An Application of the Group-Oriented Concurrent-Chains Arrangement

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Abstract

Group contingencies are a set of behavior management procedures used to improve the behavior of several students simultaneously. Despite evidence supporting the effectiveness of each group contingency in managing academic and challenging behaviors, the decision to select one group contingency over another may be difficult for teachers, especially if similar efficacy is found. In this study, we compared the effectiveness of three group contingencies on disruptive behavior with 13 typically developing eighth-grade students. Results showed that all three group contingencies reduced levels of disruptive behavior from baseline levels. We then assessed the students' individual preferences for the group contingencies using a group-oriented concurrent-chains procedure. Most students showed preference for one of the group contingencies, and most preferred the independent group contingency. These results demonstrated that the group-oriented concurrent-chains procedure was an effective and efficient method of identifying individual preferences for behavior-change procedures in a classroom setting.

Keywords Concurrent-chains arrangements · Group contingencies · Preferences

Group contingencies are a set of behavior management strategies frequently used in classroom settings (Mitchell, Tingstrom, Dufrene, Ford, & Sterling, 2015; Skinner, Williams, & Neddenriep, 2004). Group contingencies are typically used to manage the behavior of large groups of individuals simultaneously by providing reinforcement to members contingent on the behavior of one individual, a select group of individuals, or all individuals of the larger group (Litow & Pumroy, 1975). These contingencies are advantageous in that they may be efficient and less costly for teachers to implement when compared to individual contingency systems (Gresham & Gresham, 1982). The most common types of group contingencies include interdependent, dependent, and independent (Litow & Pumroy, 1975).

Interdependent group contingencies work by establishing performance criteria for all members of the group, and each member of the group is required to meet the criteria in order for any member to earn the reward (Litow & Pumroy, 1975).

Barrish, Saunders, and Wolf (1969) used an application of an interdependent group contingency known as the good behavior game (GBG) to decrease disruptive behavior with fourth-grade students in a general education classroom. The students were divided into two teams during math and reading periods, and each instance of out-of-seat behavior or talking out resulted in the teacher putting a mark on the chalkboard. Larger numbers of points indicated more disruptive behavior. The team (or teams) that met the criterion of not exceeding a specified number of marks won the game and earned privileges (e.g., extra recess). Results showed decreases in disruptive behavior and increases in levels of student engagement only when the GBG was in effect. The desirable effects of the GBG have been replicated with various populations, such as kindergarten students (Donaldson, Vollmer, Krous, Downs, & Berard, 2011), multiethnic high school students (Kleinman & Saigh, 2011), an at-risk first grader (Ling, Hawkins, & Weber, 2011), and bilingual preschoolers (Murphy, Theodore, Aloiso, Alric-Edwards, & Hughes, 2007).

Dependent group contingencies differ from interdependent group contingencies in that the reward is provided to members of the group contingent on the performance of only one member or a small group (Litow & Pumroy, 1975). If the individual or small group does not meet the predetermined criteria, no member of the larger group receives the reward. Heering and Wilder (2006) examined the effects of an unknown dependent

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group contingency (students were not told the identity of the target student) for on-task behavior during math instruction in a general education setting. The results showed a reduction of off-task behavior for the group when the dependent group contingency was in effect. In addition, the experimenters evaluated whether the students experienced adverse social consequences via a social validity questionnaire. Eighty percent of third-grade students and 93% of fourth-grade students reported never being blamed by peers when the class did not earn the reinforcer. These results were noteworthy because they addressed a commonly cited limitation associated with dependent group contingencies, which included peers experiencing frustration when the selected student(s) did not meet the criteria (Romero, 1998).

A third type of group contingency is the independent group contingency, which involves presenting the same behavioral contingency to all members of the group, but only individuals that meet the criteria earn the reward (Litow & Pumroy, 1975). The individuals that do not meet the criteria do not earn the reward. Brantley and Webster (1993) evaluated the utility of an independent group contingency management system with 25 fourth-grade students in a regular classroom setting. Results showed that the intervention was effective in improving inappropriate target behaviors quickly.

Given that there are a variety of group contingencies from which to select, it is important for teachers to have a data-supported reason for selecting and implementing one in the classroom. One possibility would be to evaluate which group contingency results in the greatest desired behavior change. However, research has not shown conclusive evidence of which group contingency is most effective (Theodore, Bray, & Kehle, 2004). Therefore, another variable that teachers may consider is student (i.e., consumer) preference. That is, if students like one of the procedures more than the others, there may be greater motivation to engage in appropriate behavior and fewer instances of off-task behavior. Cole, Davenport, Bambara, and Ager (1997) emphasized that teachers should provide frequent choices to students with challenging behaviors as a proactive behavior management strategy. Similarly, Hanley (2010) stated that recipients of behavior-change programs (e.g., group contingencies) should be actively involved in the intervention planning process.

One way to obtain objective preference data for behavior-change procedures (e.g., group contingencies) is to use a concurrent-chains arrangement. A concurrent-chains arrangement involves a participant selecting an initial link (e.g., color card) that results in access to a terminal link (e.g., behavior-change procedure; Hanley, 2010). Preference for the behavior-change procedures is determined by examining the number of times an individual selects and experiences a particular procedure compared to the other available alternatives. Many studies have demonstrated the efficacy of a concurrent-chains arrangement to identify preferences during one-on-one sessions

(e.g., Luczynski & Hanley, 2009; Sran & Borrero, 2010; Tiger, Hanley, & Hernandez, 2006). Layer, Hanley, Heal, and Tiger (2008) extended the utility of this procedure by using a group-oriented concurrent-chains arrangement to identify preschoolers' preferences for different food items. Students privately selected a color card (initial link) that was associated with a food item (terminal link). Each student's initial-link selection was placed in a bag and the experimenter randomly selected one card from the bag. The food item associated with that card was then provided to all students, regardless of their individual initial-link selection. Results of the study showed that the group-oriented concurrent-chains arrangement was an effective and efficient way of identifying individual preferences without conducting one-on-one individual assessments.

The group-oriented concurrent-chains arrangement may be a useful strategy for classroom teachers who want to include students' preferences in the educational context. However, additional research is needed to identify whether the group-oriented concurrent-chains arrangement can be used to efficiently identify individual preferences for behavior-change procedures (e.g., group contingencies) in addition to discrete stimuli (e.g., food; Layer et al., 2008). The purpose of the current study was to (a) assess group and individual preferences for three types of group contingencies with similar effectiveness utilizing a group-oriented concurrent-chains arrangement and (b) evaluate the social validity of the procedures.

Method

Participants, Setting, and Materials

Participants included 13 typically developing eighth-grade students, 13 to 14 years old. All participants provided assent, and guardians provided written informed consent prior to beginning the study. One participant withdrew assent at Session 15, but his data are included up to that point. Each session's procedures were implemented by the classroom teacher (primarily) or student teacher, each of whom consented to participate. The classroom teacher was a 58-year-old female with 12 years of teaching experience; a bachelor's degree in criminal justice; an alternative teacher certification in special education, early childhood through twelfth grade; and math, language arts, and social studies certifications for fourth through eighth grade. The student teacher participated in the study only until Session 16 because she completed her university teaching requirements and was no longer working at the school. The student teacher and classroom teacher worked collaboratively to implement the procedures during the initial sessions, where one provided a lecture to the students while the other recorded occurrences of target behaviors.

The teachers conducted each 40-min session during whole-group instruction and work periods of a general education math class in a public school classroom. We chose to conduct sessions during math because the classroom teacher reported high rates of disruptive behavior during these lessons. Students sat in individual desks arranged in rows, and the teacher's desk was located in the front corner of the room. The teachers implemented all sessions during the day's first class period (math), 2 or 3 days per week depending on the school's block scheduling.

We used a variety of materials including a whiteboard and marker, poster boards with the names of the group contingencies, a clipboard with paper and a pen to record target behaviors and points, and index cards with the students' names and group contingency names. The teacher read a script aloud prior to the start of each session to ensure consistency across sessions. The teacher placed a list of items and activities with their "prices" on the wall in the classroom, visible to all students. The teacher selected items that were found in the school store and could easily be delivered in a classroom setting. Students ranked the items and activities prior to intervention sessions to identify 10 backup reinforcers. Contingent on meeting the team's goal, the teacher distributed electronic "dollars" with the school's logo as tokens that could later be exchanged.

Experimental Design and Dependent Variables

A multielement design was used to evaluate the effectiveness of the three group contingencies (Browning, 1967). Two target behaviors (dependent variables) were identified as disruptive by the teachers and warranted intervention. The first target behavior, *talking out*, was defined as (a) verbalizations emitted without permission, (b) talking to other students when the teacher was providing instruction, (c) complaining or arguing with the teacher, (d) having discussions unrelated to the assignment during partner work, and (e) talking to peers other than their assigned partners during group work. We recorded instances of talking out using a frequency count that was later converted to a rate (responses per minute) for each session. Because each instance of talking out may have varied in duration, we only collected data on a new instance if at least 3 s had passed since the previous instance. The second target behavior, *off-task behavior*, was recorded using momentary time sampling (1-min intervals) and was defined as a student (a) looking away from relevant lesson materials or the teacher during instruction, (b) laying his or her head on the desk, or (c) having his or her eyes closed. Data collection on off-task behavior began during Session 6 because off-task behavior was not initially identified as problematic.

A group-oriented concurrent-chains arrangement was used to assess student preference for the group contingencies. The dependent variable was the cumulative number of selections

of each initial link (name of the group contingency). At the start of each session, students were each given a card with their name and three group contingencies. Each student selected his or her preferred group contingency privately by circling the name of the contingency and placing the card in a bag held by the teacher. We analyzed preference data via permanent product of student selections.

Interobserver Agreement (IOA) and Procedural Integrity

IOA was assessed during approximately 30% of sessions during each phase (i.e., baseline, efficacy, and preference). The second independent observer was a licensed specialist in school psychology employed within the school district and was trained in data collection prior to collecting data. For talking out, total count IOA was used by dividing the smaller total by the larger total and multiplying by 100% for each session. Mean total count agreement was 95% (range 88%–100%). Interval-by-interval IOA was used to calculate off-task behavior by summing the total number of intervals in which observers were in agreement and dividing the sum by the total number of observation intervals (with agreements and disagreements). Mean interval-by-interval IOA was 98% (range 85%–100%). To calculate IOA of student selections during the group-oriented concurrent-chains arrangement, two observers independently viewed the cards and recorded student selections on a data sheet. The data were then compared for agreements. IOA was collected during 33% of sessions by dividing the number of agreements by the number of agreements plus disagreements, and multiplying by 100%. IOA was 100%.

To increase the likelihood that the group contingencies were implemented correctly, both teachers received formal training from the first author prior to the efficacy phase. Training included an oral explanation of group contingencies, a review of the script, direction in how to organize students into teams for the interdependent group contingency, criteria for distributing points to teams and/or individual students, criteria to establish a winner (interdependent), and directions for how to provide the points and backup rewards. During the training, the experimenter gave the teachers several opportunities to role-play different anticipated scenarios with the experimenter. The experimenter provided performance feedback contingent on correct and incorrect performance. Training was discontinued once each teacher achieved 100% correct responding during role-play scenarios.

As a measure of procedural integrity, the second author independently collected data on instances of disruption to evaluate whether points were delivered to each participant or team at the correct time. The data collected by the observers were compared to data collected by the teacher during 30% of sessions across all phases of the study. Additionally, the

second author compared whether the rewards were given correctly (contingent on meeting the goal). Mean procedural integrity was 95% (range 85%–100%), demonstrating high procedural integrity.

Social Validity

Questionnaires were distributed to the students and primary teacher following the preference evaluation as a measure of social validity (see Table 1). Questions on the student questionnaire focused on whether or not the student found the group contingencies to be beneficial in regard to his or her own behavior and the behavior of his or her peers and which group contingency he or she favored overall and why (open ended). The preferred contingency reported on the questionnaire was compared to the preferred contingency determined via the group-oriented concurrent-chains assessment for each student.

Procedures

Efficacy Evaluation

Prior to the preference evaluation, we evaluated the efficacy of an interdependent, dependent, and independent group contingency on disruptive behavior. All sessions were 40 min in duration and conducted during math period.

Baseline

During the baseline phase, the teacher or student teacher used her typical classroom management method, which included no programmed behavior management strategies. The teachers provided a vocal statement on an intermittent schedule to redirect any occurrence of disruptive behavior. No formal contingencies were in place for the target behaviors.

Efficacy Phase

During the efficacy phase, the teachers implemented each of the three group contingencies in a quasi-random order for three sessions each. The purpose of the efficacy phase was to assess whether the group contingencies decreased talking out and off-task behavior and to ensure that the students had equal exposure to the contingencies. During each session of the efficacy phase, a sign stating which group contingency was in effect was located in the front of the classroom, visible to all students. Each sign was a different color and alternative names were assigned to each group contingency to aid the students in discrimination. Prior to beginning each session, the teacher described the contingencies related to each group contingency along with a description of target behaviors that resulted in points. Students were also reminded that electronic

dollars were contingent on their points remaining at or below the daily goal. Teachers delivered electronic dollars in the presence of the experimenters but were not required to provide access to the backup reinforcers in their presence.

Interdependent Group Contingency During the interdependent group contingency (i.e., the all-for-one game) sessions, the teacher divided the students into two teams. Students were permitted to choose team names that were written on the whiteboard. Contingent on a team member engaging in a target behavior, the teacher wrote one point on the board. Points were placed on the board throughout the session each time a disruptive behavior occurred. Points were never removed or erased. At the end of the session, the winning team was the one with five points or fewer and earned the reward. If both teams met the goal, both teams were the winners, and both teams earned the rewards. Team members on the winning team(s) earned two electronic dollars, which could be exchanged for backup reinforcers at the end of the day.

Independent Group Contingency The independent group contingency (i.e., the free-for-all game) sessions were conducted similarly to the interdependent group contingency sessions except that students were not divided into teams. Students were given the opportunity to earn rewards independent of every other student. Contingent on a disruptive behavior, a point was given for only the student that emitted the disruptive behavior (not the whole class). At the end of the session, each student with five points or less earned the reward. Students with six points or more did not meet the criteria and did not earn the reward.

Dependent Group Contingency The dependent group contingency (i.e., the one-for-all game) sessions were similar to the independent group contingency sessions except that at the beginning of the session, the teacher randomly selected one student's name from a bag to serve as the target student. Students in the class earned a reward if the target student met the criteria of five or fewer points. To protect the target student's identity, we did not inform the class of which student was selected. Therefore, no student knew whose behavior was being observed by the teacher. At the end of the session, if the target student had five points or less, all students in the class earned the reward. If the target student had more than five points, no student earned the reward.

Preference Evaluation

Following exposure to the group contingencies during the efficacy evaluation, the teacher informed the students that they would have the opportunity to vote for which game (i.e., group contingency) they wanted to experience each day as they entered the classroom. At the beginning of the session,

Table 1 Social validity results

Social validity questions	Percentage of “yes” responses (<i>n</i>)
Were you able to pay more attention during the behavior games compared to class periods when you were not playing a behavior game?	91% (10)
Did you work harder during independent work periods when you were playing a behavior game compared to when you were not playing a behavior game?	73% (8)
Did you observe improvements in your own behavior during the behavior games compared to class periods when you were not playing a behavior game?	73% (8)
Did you observe improvements in your classmates’ behaviors during the behavior games compared to class periods when you were not playing a behavior game?	82% (9)
Did you vote honestly when indicating which of the three behavior games you wanted to play?	100% (11)

Eleven of the twelve students completed the questionnaire

the teacher gave each student a card (i.e., initial link) that contained the student’s name and the names of the three games (group contingencies). The teacher instructed the students to circle the game they wanted to play that day but to keep their selections secret to prevent one student’s selection from influencing another student’s selection. Students circled their selections privately and independently and deposited their cards into a bag held by the teacher. Once all students made their selections, the teacher randomly selected one card and implemented the associated contingencies (i.e., terminal link). The preference phase continued until a clear preference was shown by a majority of the students and the class overall. Preference for one of the group contingencies was shown when a student made four consecutive selections to the same game. We continued to monitor disruptive behavior during the preference evaluation.

Results

Figure 1 shows the effects of the interdependent, dependent, and independent group contingencies on talking out and off-task behavior. The top panel shows the rate of talking out for all students. During baseline, talking out occurred at a mean rate of 2.7 instances per min. When the efficacy phase was implemented, the rates of talking out decreased during all three group contingencies with the greatest reduction observed during the interdependent group contingency ($M = 0.3$ per min) compared to the independent group contingency ($M = 0.9$ per min) and the dependent group contingency ($M = 1.4$ per min). The final phase shows the rate of talking out when students selected the group contingency during the group-oriented concurrent-chains arrangement. The only contingency that was implemented during this phase was the independent group contingency, and the rate of talking out remained low ($M = 0.5$ per min).

The bottom panel of Fig. 1 shows the percentage of intervals with off-task behavior for all students. During baseline, off-task behavior occurred during a mean of 84% of the

intervals. When the efficacy phase was implemented, the percentages of off-task behavior decreased during all three group contingencies, with little difference between the dependent group contingency ($M = 24.3\%$), independent group contingency ($M = 20.0\%$), and interdependent group contingency ($M = 20.3\%$). During the preference phase, the level of off-task behavior remained low ($M = 5.5\%$).

Figure 2 shows individual preference results for 12 participants. Seven participants demonstrated preference via our criteria of selecting the same initial link for four consecutive selections. Of these seven students, five (i.e., John, Larry, Marian, Tom, and Zara) demonstrated a clear preference for the independent group contingency, whereas two students (i.e., Mark and Mike) showed a preference for the interdependent group contingency. Of the remaining students, three students (i.e., Betty, Ian, and Jessica) selected the independent group contingency three consecutive times, and two students (i.e., Elisa and Erin) showed inconsistent selections. These data demonstrate that the group-oriented concurrent-chains arrangement effectively identified individual preference of behavior-change procedures for a majority of the participants within only a few sessions.

Results of the social validity questionnaire for the students are depicted in Table 1. Overall, responses were favorable with respect to observing improvements in target behaviors. Students also reported they paid more attention and worked harder when playing the games than when not. Students were also asked why they liked their preferred contingency, and the majority indicated that they liked relying on their own behavior to earn rewards rather than relying on their peers’ behaviors.

Table 2 shows the correspondence between the preferred group contingency identified via the group-oriented concurrent-chains arrangement and the social validity questionnaire. Of the 11 students who completed the questionnaire (Erin was absent), both assessments identified the same preferred contingency for nine students (82%). Of the students that did not show agreement between assessments (Mike and Mark), it is interesting to note that the probability of their initial-link

Fig. 1 Rate of talking out (top panel) and percentage of intervals with off-task behavior (bottom panel) for all students during the baseline, efficacy, and preference evaluation phases

selections being chosen and implemented during the terminal link was very low compared to the other students' selections. Participants for whom we observed agreement between the assessments had a probability of their selections chosen of at least 0.7.

The teacher's responses on the questionnaire mirrored the students' responses in that the teacher indicated that she observed fewer classroom disruptions and improved work performance when the group contingencies were in effect. Interestingly, the teacher reported that she most preferred the dependent group contingency, despite its lack of preference by the students. The teacher stated it was preferred because it was "mysterious" and no one was aware of the target student's identity.

Discussion

The results of the current study demonstrated the effectiveness of the group-oriented concurrent-chains arrangement to identify eighth-grade students' individual preferences for behavior-change procedures. During the efficacy assessment, implementation of all three group contingencies resulted in a decrease of off-task behavior and talking out. During the preference evaluation, all students selected their preferred group contingencies by circling the name of the game (i.e., group contingency) they wanted to experience; the teacher then randomly selected one card each day and implemented the associated contingency. Despite the teacher always (by chance) selecting the independent group contingency, clear individual

Fig. 2 Individual preference results for 12 participants during the preference evaluation

preferences were established for a majority of the participants. Many of the participants preferred the independent group contingency, but some students preferred the interdependent group contingency. These data suggest that when different behavior-change procedures show similar efficacy, one variable to aid in deciding which procedure to implement might be consumer preference.

The results of the social validity questionnaires were very informative with respect to implications of the group-oriented concurrent-chains arrangement. The majority of students were able to specify their preferred group contingencies via a

questionnaire, but two participants identified different contingencies than when directly assessed. These data suggest that simply asking participants what they prefer may not be sufficient or accurate and emphasize the need for efficient and effective preference procedures. Additionally, the teacher indicated that the dependent contingency was her most preferred contingency even though it was least favored by the students. The teacher indicated that she liked the dependent contingency because no one was aware of the target student; however, if these results were to be replicated with additional teachers, they might be cause for concern. Specifically, teachers should

Table 2 Preference evaluation results

Participant	Preference evaluation results	Questionnaire results	Correspondence yes/no	Probability of selections chosen
Betty	Independent	Independent	Yes	0.7
Elisa	Independent	Independent	Yes	0.8
Erin	Interdependent	–	–	0.3
Ian	Independent	Independent	Yes	0.8
Jessica	Independent	Independent	Yes	0.8
John	Independent	Independent	Yes	0.8
Larry	Independent	Independent	Yes	0.8
Marian	Independent	Independent	Yes	0.8
Mark	Interdependent	Independent	No	0.0
Mike	Interdependent	Independent	No	0.2
Tom	Independent	Independent	Yes	0.8
Zara	Independent	Independent	Yes	0.8

Data are missing for Erin's questionnaire results because of an extended absence from school. Correspondence data were not obtained for Erin without the questionnaire results

select interventions that are effective and preferred by the direct consumers (students); selection for alternative reasons should be supported by data. Therefore, future research might assess the variables that affect teacher selection of behavior-change procedures. For example, one could argue that the data collection method associated with the dependent group contingency was simpler compared to the others because only one student's behavior was recorded. As a result, the dependent group contingency may have been viewed as less effortful than the other contingencies, supporting the influence of response effort on preference.

This study replicated the results of Layer et al. (2008), which showed the group-oriented concurrent-chains arrangement was effective in identifying individual preferences of several participants simultaneously. The current study also extended Layer et al. in several ways. First, the current study used students enrolled in a general education eighth-grade classroom where the teacher, who served as the implementer, had identified disruptive behavior that warranted intervention. It is important to continue evaluating the effectiveness of not only the group contingencies but also the group-oriented concurrent-chains arrangement with a variety of populations to assess their generality. Second, we evaluated preference for different behavior-change procedures as opposed to discrete items (i.e., food) within the group format. Preference for behavior-change procedures has been evaluated within a concurrent-chains arrangement previously (e.g., Brower-Breitwieser, Miltenberger, Gross, Fuqua, & Breitwieser, 2008; Luczynski & Hanley, 2009; Tiger, Hanley, & Heal, 2006); however, the addition of the group component better represents the natural classroom environment. That is, students in a general education classroom rarely work in one-on-one settings with the teacher that allow for individual assessment. The group format likely introduced some variance

not typically associated with one-on-one settings. Specifically, if students selected different initial links during any given trial, the group format reduced the probability that each student experienced his or her selection, which could decrease the accuracy of the concurrent-chains arrangement. In our study, we observed that the majority of students continued to allocate responding toward only one of the alternatives regardless of whether their terminal link was experienced. Future research may evaluate the variables that influence preference differently when assessed in one-on-one and group formats.

Third, we collected supplemental social validity data from the students (consumers). The social validity data allowed us to gather subjective data about the procedures that may not always be addressed in the behavior-analytic literature. Additionally, we gained insight as to why some students made the initial-link selections they did (e.g., reliance on one's own behavior rather than peer behavior). The final question on the social validity questionnaire asked students to state which contingency was most preferred, as a way of measuring whether the written responses matched the repeated-selection responses during the group-oriented concurrent-chains arrangement. For many of the students, preferences aligned, suggesting that the group-oriented concurrent-chains procedure may not always be necessary if a simple question could yield the same outcome. However, it is important to note that the preference evaluation was brief (less than 3 min in duration) and not all students' preferences matched. Therefore, future research might investigate under what conditions students may repeatedly select and experience a behavior-change procedure but report a different procedure as most preferred when asked to respond in writing. Overall, these data support the use of a relatively efficient method for identifying individual preferences that may be used in educational settings with students of various ages.

The results of this study have implications for teachers that support the use of the group-oriented concurrent-chains arrangement in the classroom. First, the preference evaluation allowed for each student to play an active role in his or her educational experience by indicating to the teacher which behavior-change procedure was most preferred. Heal and Hanley (2007) showed that preschoolers' least preferred instructional contexts resulted in the highest rates of undesirable behavior. By incorporating students' preferences into the daily routine, teachers may observe decreases in undesirable behaviors that could lead to additional instructional time. Second, the initial-link selections were made individually and privately, without other students seeing other students' selections. This type of voting procedure is not commonly used in classrooms because of the perceived time needed compared to simply having the students raise their hands. Hand raising may not be a desirable method of indicating preference because other students have an opportunity to influence votes and thus the obtained results may not be accurate and representative of the students' true preferences. Finally, by conducting the group-oriented concurrent-chains arrangement, teachers, paraprofessionals, and administrators gain access to valuable data that can be analyzed and perhaps generalized across settings, instructional procedures, and topics. Future research could evaluate the generalizability of the procedure and long-term effects, including changes in disruptive behaviors and academic performance.

Despite the clear individual preferences observed, we identified a few limitations of this study that could be addressed with future research. We evaluated the effects of the group contingencies using a multielement design but could have increased the strength of the design by continuing the efficacy phase for additional sessions or by repeating the baseline and efficacy phases (with a reversal design). Due to uncontrollable events and time constraints associated with the end of the school year, we were only able to conduct three sessions of each group contingency during the efficacy phase, which may not have been enough exposure for the students prior to the preference evaluation. Despite the limited number of efficacy sessions, we did show that all three group contingencies decreased off-task behavior similarly from baseline levels; however, it appeared that the interdependent group contingency was more effective at decreasing talking out than the independent and dependent group contingencies. Therefore, future research might evaluate the conditions under which it is best to select a behavior-change procedure via consumer preference if differential efficacy of the procedures is observed.

Second, only the independent group contingency was implemented during the preference phase, due to a majority of students selecting the independent group contingency and the random selection by the teacher. As a result, students'

preferences for the independent group contingency may have been influenced. However, some of the students demonstrated a preference for the other contingencies, suggesting that only experiencing one group contingency during that time may not have affected the selection responses. Still, additional research is warranted to evaluate this phenomenon and might be accomplished by exposing the students to all three group contingencies evenly during the preference evaluation and contriving the teacher selections (drawn from the bag following student selections). Third, the current study showed that students in the same class preferred different behavior-change procedures. These data may lead teachers to question how they should select behavior-change procedures to implement in the classroom given that one procedure will likely not be the most preferred by all students. Therefore, future research should systematically evaluate whether the selection procedure differentially affects appropriate and problem behaviors. Finally, we were unable to collect any follow-up data due to the end of the academic year. Future studies could evaluate the durability of these procedures by collecting maintenance data on students' behavior, whether students' preferences changed over time with additional exposures, and teacher adherence to the procedures following termination of the study.

Implications for Practice

- This study is an extension of previous research on the use of the group-oriented concurrent-chains arrangement in a public education setting.
- This study is an extension of previous research on the use of the group-oriented concurrent-chains arrangement to identify individual preferences for instructional procedures.
- The same preferred instructional procedures were identified via the group-oriented concurrent-chains arrangement and traditional means (questionnaire).
- Participants reported favorable opinions of group contingencies and the preference evaluation.

Funding This study was not funded.

Compliance with Ethical Standards

Conflict of Interest Kristina K. Vargo declares that she has no conflict of interest. Kathleen Becknell declares that she has no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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