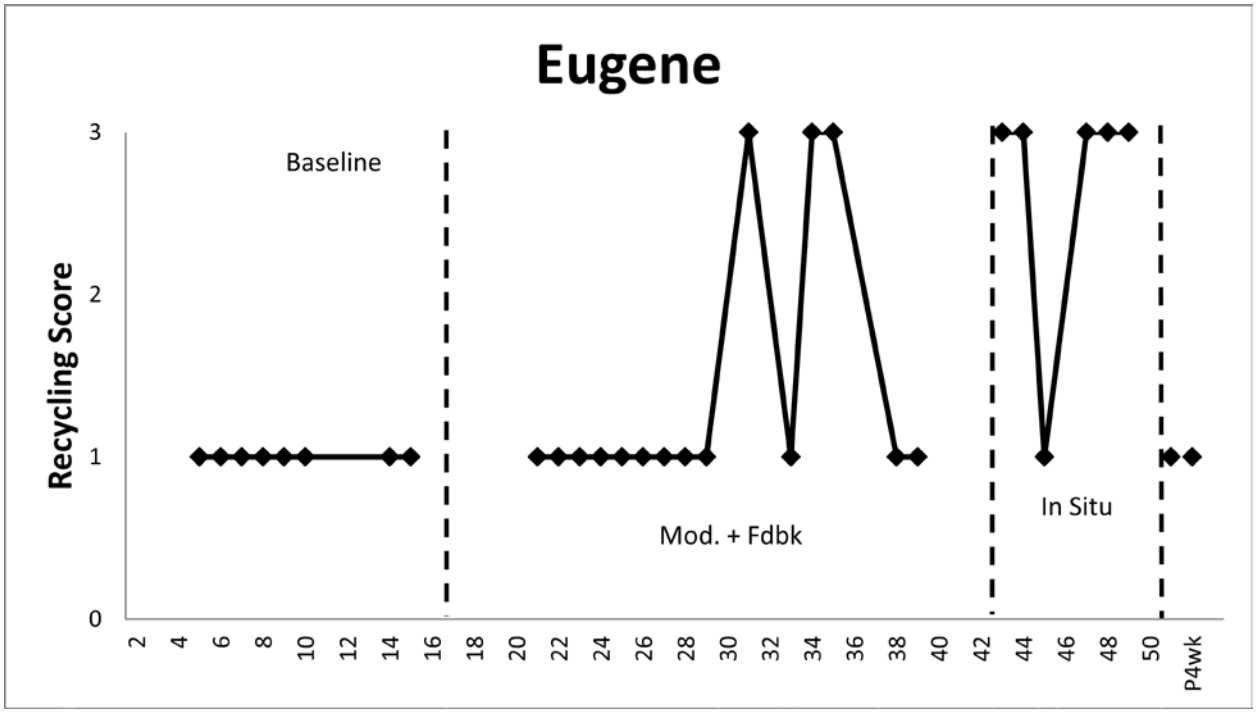

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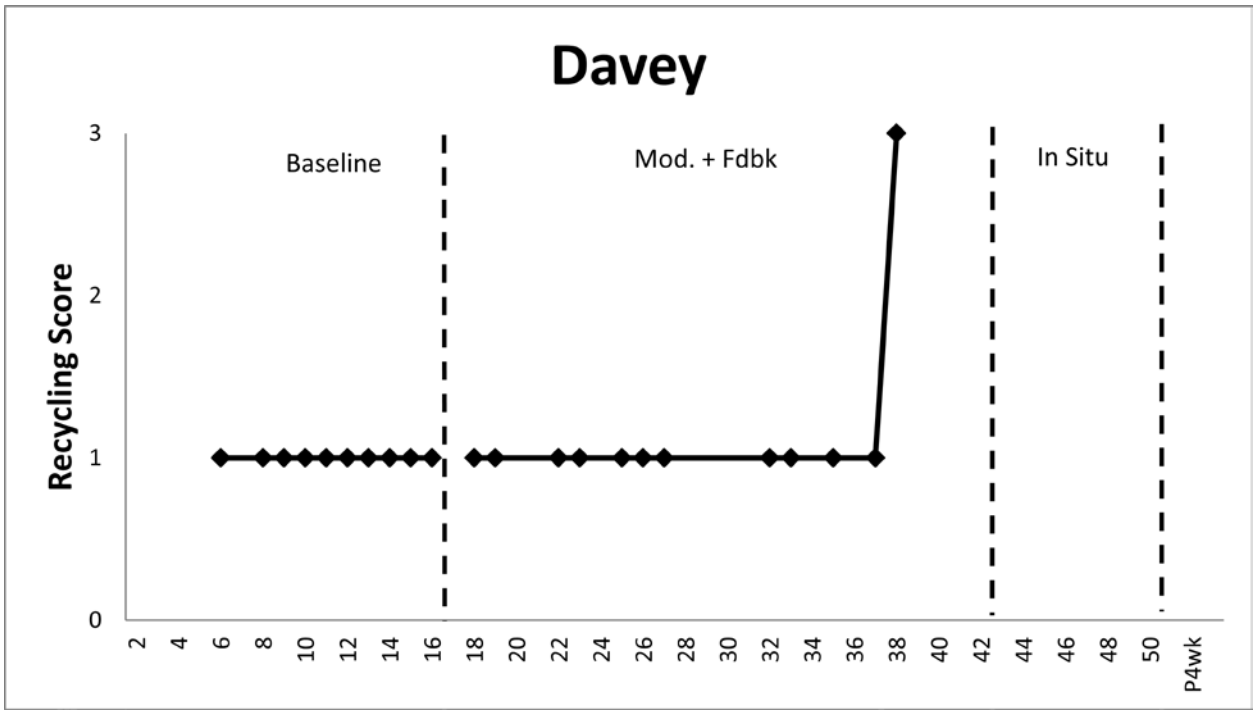

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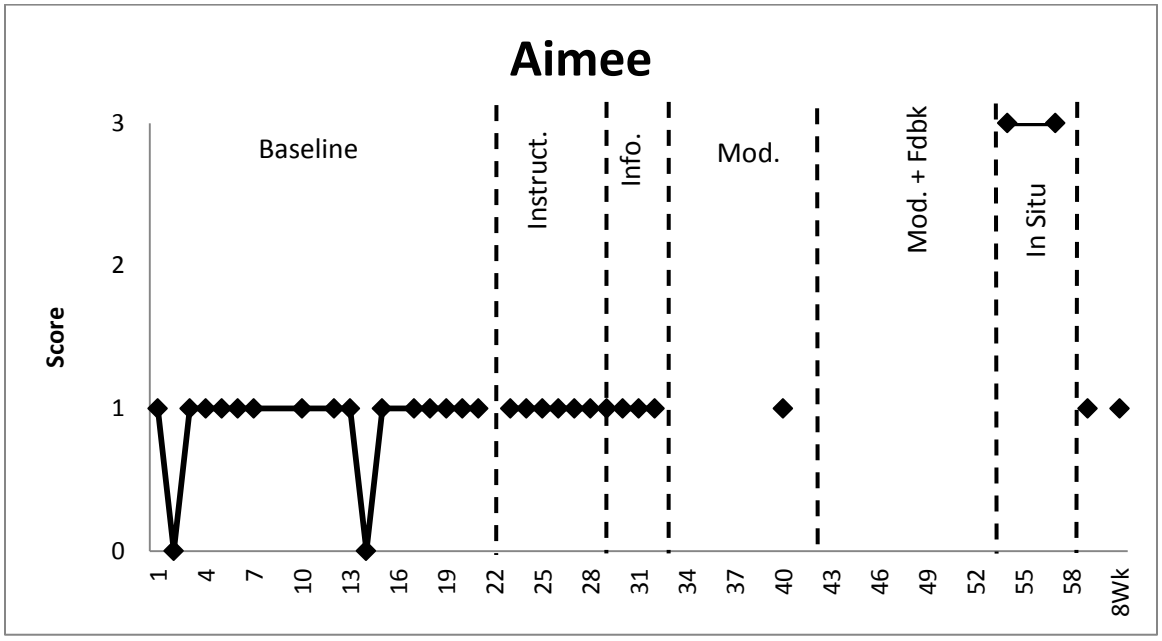

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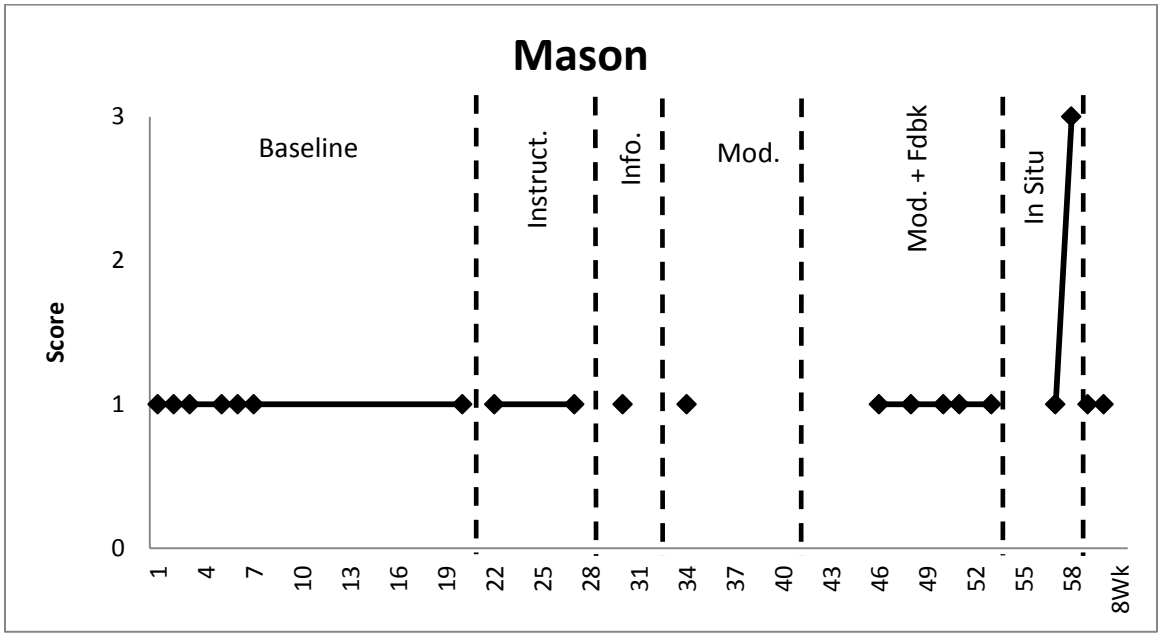

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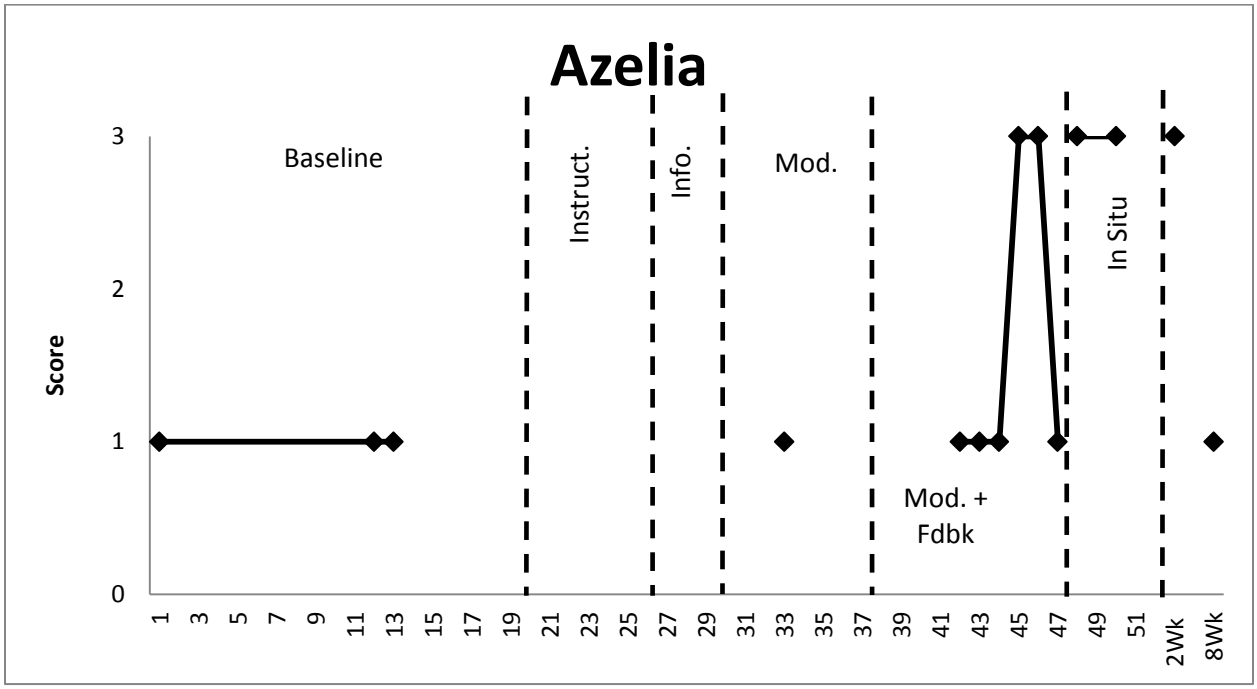

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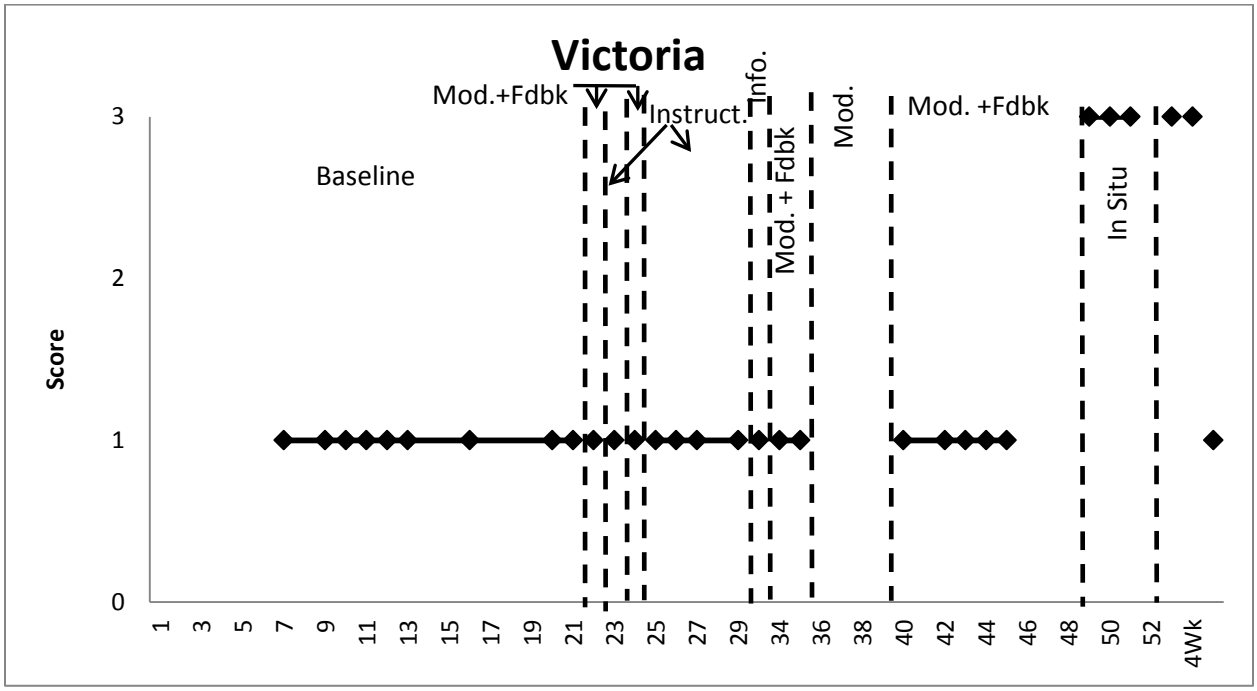

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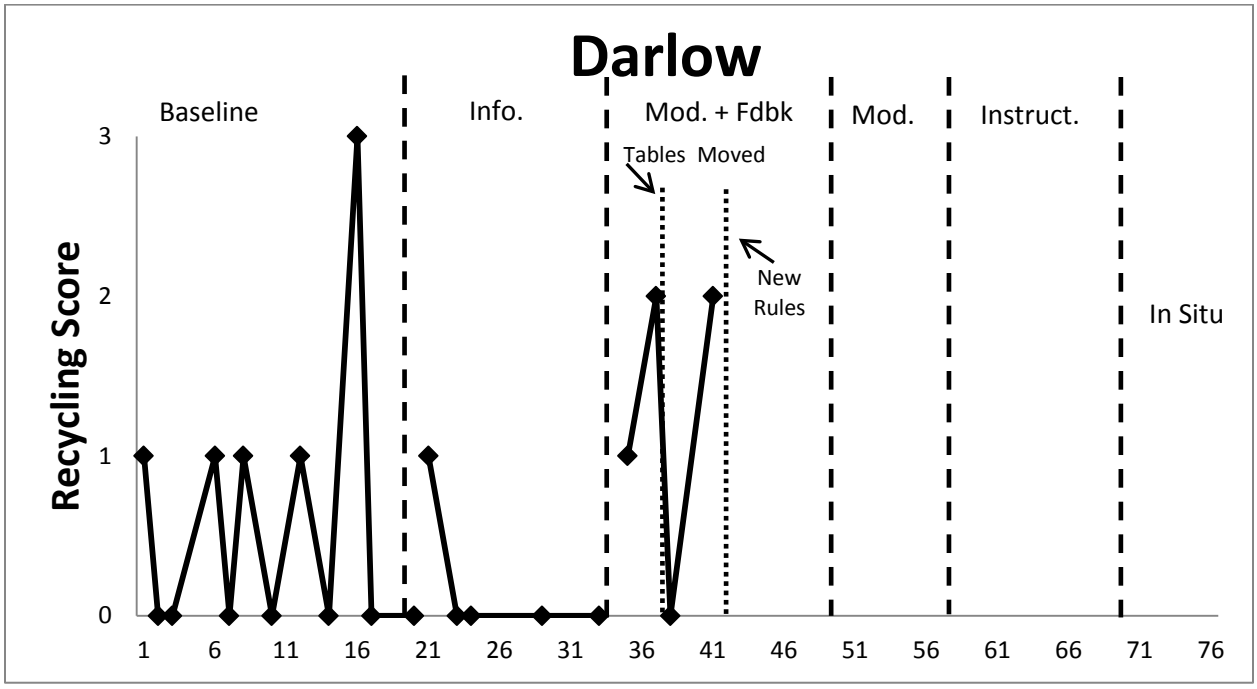

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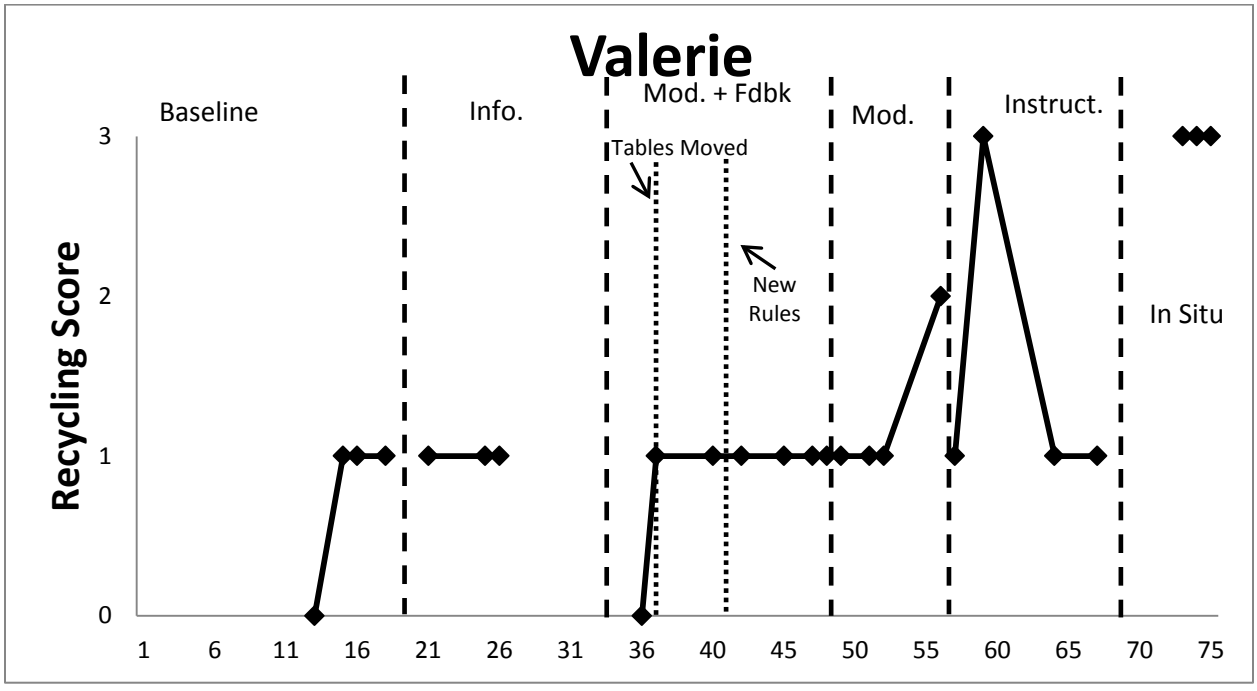

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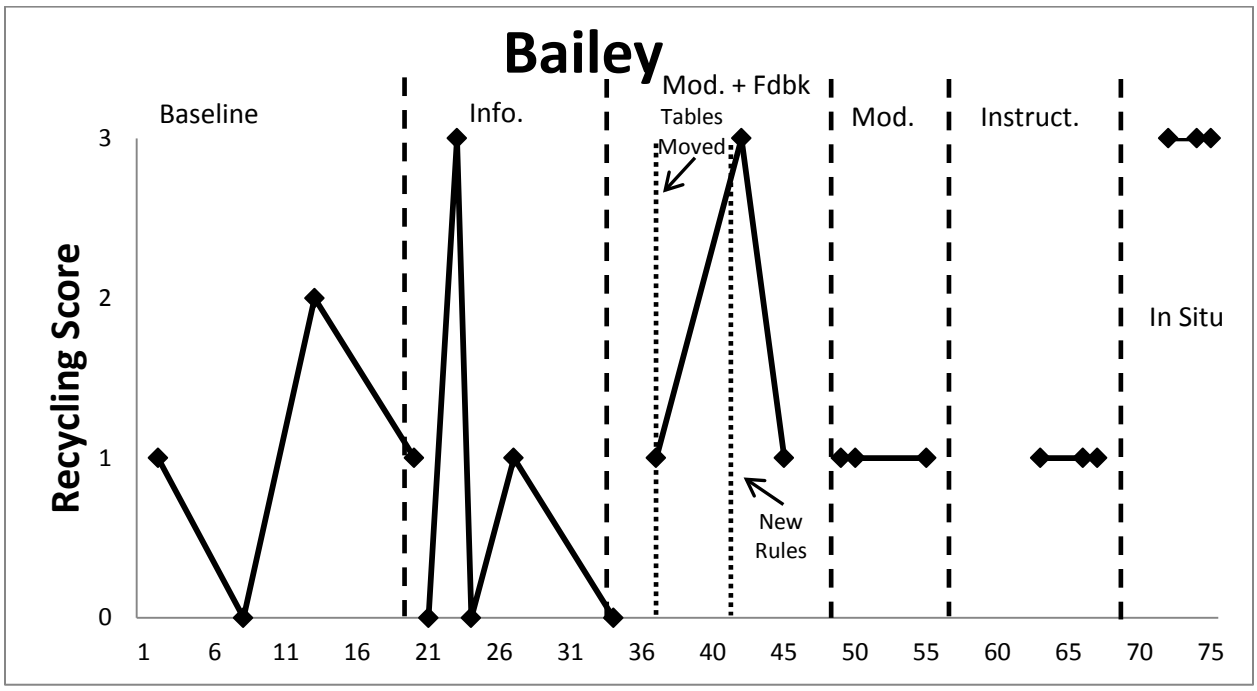

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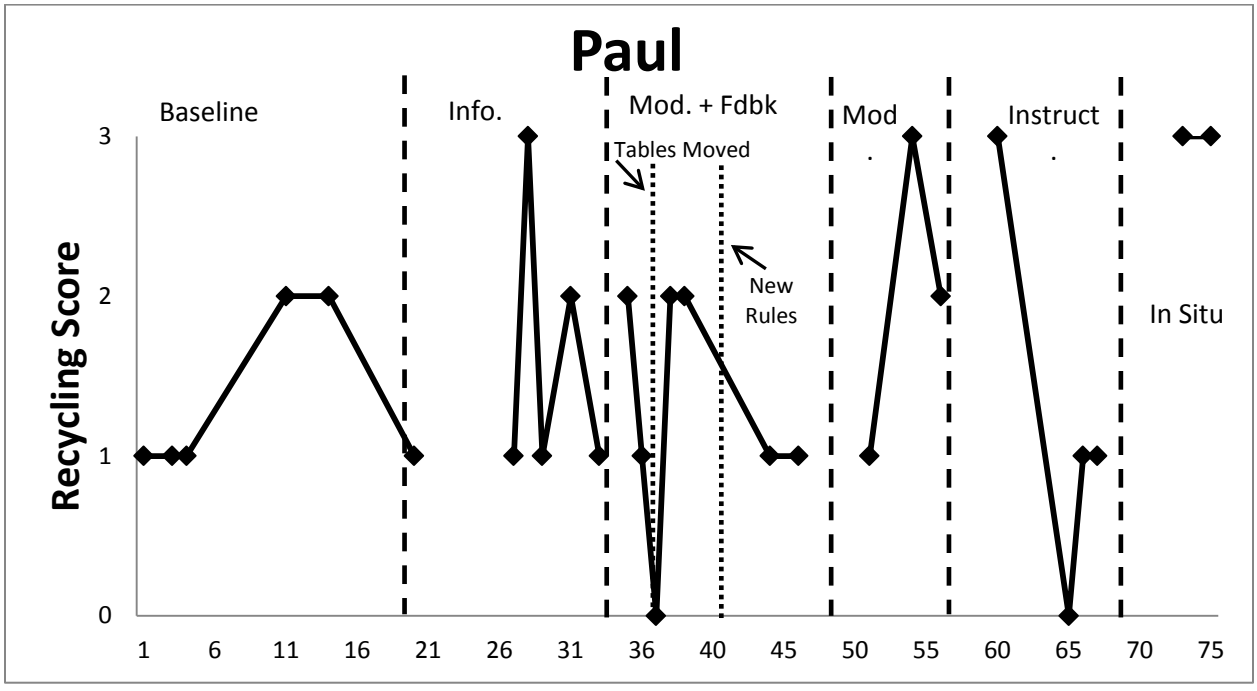

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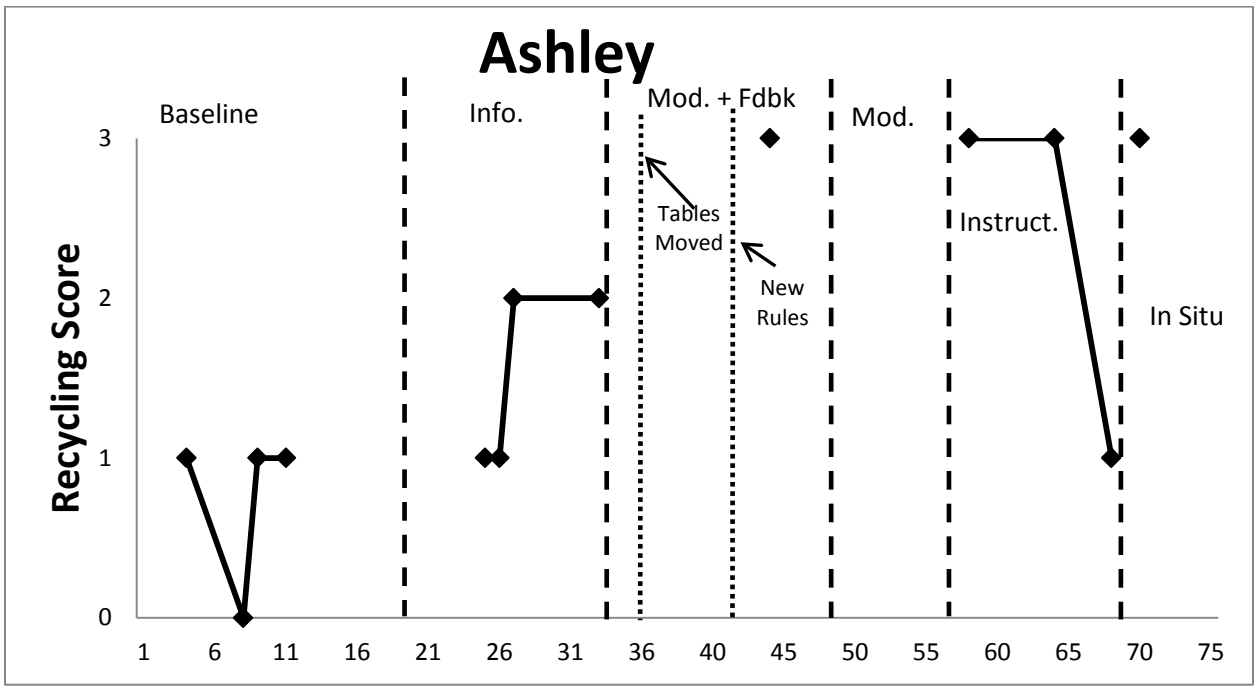

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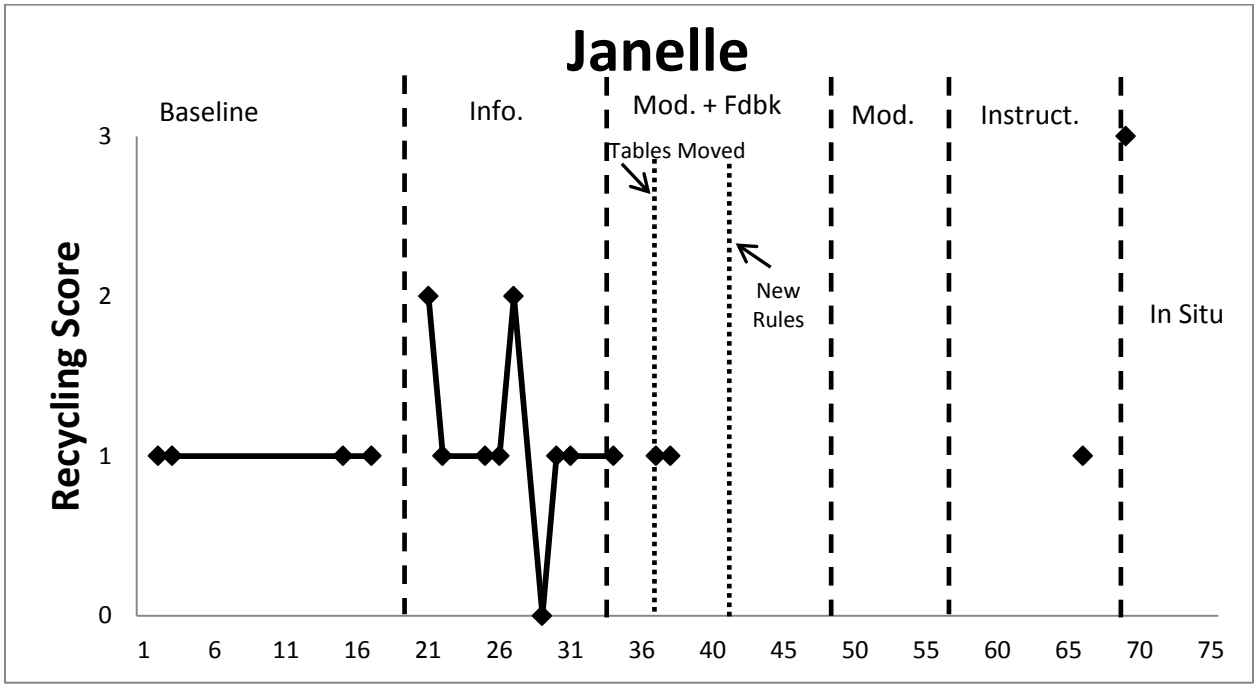

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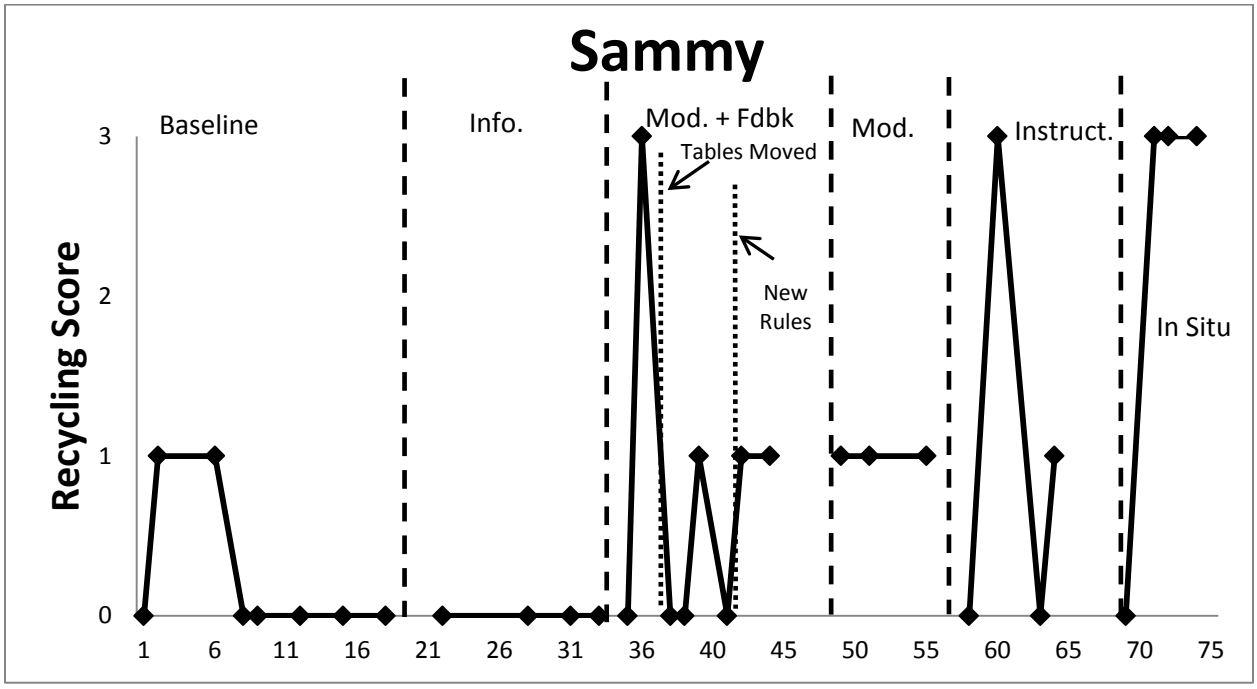

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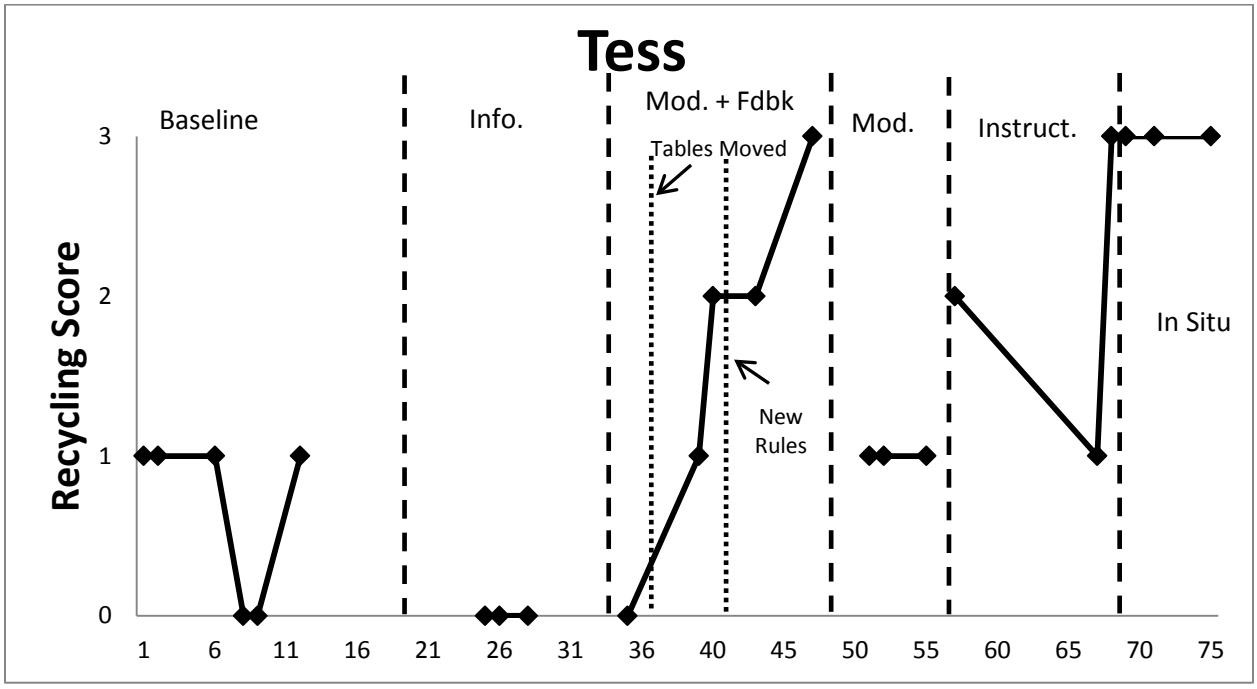

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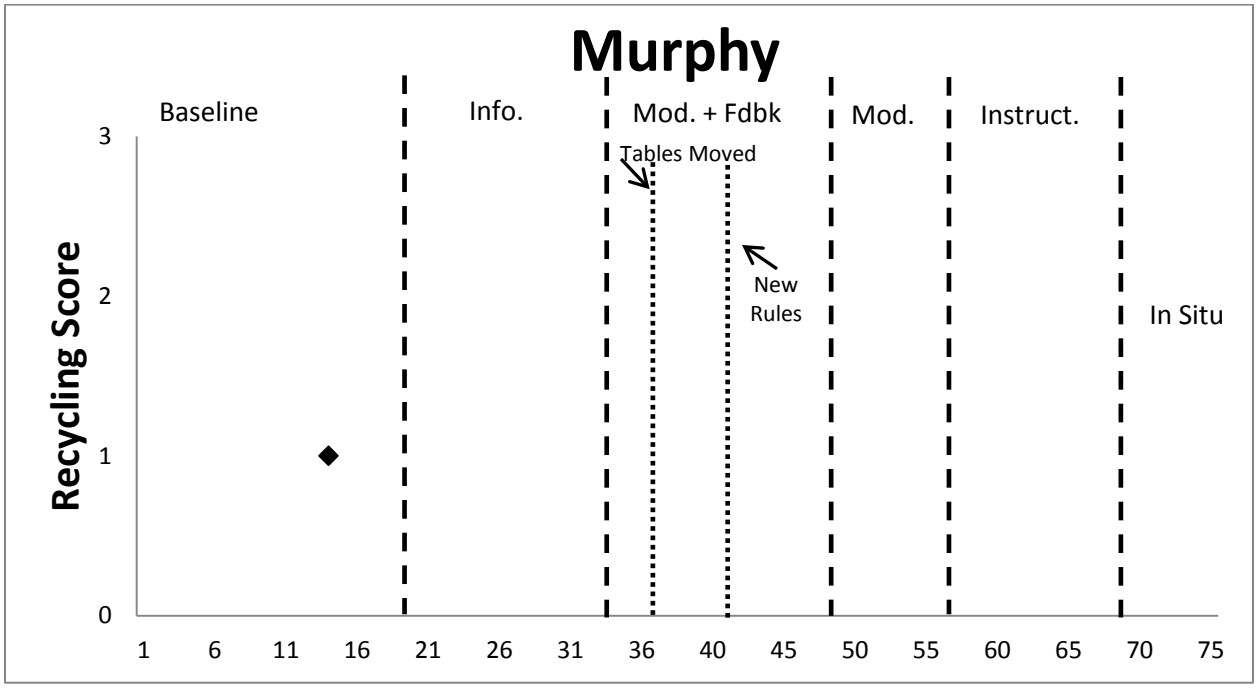

Murphy
Baseline
Info.
Mod. + Fdbk
Mod.
Instruct.
Tables Moved
New Rules
In Situ
Recycling Score
3
2
1
0
1
6
11
16
21
26
31
36
40
45
50
55
60
65
70
75

Appendix 1.

Score Key

0=did not dispose of recyclable
1=disposed recyclable in trash
2=disposed recyclable in wrong recycle bin
3=disposed recyclable in correct

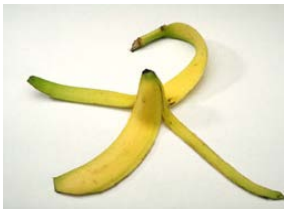
Data Sheet

Data Collector:		**Date:**		**Time:**	**Site:** A B C D E
Phase:		**Video Played?:** Y N		**Notes:**	
Participant Present/Absent	**Opportunity**	**Score**	**Antecedent**		**Consequence**
01 P A	Y N				
02 P A	Y N				
03 P A	Y N				
04 P A	Y N				
05 P A	Y N				
06 P A	Y N				
07 P A	Y N				
08 P A	Y N				
09 P A	Y N				
10 P A	Y N				
11 P A	Y N				
12 P A	Y N				

Appendix 2.

Recycling!!!

Which ones can you recycle? Circle each one you **can** recycle.



Circle the sign that means “recycle.”

Appendix 3.

Appendix A

Transcription of an online “New ENERGY STAR PSA Campaign” PSA.

Source: http://www.energystar.gov/index.cfm?c=promotions.pt_psa

Boy 1: “Global warming is a problem.”

Fade in Music

Animated ‘Whoville’ Monkey 1: “Sound the alarm!”

Animated ‘Whoville’ Monkey 2: “Aaaahhhh!”

Girl 1: “We think it’s an important thing to save energy.”

Girl 2: “To protect the environment.”

Girl 3: “To protect the future.”

Narrator over ‘Whoville’ animation: “Every Who in Whoville makes a difference.”

Who 1: “We need everyone!”

All Whos: “We are here! We are here!”

Boy 1: “Together…”

Mom: “Together…”

Girl 4: “Together…”

9 Children: “…we’re making all the difference.”

Narrator over family in home: “Save energy with EnergyStar and then you can be…”

Girl 1: “…part of the solution.”

Who 2: “Yeah!!!”

Narrator: “Go to energystar.gov/kids to see what else you can do.”

Music Hard Out

Appendix 4.

Information Script

Girls 1, 2, 3: “Recycling rocks!”

Girl 1: “You can recycle cans, water bottles, and sometimes these.”

Girl 2: “Recycling paper is awesome.”

Girls 1, 2, 3: “Recycling rocks!”

Girl 2: “You can recycle soda cans, plastic bottles, and glass.”

Girl 1: “Recycling paper is very awesome.”

Girl 3: “Recycling’s really easy…”

Girl 2: “…recycling saves the planet…”

Girl 1: “…recycling rocks!”

Appendix 5.

Instructions Script

Girl 1: “You should recycle soda cans, plastic bottles, and glass jars.”

Girl 2: “Just look for the recycling symbol.”

Girl 1: “If it has a recycling symbol on it, recycle it.”

Girl 2: “Bottles and cans go in their own bin.”

Girl 3: “You can recycle paper, too.”

Girl 1: “Paper goes in the in the paper bin.”

Girl 2: “Recycling keeps the sky blue…”

Girl 3: “…and the trees green…”

Girl 1: “…it keeps the planet healthy.”

Girl 3: “Recycling’s really easy…”

Girl 2: “…recycling saves the planet…”

Girl 1: “…recycling rocks!”

Appendix 6.

Modeling Script

Girl 3: “You can recycle paper…”

Girl 1: “…glass…”

Girl 2: “…bottles and cans.”

Girl 1: “You know how easy it is to recycle?”

Girl 3: “Yeah, you just put it in the bin.”

Girl 1: “Paper goes in the paper bin.”

Girl 2: “Bottles and cans go in their own bin.”

Girl 1: “If it has a recycling symbol on it, you can recycle it.”

Girl 3: “Recycling’s really easy.”

Girl 2: “Yeah, you just put it in here.”

Girls 1, 2, 3: “Recycling rocks!”

Appendix 7.

Modeling-Plus-Feedback Script

Girl 3: “You can recycle paper…”

Girl 1: “…glass…”

Girl 2: “…bottles and cans.”

Girl 2 (to Girl3): “Nice, you recycle.”

Girl 3: “Thanks.”

Girl 1: “If it has a recycling symbol on it, you can recycle it.”

Girl 1: “Paper goes in the paper bin.”

Girl 2: “Bottles and cans go in their own bin.”

Girl 3 (to Girl 1): “Hey, good job recycling.”

Girl 1: “Thank you.”

Girls 1, 2, 3: “Recycling rocks!”

Appendix 8.

Family Questionnaire

This questionnaire is voluntary. If you would like to provide information, please circle "yes" for question number one and answer questions 2-7. If you would like to decline to provide information, please circle "no" for question number one and return the questionnaire to the daycare center. Please circle the **one** option that best fits your answer.

1. **Would you like to provide the following information? (If yes, please answer questions 2-7 and return this questionnaire to the daycare/preschool site. If no, please do <u>not</u> answer questions 2-7 and return this questionnaire to the daycare/preschool site.)**

   Yes No

2. **Does your family recycle bottles?**

   Always Often Sometimes Rarely Never

3. **Does your family recycle cans?**

   Always Often Sometimes Rarely Never

4. **Does your family recycle paper?**

   Always Often Sometimes Rarely Never

5. **Does your family recycle non-bottle plastics?**

   Always Often Sometimes Rarely Never

6. **What socio-economic status do you consider your family?**

Lower Class Lower-Middle Class Middle Class Upper-Middle Class Upper Class

7. **What is the highest level of education any of the adults of the house completed?**

Elementary Middle/Junior High High School College Post-Graduate

Appendix 9.

Script for adults to follow should any student ask about recycling:

"I don't know."

shrug (no vocal answer)

"Later this year we're going to have a whole class about recycling. You can ask me that question again then."