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ORIGINAL ARTICLE

Effects of a Modified Power Card Strategy on Turn Taking and Social Commenting of Children with Autism Spectrum Disorder Playing Board Games

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Abstract Children with autism spectrum disorder (ASD) often have very narrow and special interests, and are less likely to engage in socially-based recreational activities than typically developing children. Few studies have examined strategies for teaching children with ASD to engage in social games with their peers. The Power Card strategy is a social narrative technique that capitalizes on a child's special interest to teach appropriate engagement in routines, social interaction, and communicative behaviors. In this study, a modified Power Card strategy was used to teach two boys with ASD appropriate turn taking and social commenting while playing board games. Participants' appropriate initiating a turn and relinquishing a turn increased with intervention; however, consistent increases in participants' appropriate commenting were not observed. Students and parents favorably rated the Power Card Strategy following intervention. Results are discussed in relation to limitations and future research.

Keywords Autism spectrum disorder · Social narratives · Power card strategy · Social stories · Social skills · Communication

Highly restricted, fixated interests that are abnormal in intensity are a core feature of autism spectrum disorder (ASD) (American Psychiatric Association 2013). Typically, such repetitive behaviors are treated with interventions to reduce their intensity and frequency (Boyd et al. 2012). Increasingly, researchers have sought to capitalize on children's special interests to teach social and communicative skills (Baker et al. 1998; Campbell and Tincani 2011; Keeling et al. 2003; Koegel et al. 2012a; Koegel et al. 2013). These strength-based strategies involve identifying the child's special interest and incorporating the interest into an individualized social-communicative intervention. For example, Koegel et al. (2012a, b) used lunch clubs based on students' special interests to increase social initiations and engagement of children with ASD and typically developing children. Similarly, Koegel et al. (2013) employed special interest-

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based lunch clubs to increase social interactions of high school students with ASD and their typically developing peers.

Problems with social initiations, such as appropriate social commenting and turn taking, are intrinsic deficits of ASD (American Psychiatric Association 2013; Chiang et al. 2008). These deficits lead to diminished opportunities for young children with ASD to acquire new social and communicative skills from the natural environment, which may further exacerbate ASD symptoms (Dawson 2008). Problems with social initiations also may limit children's interactions with their typically developing peers and act as a barrier to successful participation in inclusive settings (Koegel et al. 2012a, b). Interventions to increase social initiations are an essential component of comprehensive educational and behavioral programs for children and youth with ASD (Duffy and Healy 2011).

The Power Card Strategy is a strength-based intervention that uses a visual aid based on the child's special interest to increase appropriate social initiations and other prosocial behaviors (Gagnon 2001). Similar to other social narrative strategies, such as Social Stories™ (Gray 1994; Kokina and Kern 2010), Power Cards incorporate a written narrative that prescribes appropriate behavior in a situation that is problematic for the child. However, Power Cards include a special interest character or hero printed on one side of the card to provide motivation for the prescribed behavior. Power Cards have a shorter narration than Social Stories™ and are smaller in size, and therefore can be easily transported between locations. The social script on the Power Card is typically read to the child prior to the problematic social situation, and contains the following elements (Gagnon 2001) (pp. 19–22) : (a) a brief scenario written at the child's comprehension level that centers on the individual's hero or special interest and the behavior or situation that is troubling; (b) a brief scenario about the child's hero or model attempting a solution to a problem similar to the one experienced by the child, along with a rationale for why the hero or model should use a positive behavior; (c) a brief three- to five-step strategy outlining the problem-solving method used by the hero or model including a description of how the hero experiences success with this strategy; and (d) a note of encouragement for the child to try the new behavior (i.e., the one used by the hero or model that resulted in a positive outcome).

Several recent studies suggest that Power Cards are an effective tool in promoting prosocial behavior of students with ASD. Specifically, the Power Card strategy has been used to increase direction following of elementary-aged students with ASD (Campbell and Tincani 2011), to improve conversational skills of adolescents with Asperger's Syndrome (Davis et al. 2010), to increase minutes spent on the playground of an elementary-aged boy with autism (Spencer et al. 2008), as well as to decrease whining and screaming (Keeling et al. 2003) and latency between transitions (Angell et al. 2011) of elementary-aged students with autism and intellectual disability.

Collectively, results of these studies suggest several potential advantages of the Power Card strategy as a social narrative intervention. As mentioned, Power Cards typically have a short narrative and they are small in size, and therefore they can be transported more easily between locations than Social Stories™, which are printed on multiple pages (e.g., Chan et al. 2011). Second, because Power Cards are small and portable, they may be used as cues to occasion appropriate behavior while the child is engaged in an activity; in some cases, children may continue to rely on the card to cue appropriate behavior following initial intervention (Campbell and Tincani 2011). The

Power Card may be written ambiguously to make it easier for children to generalize target skills across settings, activities, and people, whereas Social Stories™ follow a prescribed format with a specific ratio of sentences. Lastly, the Power Card is small and can be used discretely so as not to draw unwanted attention to the student.

Research suggests that children with ASD are substantially less likely to participate in social and recreational activities than their typically developing peers (Solish et al. 2010). Although some studies have investigated techniques for teaching children with ASD to engage in solitary leisure activities, such as playing video games alone (Blum-Dimaya et al. 2010), few have examined strategies for teaching children to participate in social games, specifically. Keeling et al. (2003) examined use of the Power Card strategy to teach "sportsmanship" skills to a child with ASD during game play with others. Results suggest that the Power Card strategy was effective in decreasing the child's challenging behavior during game play. The current study is a systematic replication of Keeling et al. to examine efficacy of a modified Power Card strategy to teach turn taking to two elementary-aged students with ASD during board game play with others. Effects of the Power Card strategy on students' appropriate social commenting were also examined.

Method

Participants

The participants in the study were two elementary-aged students who were diagnosed with ASD. James, a 9-year-old African American male, was diagnosed with Pervasive Developmental Disorder—Not Otherwise Specified (PDD-NOS). The Kaufman Assessment Battery for Children, Second Edition (KABC II) was given to him in 2011, and he received an aggregate standard score of 59, which identified him in the lower extreme range of intellectual disability. Daniel was a 10-year-old African American male. In 2008, while receiving early intervention services, he was diagnosed with autism using the Childhood Autism Rating Scale (CARS), which identified his symptoms of autism in the moderate to severe range; a standard score for the CARS was not available at the time of the study. He also received special education services for speech-language impairment. Both students could speak in simple sentences and they were able to have two—three turn conversations with adults and peers. Prior to the study, informed consent for subjects to participate in the study was attained from their parents according to university and school district Institutional Review Board guidelines.

Setting

The setting of the study was a public school's 3rd—5th grade self-contained classroom for students with ASD in a large, metropolitan city in the northeast United States. The study was completed during the social skills block period from 2:00–2:30 pm. During the social skills block, students worked with each other and adults on activities to increase their appropriate social interactions through role-plays, strategic use of peer buddies, and game play. Prior to the social skills block, the students completed math

intervention groups with the teacher and, after participating in the social skills group, the students had snack time. The games were played at a table shaped like the letter U on the side of the room away from the other students. The students who participated in the study were seated across from each other in chairs with backs. The teacher sat behind the horseshoe table and the classroom assistant sat off to the side of one of the students. There were four other students in the room and one paraprofessional. The other students who were not participating in the study completed an independent activity in the front of the room during the game play. Each of the two students who participated in the study had a Power Card with him at the table during intervention.

Materials

The materials were three board games and the Power Cards. The games were Topple™, Operation™, and Honey Bee Tree™. These games were chosen because they required the students to perform a similar motion, the pincer grasp, to complete their turn; this response was already in each student's repertoire prior to the study. The students had not played any of the games prior to the study. For Topple™, the goal was to place pieces on top of a structure without knocking the structure over. For Operation™, the objective was to get the most number of pieces out of the game board with an operating tool similar to tweezers. For Honey Bee Tree™, the goal was to remove leaves without having bees fall out.

Power Cards Each student had one Power Card for each of the three games they played after the intervention had been introduced for that game. As described by Gagnon (2001), the Power Card strategy employs two material elements: a scenario that describes the child's special interest character or hero in a problematic situation attempting a solution to the problem, and the Power Card, which outlines a brief three- to five- step problem solving strategy for the situation. Given that the current study focused on three behaviors (i.e., appropriately initiating a turn, relinquishing a turn, and commenting) which would require lengthy and possibly confusing explanations within the scenarios, the Power Card strategy was simplified to omit the scenarios and to include only the brief three- to five-step problem solving strategy. The students' special interest character was printed on one side of the card, and instructions for playing each game, written from the character's point of view, were printed on the other side of the card (See Fig. 1). The special interest character printed on each student's cards, Ninja Turtles™, was determined by informational observation of the first author, their teacher, of their daily conversations, games played on the computer, and toys they brought into school, which prominently included Ninja Turtles™ characters. Each of the Ninja Turtle™ characters was different based upon the individual student's preference.

Operational Definitions of Target Behaviors

The three target behaviors measured were appropriately initiating a turn, appropriately relinquishing a turn, and appropriate commenting. Each of these behaviors was measured with event recording per turn taking opportunity, and then converted into a

A. Topple™
   1. Initiating
      Donatello says when the other player places all of their pieces on the pyramid then it is your turn to roll the dice.
   2. Relinquishing
      Donatello says once you place the number of Topple™ pieces on the pyramid that the dice say, tell your friend "your turn."
   3. Appropriate commenting
      Donatello tells his friends "You did it!" and "You won!"

B. Operation™
   1. Initiating
      Donatello says when the other player passes you the tweezers that means it is now your turn.
   2. Relinquishing
      Donatello says when you hear and feel the buzz from the tweezers touching the board or you get the bone out and place it in front of you then you give your friend the tweezers and say "your turn."
   3. Appropriate commenting
      Donatello tells his friends "You did it!" and "You dropped it!"

C. Honey Bees™
   1. Initiating
      Donatello says when the other player removes a leaf from the tree and sets it on the table then it is your turn!
   2. Relinquishing
      Donatello says once you play your leaf on the table tell your friend "your turn."
   3. Appropriate commenting
      Donatello tells his friends "You won!" and "You dropped it!"

Fig. 1 Instructions for appropriately initiating a turn, appropriately relinquishing a turn, and appropriately commenting, printed on the Power Cards for Topple™, Operation™, and Honey Bees™ for James

percentage of responses per opportunity. Initiating a turn for each game was different; therefore, the operational definition of initiating a turn was specific to each game. For Topple™, initiating a turn occurred when the student rolled the dice to determine how many Topple™ pieces were added. For Operation™, initiating a turn occurred when the student took tweezers from the opponent and drew a card from the deck. For Honey Bees™, initiating a turn occurred when the student removed a leaf from the tree.

The second behavior measured was relinquishing a turn. This behavior was also specific to each game. For Topple™, relinquishing a turn occurred when the student placed the number of Topple™ pieces, indicated by the dice, on the pyramid. For Operation™, relinquishing a turn occurred when the tweezers were handed to his opponent. For Honey Bees™, relinquishing a turn occurred when a leaf was placed on the table.

The third behavior measured was appropriate commenting. This was defined as a student independently making a comment relevant to the games. Appropriate commenting included all comments that were contextually specific to the game being played. Examples included positive feedback to an opponent or feedback about a specific turn, including, "You won!" or "That was a really hard one!" Non-examples included repeating TV show or movie lines, reading verbatim from the Power Card, and comments about pregame or postgame activities.

Data for the study were collected by the first author, the students' teacher, using a clipboard and data sheet. For each turn taking opportunity during baseline, intervention, and maintenance, the first author recorded whether each of the three target behaviors was performed correctly. To prevent sequence effects, the order of the three games played during each session was chosen at random using a random-number generator.

Experimental Design

A single-subject, multiple probe across conditions design (Gast and Ledford 2014) was used to assess the effectiveness of Power Cards across three games with two students with ASD. As discussed, during the days in which all three board games were played, the order in which the games was played was determined at random. Initially, the researchers conducted simultaneous baselines across all three games. After baseline was stable for the first game, the Power Card intervention was introduced. When intervention data on the first game improved and became stable, the Power Card intervention was introduced on the second game. When intervention data on the second game improved and became stable, the Power Card intervention was introduced on the third game. After data were stable across all three games, a shortened, faded version of the Power Card was then introduced on day 23. This version had three words on it that served as a reminder for initiating their turn, relinquishing their turn, and appropriate commenting. Finally, the Power Card was withdrawn on session 27 to assess for maintenance.

Procedure

Baseline During each baseline session, the two students were presented with each of the three games and asked to play it together. The order in which the games were played was determined at random. The teacher gave the students each game, provided verbal instructions for how to play the game, and then allowed the students to play the game until one student gesturally was the winner. No instructions or prompting related to initiating a turn, relinquishing a turn, or appropriate commenting were provided.

Intervention Intervention session were identical to baseline, except the Power Card Strategy was used to increase appropriately initiating a turn and relinquishing a turn, and appropriately commenting. As discussed, to simplify the intervention to accommodate the complexity of the three target behaviors and game play scenarios, the Power

Card strategy was modified from Gagnon's (2001) description to omit the narrative component and to include only the Power Card itself. First, the teacher presented each student with the corresponding Power Card to match the game. During the first session, the teacher and student read the Power Card out loud together. During subsequent sessions, the teacher placed the Power Card next to the student; if the student did not initiate a turn within approximately 5 s, the teacher pointed to the Power Card as a prompt for the student to read the card and to follow the instructions. If the student did not immediately respond to the teacher's gestural prompt, a verbal prompt was provided. The same sequence of prompting steps was followed for relinquishing a turn. No prompts were provided for appropriate commenting since it was not necessary for students to comment to complete the steps of each game, and to prevent the students from reading verbatim the example comments on each Power Card. Power Card was a 10 cm×15 cm card that had a picture of the student's special interest, his favorite Ninja Turtle™ character, on one side, and instructions to appropriately initiate a turn, relinquish a turn, and appropriately comment on the other side. Figure 1 contains the text on James' Power Card, outlining the steps for appropriately initiating a turn and relinquishing a turn, and appropriately commenting, as performed by his special interest character, Donatello. The steps of performing target behaviors were written at each participant's readability level as informally assessed by the first author; each participant was able to independently read his card.. Each student had an individualized card for each game. There were six cards total, one per game per student.

Power Card Fading After data were stable for initiating and relinquishing a turn for each student across all three games (session 23), the Power Card was faded to a card with the student's favorite Ninja Turtle character and three one-word steps corresponding with each of the target behaviors. Data were considered stable when there were three consecutive sessions at 80 % or higher. During the first session, the card was read to the student prior to his first turn. During subsequent sessions, the teacher presented the Power Card to the student and told the student to read the Power Card prior to beginning the game. For Operation™, the three words of the faded Power Card were passes, buzz/pull, and tell. For Topple™, the three words on the faded Power Card were card were roll, place, and tell. For Honey Bee Tree™, the three words on the faded Power Card were removes, place, and tell.

Maintenance After data on initiating and relinquishing a turn were stable for all three games following intervention, a maintenance probe was taken 11 days after the last intervention session without the Power Card to evaluate if gains in target behaviors continued in the absence of the Power Card. Both students played the games and data were taken on initiating a turn, relinquishing a turn, and appropriate commenting, as during baseline and intervention. The order of the games to be played for probes was also chosen at random using a random-number generator.

Procedural Fidelity

A procedural fidelity checklist comprised of the steps of baseline and intervention was completed by the first author for 33 % of baseline and intervention sessions, selected at

random. There were 9 steps on each procedural fidelity checklist. 100 % of steps were completed during all sessions for which data were collected.

Interobserver Agreement

Interobserver Agreeement (IOA) was determined by comparing data collected by the primary observer, the first author, and a secondary observer, a classroom teaching assistant. IOA was calculated using a point-by-point agreement ratio, in which the number of agreements on each of the target behaviors for each turn was divided by the number of agreements plus disagreements, multiplied by 100. Prior to beginning baseline, the primary and secondary observer conducted practice sessions until they reached IOA of 90 % for Honey Bees™, 100 % for Operation™, and 85 % for Topple™. IOA data were then collected for 33 % of the sessions, selected at random. During the study, the interobserver agreement for both students averaged 91 % for Honey Bees™ (range, 83–96 %), 95 % for Operation™ (range, 87–100 %), and 92 % for Topple™ (range, 86–100 %).

Social Validity

Social validity of the Power Card strategy was assessed through an open-ended parent survey and a student survey (See Figs. 2 and 3). Parents were asked to play the board game with their child using the Power Card, and then to answer the survey questions. The questions were constructed to assess if game play was a struggle at home and to assess the usefulness of the Power Card at home. Questions 1 through 4 addressed the extent to which students played games at home and the extent to which game play was problematic prior to intervention; Question 5 addressed the extent to which the Power Card was effective in improving students' game play; and Questions 6 and 7 addressed the usability of the Power Card and ease of incorporation into daily activities in the home.

The student survey was constructed to assess the extent to which students enjoyed and benefitted from the Power Card strategy during game play. The teacher read each of the questions to the students after completing the day's games at the conclusion of the study. The students then scribed the answers onto the survey paper. Questions 1 and 2 addressed the extent to which students liked the Power Card strategy; Questions 3 and 4 addressed the extent to which students enjoyed the turn-taking games; and Questions 5, 6, and 7 addressed students' desire to use Power Cards in the future, incorporation of the special interest character into the Power Card, and students' enjoyment of turn taking during the games.

Results

Results for James are displayed in Figs. 3 and 4, and results for Daniel in Figs. 5 and 6. As can be seen in Figs. 3 and 5, the Power Card strategy increased the frequency of independently initiating a turn and relinquishing a turn for James and Daniel compared to baseline. Increases in turn taking maintained when the Power Card was faded and then withdrawn. In contrast, Figs. 4 and 6 show that the Power Card had little consistent

1. Have you ever played games with your child before?

2. If so, which games have you played?

3. If so, how did it go?

4. In the past, which parts of the game could the child do and which aspects were problematic?

5. After using the Power Card, did you see a difference?

6. Was the Power Card easy to use?

7. Would you like to try the Power Card for other daily activities?

Student Questions

1. Did you like the Power Card? Yes Maybe No

2. What was your favorite part of the Power Card?

3. Did you like the games? Yes Maybe No

4. Which game was your favorite to play?

5. Would you like to use more Power Cards? Yes Maybe No

6. I liked getting help from the Ninja Turtles! Yes Maybe No

7. Do you like to take turns with your friends? Yes Maybe No

8. Who else would you like to see on your Power Cards?

Fig. 2 Open ended parent and student social validity surveys

effect on students' appropriate commenting, which varied substantially across conditions with marginal improvement following intervention, except for appropriate commenting during the Operation™ game.

James

Turn taking As shown in Fig. 3, for Operation™, Topple™, and Honey Bees™, respectively, James averaged just 17 % (range, 0–37 %), 19 % (range, 0–40 %), and 20 % (range, 0–50 %), and 17 % of turns appropriately initiated during baseline. During intervention, his percentage of turns appropriately initiated increased to 97 % (range, 90–100 %), 96 % (range, 83–100 %), and 98 % (range, 80–100 %), respectively. As shown in Fig. 1, his percentage of appropriately relinquishing a turn averaged

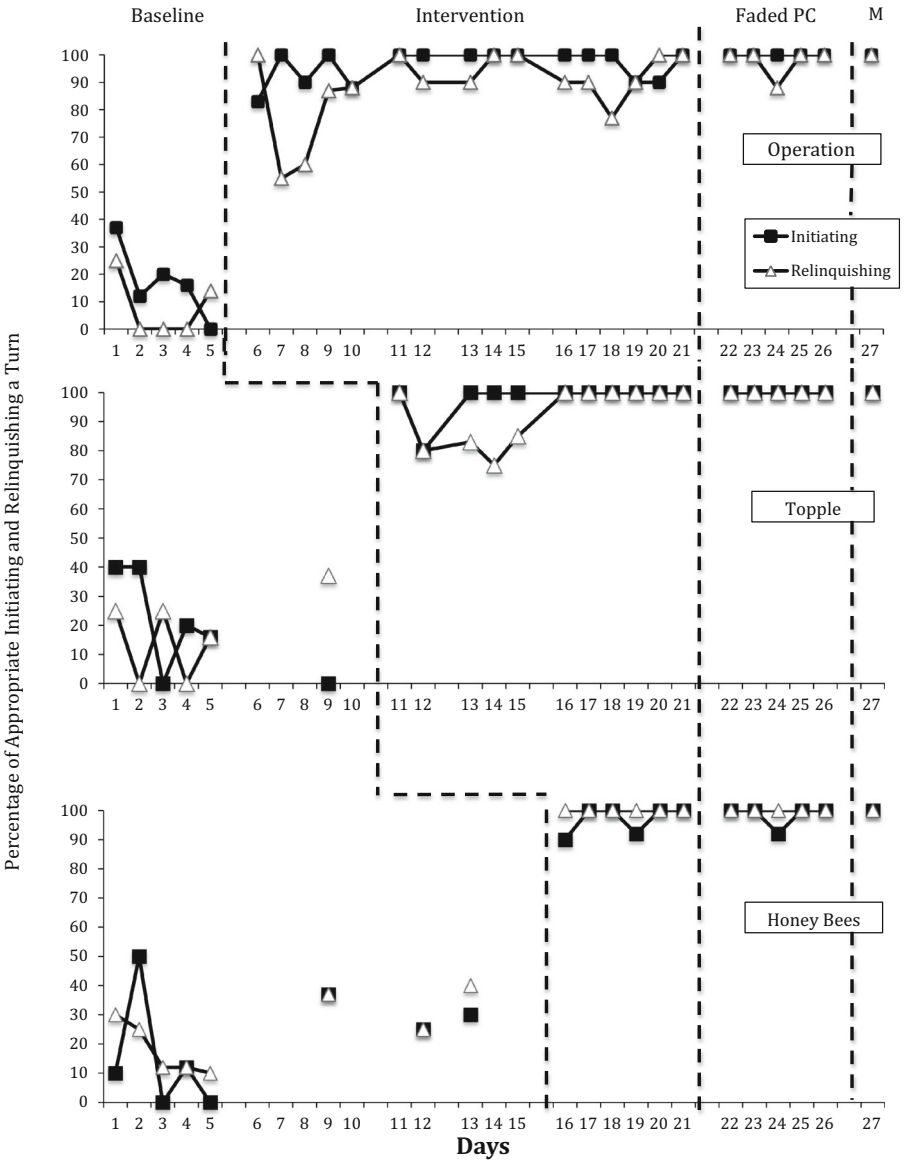

Fig. 3 Percentage of appropriate initiating and relinquishing a turn during baseline, intervention, fading, and maintenance for James

just 23 % (range 10–37 %), 7 % (range 0–25 %), and 17 % (range, 0–37 %) during baseline. During intervention, his percentage of appropriately relinquishing a turn increased to 88 % (range 55–100 %), 93 % (range, 83–100 %), and 89 % (range, 78–100 %).

On session 23, the Power Card was faded to three one-word steps and a picture of Ninja Turtle™ for five sessions. With the shortened Power Card James continued to display high levels of initiating and relinquishing a turn. On average, he initiated a turn 100 % for Operation™, 100 % for Topple™, and 98 % for Honey Bees™ during this

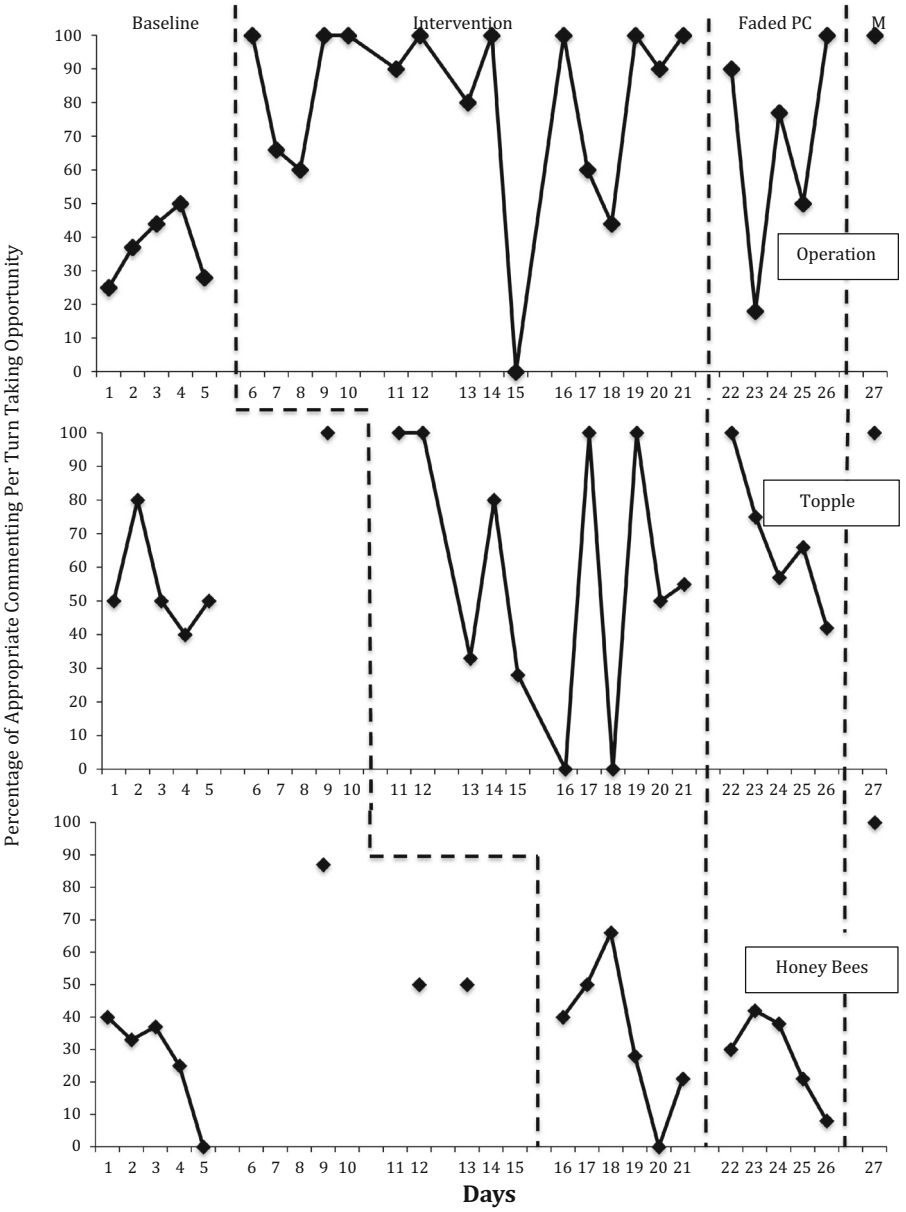

Fig. 4 Percentage of appropriate commenting per turn taking opportunity during baseline, intervention, fading, and maintenance for James

condition. On average, he relinquished a turn 97 % for Operation™, 100 % for Topple™, 100 % for Honey Bees™ during this condition. Finally, maintenance data were collected using the faded Power Card 11 days after intervention ended on the last game. James achieved 100 % for all three games for initiating and relinquishing a turn.

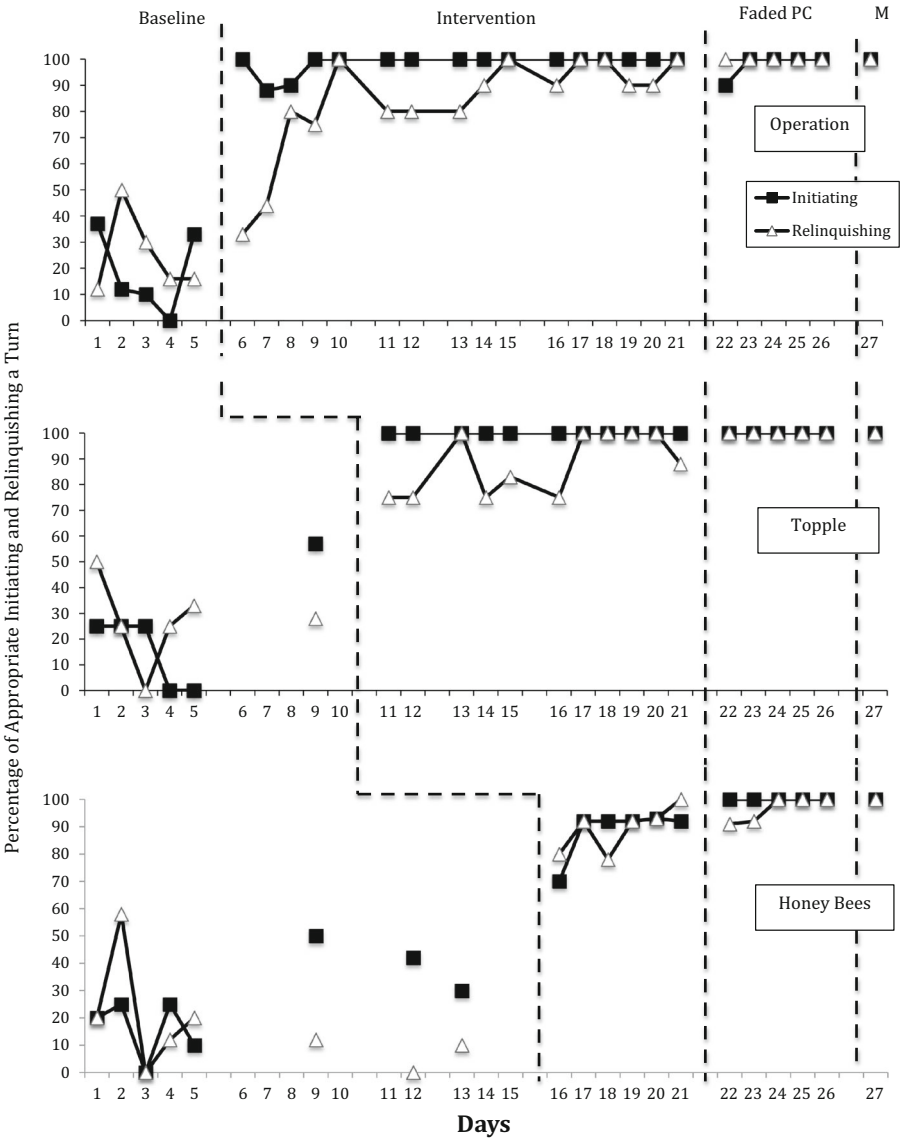

Fig. 5 Percentage of appropriate initiating and relinquishing a turn during baseline, intervention, fading, and maintenance for Daniel

Appropriate commenting As shown in Fig. 4, in contrast to initiating and relinquishing a turn, the Power Card strategy did not consistently increase James' appropriate commenting above baseline levels. For Operation™, Topple™, and Honey Bees™, and, he averaged 36 % (range, 25–50 %), 61 % (range, 28–100 %), and 40 % (range 0–87 %) appropriate commenting during baseline. During intervention, he averaged 34 % (range 0–100), 80 % (range 0–100 %), and 58 % (range 0–100 %) appropriate commenting. During the faded Power Card phase, he averaged just 67 %, 68 %, and 27 % appropriate commenting. Finally, during the maintenance probe, he commented on 100 % of opportunities for all three games.

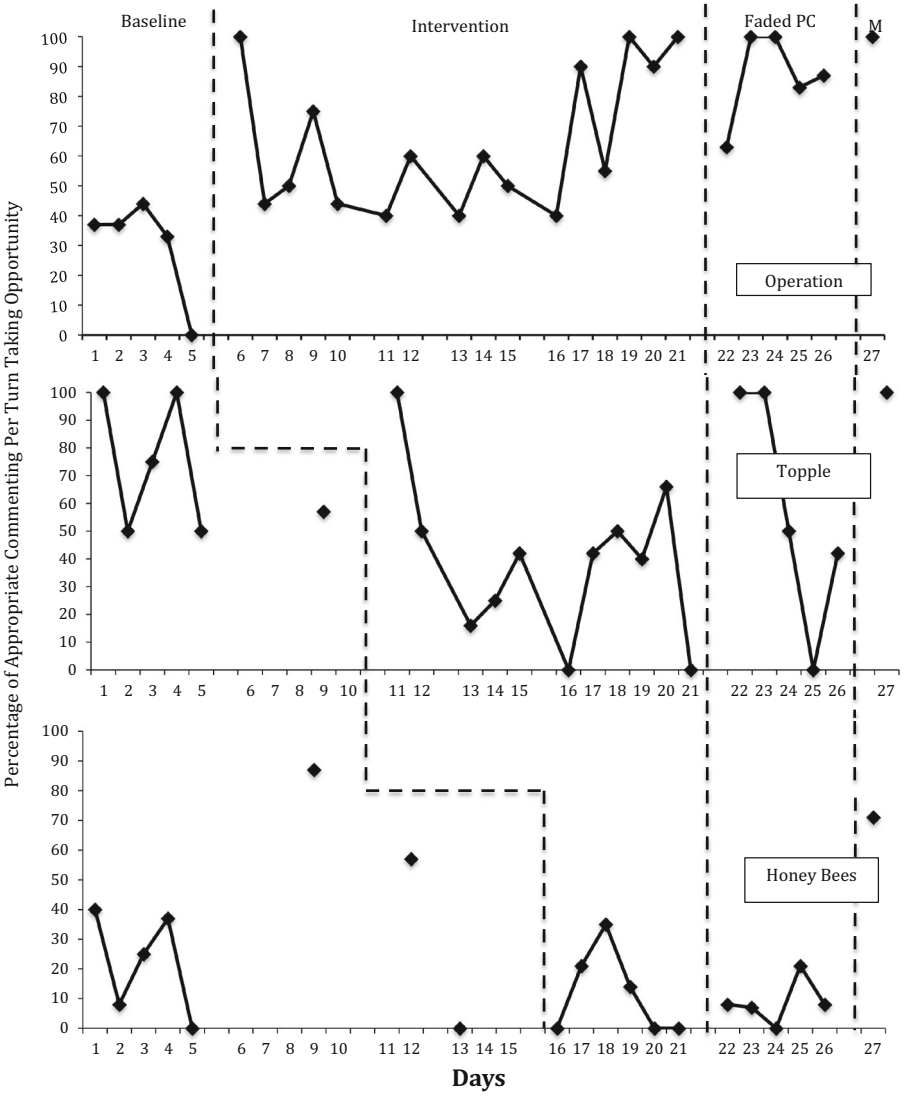

Fig. 6 Percentage of appropriate commenting per turn taking opportunity during baseline, intervention, fading, and maintenance for Daniel

Daniel

Turn taking As displayed in Fig. 5, for Operation™, Topple™, and Honey Bees™, respectively, Daniel averaged just 18 % (range 0–37 %), 22 % (range 0–57 %), and 25 % (range 0–50 %) of turns initiated appropriately during baseline. During intervention, his percentage of turns appropriately initiated increased to 98 % (range 88–100 %), 100 %, 88 % (range 70–92 %). As shown in Fig. 6, his percentage of appropriately relinquishing a turn during baseline averaged just 7 % (range 0–25 %), 26 % (range 0–50 %), 23 % (range 10–37 %), respectively. During intervention, his

percentage of turns relinquished appropriately increased to 71 % (range 33–100 %), 88 % (range 88–100 %), and 89 % (range 78–100 %).

On session 23, the Power Card was faded to three one-word steps and a picture of Ninja Turtle™ for five sessions. With the shortened Power Card, Daniel continued to display high levels of initiating and relinquishing a turn. On average, he initiated a turn 98 % for Operation™, 100 % for Topple™, and 100 % for Honey Bees™ during this condition. On average, he relinquished a turn 100 % for Operation™, 100 % for Topple™, and 96 % for Honey Bees™ during this condition. Finally, maintenance data were collected without using the Power Card 11 days after intervention ended on the last game. Daniel achieved 100 % for all three games for initiating and relinquishing a turn.

Appropriate commenting As shown in Fig. 6, in contrast to initiating and relinquishing a turn, the Power Card strategy did not increase Daniel's appropriate commenting above baseline levels. For Operation™, Topple™, and Honey Bees™ he averaged 30 % (range, 0–44 %), 72 % (range, 50–100 %), and 31 % (range 0–87 %) appropriate commenting during baseline. During intervention, he averaged 64 % (range 40–100 %), 37 % (range 0–100 %), and 10 % (range 0–100 %) appropriate commenting. During the faded Power Card phase, he averaged 86, 58, and 8 %. Finally, during the maintenance probe, he commented on 100 % of opportunities for Operation™, 100 % for Topple™, and 71 % for Honey Bees™.

Social Validity

Parents At the conclusion of the study, both students' parents were asked to play one of the games, Operation™, at home with their child and to complete an open ended survey to evaluate their opinions regarding the intervention (See Fig. 2 for questions). To question 1, both parents reported that they had played games with their children at home prior to the study. To question 2, James' parent reported that they played Monopoly™; Uno™, Jenga™, Candyland™ and Daniel's parents reported that they played video games with him. To question 3, James' parent expressed difficulty with him taking too many turns, wanting to roll the dice for all players, and wanting to build with Jenga blocks to knock over the tower. To question 3, Daniels' parent expressed that he had a problem waiting his turn and had a hard time losing before the study. To question 4, James' parent expressed that he had the ability to do all parts of the games, but was unable to wait his turn and wanted to quit when he could not wait his turn before the study. To question 4, Daniels' parent expressed that he was a fast learner with video games, but his tantrums were so severe when he lost they had to stop him from playing before the study. To question 5, James' parent reported a difference in his game play following the study in that he required fewer prompts to wait, but he still wanted to help other players during their turns. To question 5, Daniels' parent reported that they didn't play board games often, but seeing how he preferred to play board games, it encouraged them to try more board games and to spend less time playing video games on the computer given results of the study. To question 6, James' parent said that step 2 on the Power Card was too long and hard to explain. To question 6, Daniels' parent said he did so well playing games following the study, they hardly used

the Power Card. To question 7, James' and Daniel's parents both expressed being open to trying other Power Cards for other daily activities. Overall, the parents' comments were generally favorable in that they indicated that their children were able to play board games using the Power Card without a tantrum.

Students At the conclusion of the study, James and Daniel were also given a survey to assess their opinions about the Power Card strategy (See Fig. 2 for questions). To question 1, both James and Daniel stated they liked the Power Card. To question 2, James stated that playing Honey Bees™ was his favorite part of the intervention and Daniel said Raf telling him how to play was his favorite part. For question 3, James and Daniel both said they liked the games and to question 4, they both said Operation™ was their favorite game. To question 5, James said he would like more Power Cards and Daniel said he did not want more Power Cards. To question 6, James and Daniel both liked getting help from the Ninja Turtles™. For question 7, James said he liked to take turns and Daniel said he maybe liked to take turns. Lastly, the students were asked who would they like to see on future Power Cards and James said Ninja's and Daniel said Leo.

Discussion

The purpose of the study was to evaluate the efficacy of the Power Card strategy to teach appropriate turn taking and appropriate social commenting during game play to two elementary-aged students with ASD. Results suggest that the Power Card strategy was effective in increasing students' appropriate initiating and relinquishing a turn during game play. These results are similar to those of previous studies showing that the Power Card strategy was effective in improving a variety of social, communicative, and behavioral skills of students with ASD (Angell et al. 2011; Campbell and Tincani 2011; Davis et al. 2010; Keeling et al. 2003; Spencer et al. 2008). In particular, the current research replicates results of Keeling et al. who used the Power Card strategy to increase "sportsmanship" skills of an elementary-aged girl with autism during gameplay.

Importantly, the participants' classroom teacher, the first author, helped to design the intervention, implemented the intervention in the absence of expert supervision, and served as primary data collector for the study. The teacher's significant involvement in all aspects of the study supports generality of the findings to typical classroom settings, in which expert supervision is not available (Lang et al. 2010; Lang and Page 2011).

Previous research indicates that children with ASD are substantially less likely to participate in social and recreational activities than their typically developing peers (Solish et al. 2010). Results of the current study support use of the Power Card strategy in expanding children's social and recreational skills by improving their participation in socially-based board games. An open-ended social validity survey suggested that socially-based games were problematic prior to intervention, that parents and the students viewed the Power Card intervention favorably, that it improved board game play at home for each of the students, and that parents were amenable to using the Power Card strategy to improve different skills.

In contrast to positive results observed for turn taking, the Power Card strategy produced little consistent improvement in students' appropriate commenting. Although experimental control was not demonstrated between the Power Card strategy and appropriate commenting, the data in Figs. 4 and 6 suggest that variable yet substantial increases in appropriate commenting occurred when each student played the Operation™ game. As reflected in their responses to the social validity survey, both students reported that Operation™ was their favorite game, and thus they may have been more motivated to comment on the game as they played it.

Appropriate commenting was defined as comments relevant to the games (e.g., "You won!" or "That was a really hard one!"). Non-contextual comments, such as repeating lines from TV shows or reading lines verbatim off of the Power Card, were not considered appropriate. Anecdotal observation suggested that both children made many non-contextual, echolalic comments throughout the games, such as repeating lines from the Ninja Turtles™ television shows. This finding underscores a potential limitation of strength-based interventions that utilize children's special interests. On one hand, strength-based interventions can increase social interactions by capitalizing on students' naturally existing special interests, especially when their interests overlap with those of typically developing peers (e.g., Koegel et al. 2013). On the other hand, in narrowing the topic of conversation to the student's special interest they may limit broader conversational topics and interactions that characterize typical conversations, as was observed in the current study. This undesired effect could be offset to some degree by including a list of appropriate and inappropriate comments in the Power Card, or by augmenting the Power Card with supplemental prompting, prompt fading, and error correction techniques.

Limitations

A few limitations of the study should be considered in relation to the results. First, the study utilized only two participants. Although clear experimental control was demonstrated for initiating and relinquishing a turn across three games for each of the participants, additional replications across more than two participants would have bolstered demonstration of experimental effect. Second, there is a possibility that participants learned game play skills not from the Power Card strategy, but from peer modeling. However, given participants' absence of strong imitative skills due to social interaction deficits associated with ASD, this is a relatively minor limitation. Additionally, the study did not systematically evaluate whether turn taking skills generalized to different games and activities in the school setting. Finally, the parent social validity survey suggested that improvements in turn taking generalized to games played in the home setting; however, the anecdotal nature of these data precludes definitive conclusions about improvements in game play at home.

Future Research

Results suggest the following key areas for future research. First, given that only two studies to date, the current study and Keeling et al. (2003), have investigated use of the Power Card strategy to promote social and recreational activity skills of children with ASD, additional research is needed to confirm benefits of the Power Card strategy

across different activities, students, and settings. Second, given the lack of effect of the Power Card strategy on appropriate commenting, future studies could investigate modifications to the Power Card to promote appropriate commenting during game play. For example, the Power Card could suggest specific social comments and discourage comments that are echolalic or non-contextual in nature. Finally, future research could evaluate whether use of the abbreviated, faded Power Card only could produce similar gains in turn taking or other social skills compared to use of the full Power Card.

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