Journal of Behavioral Education (2023) 32:690–702
https://doi.org/10.1007/s10864-022-09467-4

ORIGINAL PAPER

A Group Contingency to Increase Walking Speed At a Residential Summer Camp

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Accepted: 24 February 2022 / Published online: 16 March 2022

Abstract

Groups of children often transition between activity spaces in both academic and recreational settings. In schools, children may be asked to walk as a group between the classroom and spaces such as a cafeteria and playground whereas summer camps similarly use different spaces for separate activities throughout a scheduled day. Interdependent group contingencies have previously addressed school-based transitions (e.g., *timely transitions game*); however, limited research has applied similar interventions to recreational settings such as summer camps. An ABAB design was used to evaluate an interdependent group contingency with visual feedback to increase walking speed between activities across one group of seven 10- to 11-year-old boys at a residential summer camp. The results showed that the intervention was effective to increase the average speed walking, in feet per second, for the group of boys. Further, there were high rates of intervention fidelity, and acceptability among camp counselors.

Keywords Group contingency · Summer camp · Transition

Children with disabilities often receive services and participate in structured activities during the summer when they are not receiving school-based services (Koegel et al., 2019). One type of program activity where children can be supervised, and experience recreational learning opportunities is a residential summer camp. Over ten million children attend a summer camp program each year where caregivers report that their children develop skills and have meaningful experiences each summer (Henderson et al., 2007). Typically for periods of 1 week or more, children will stay on a campus under the supervision of counselors and engage in activities across a variety of domains (Thurber et al., 2007). Summer camp provides opportunities

Thank you to Zoe Miller and Gemima Fauvel, EdS for their assistance with this study.

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for engagement in various activities, in addition to practicing appropriate behaviors and social skills (Brown, 2005). Residential summer camp programs for youth with social, emotional, developmental and learning disabilities have been effective at improving social skills (Flynn et al., 2019). These programs develop skills through in situ learning and structured skill building instruction. Caregivers of camp participants reported that they send their children to camp primarily to have fun, promote family values, and increase self-esteem (McCole et al., 2019). That being said, programs that serve predominantly youth with disabilities may observe disruptive behavior or skills deficits that may preclude some from experiencing the fun recreational experience with their peers. There is unfortunately limited behavior intervention research published in a recreational summer camp setting that addresses that directly.

Similar to school environments, summer camps frequently require activity-to-activity transitions where groups of children must walk from one activity space to another. Slow transitions between activities have impacted the classroom environment with significant increased problem behavior (VanMaaren et al., 2020), lost instructional time (Campbell & Skinner, 2004), and increased teacher frustration due to slow walking (David & Sullivan, 2005). Children are also more likely to engage in problem behaviors during transitions between activities (VanMaaren et al., 2020). In addition to changes in behavior, slow transition speeds can result in significant lost program time. Campbell and Skinner found that waiting for appropriate behavior to transition occupied approximately 23 min per day in a general education classroom and similarly, Hawkins et al. (2015) reported that upwards of 12 h of instructional time in a school year could have been lost due to these delays during transitions. The average walking speed for 10- to 11-year-old students in a school hallway is 4.6 ft/s whereas the slowest a teacher would find acceptable if one of their students had a mobility problem was 2.9 ft/s (David & Sullivan, 2005). It is important to note that these measurements were conducted indoors on a flat surface. When these transitions move outdoors, transition speed is expected to be slower due to changes in gradient and traversing uneven surfaces (Magyari-Sáska, & Dombay, 2012). When children are walking slower than expected, it stands to reason that problem behaviors may be more likely to occur, thus resulting in delays to prescheduled activities.

Campbell and Skinner (2004) implemented an interdependent group contingency with explicit timing procedure (i.e., *timely transitions game)* to reduce transition times among a class of sixth grade students in a general education classroom. An interdependent group contingency is an intervention strategy where a consequence is delivered based on the behavior performance of a group of individuals. In this case, the goal, or performance expectation, was for the entire class to meet the criteria of a reduced transition time (Campbell & Skinner, 2004). The behavior of each individual of the group is interdependent in that all participants must meet the criteria for the group to access the reward. If the time required for the class to line up was less than the criterion selected, the students earned a letter to spell a word (e.g., P-A-R-T-Y). When the word was complete, the students received access to that reward (e.g., class party). At the start of the intervention, the class was informed of the rules of the *timely transitions game*; students were told the time to line up for

the transition would be recorded (i.e., explicit timing procedure) and if they did not exceed the randomly selected transition time, they would earn a letter toward the larger group reward (i.e., interdependent group contingency). There was no punitive action for exceeding the goal criterion. Although the researchers proposed an ABAB design, the teacher declined a brief withdrawal of the intervention which resulted in an A-B design. There was an immediate decrease in time for transition; however, without replication of the experimental effect, the researchers did not control for threats to internal validity.

To address that methodological limitation, Hawkins et al. (2015) implemented a randomized interdependent group contingency to address transition behavior across three classrooms using a series of ABAB designs. Rather than measure the time required to line up, Hawkins et al. measured the percent of students prepared to begin class at the start time. The criteria to access the reward (i.e., number of students ready for class) as well as the specific reward were randomized each session. Hawkins et al. found that an interdependent group contingency was effective at increasing the proportion of 11- to 14-year-old students with emotional and behavioral disorders at an alternative school setting who are ready to begin class on time during transitions, extending the demonstration of this intervention to an alternative setting with youth with disabilities.

VanMaaren et al. (2020) extended this work further to address student behavior while walking between rooms in a summer program at a community school setting. In this variation of an interdependent group contingency to address transition behavior, VanMaaren et al. measured disruptive behavior during hallway transitions. The criteria to access the group reward was based on the frequency of disruptive behavior while the group walked from one room to another within the school building. While this was the first demonstration of this intervention outside of the classroom setting, the researchers focused on a reduction in disruptive behavior and conducted measurement inside a building (i.e., hallway). Van Maaren et al. found a reduction in total transition time, yet that was not a focus of their study as treatment decisions were based on the rate of disruptive behavior.

Previous demonstrations of an interdependent group contingency on the transition behavior of elementary (e.g., Campbell & Skinner, 2004) and middle school classes (Hawkins et al., 2015) were effective for reducing time to line up and increase percent of students prepared at the start of a lesson, respectively. Additionally, this intervention has been generalized to a summer program reducing disruptive behavior during hallway transitions (VanMaaren et al., 2020). The current study extends that previous work by measuring walking speed during transitions between activity spaces in an outdoor recreational environment. This study addressed the following research questions: (1) Is there a functional relation between the implementation of an interdependent group contingency and the increase in walking speed for youth with disabilities at a residential summer camp? And (2) do staff report the interdependent group contingency to be a socially valid intervention to address transition speed for youth with disabilities at a residential summer camp?

Method

Participants and Setting

This study took place at a residential summer camp program for youth with social, emotional, or behavioral challenges in the northeastern USA. Approximately 44% of youth who participated in camp programming (hereafter *campers*) are white, 25% are Black, 15% Latino and 15% identify as multiethnic. Approximately 50% of camper families were eligible for scholarship or agency funding to send their child to camp. By enrolling their child in the program, all families provided consent for behavior intervention services and data collection within the scope of the summer camp program. This study then received approval by the university ethics review committee and the review panel of the residential summer camp for retrospective release of intervention data. This camp program served approximately 175 children for a 10-day session; however, each group of campers (i.e., *bunk*) consisted of 5 to 7 children. A bunk of campers was included in the intervention protocol if camp counselors reported the bunk walking slowly between activities without reported gross motor deficits, and not concurrently receiving interventions targeting transitions between activities.

One bunk of seven campers, ages 10 to 11 years old (M = 10.73 years old) participated in this study. All campers identified as male. Four of the campers had a diagnosis of autism spectrum disorder (ASD), four of the campers had a diagnosis of attention-deficit/hyperactivity disorder (ADHD), four of the campers had a diagnosis of learning disabilities, and four of the campers had a diagnosis of anxiety; the total count of diagnoses is greater than the number of child participants due to comorbid diagnoses. Caregivers provided diagnoses upon application to the summer camp program. The residential summer camp could not provide individual participant diagnoses.

Staff participants included two camp counselors, two intervention specialists, and their supervisor. The camp counselors implemented and rated the social validity of the intervention whereas the intervention specialist and their supervisor conducted all data collection procedures. One camp counselor identified as a white/nonhispanic male and the other identified as an African-American male. One camp counselor had worked previously at this summer camp for one year whereas the other camp counselor was in his first year of employment; they were 23 years old and 18 years old, respectively. All camp counselors participated in a 50-h training (e.g., didactic instruction, role-play, rehearsal, and specific performance feedback) prior to the arrival of campers to learn the skills of the job.

The supervisor was a doctoral-level board-certified behavior analyst with 10 years of experience supervising behavioral intervention at summer camp programs serving youth with disabilities. The intervention specialists had a bachelor's degree, and master's degree, respectively, and a minimum of one year of previous experience in providing intervention to youth with disabilities. Prior to this intervention, both intervention specialists had been trained on data collection procedures using a behavioral skills training approach. The supervisor of

the intervention specialists provided a didactic training on data collection and initially modeled data collection procedures. Then the intervention specialists rehearsed data collection procedures with a different group of campers alongside the supervisor. The intervention specialists demonstrated greater than 80% agreement with the supervisor for data collection across three observations prior to initiating data collection procedures for this intervention.

All phases of the study took place on the campus of the residential summer camp. More specifically, all transitions between activities were outside on well-maintained packed-dirt trails with gradual changes in elevation between camp buildings during the summer season.

Materials

A timer (estimated $10 United States Dollar [USD]) and a laminated token board were used for the purpose of this study. Additionally, individually wrapped candies were used as a reward for when the group of campers met reinforcement criteria. Two stopwatches (estimated $20 USD), clipboard and data sheet were used for data collection purposes. Additionally, the intervention specialists used a 12-in contractors measuring wheel (estimated $60 USD) to calculate the distance between buildings. Total costs for intervention materials were under $20 USD to conduct this study and data collection materials were estimated to cost approximately $80 USD.

Dependent Measures and Data Collection

The primary dependent variable was the campers' walking speed in feet per second. The intervention specialists recorded the duration of each transition. The transition duration began when the first camper passed the doorway of the starting activity and terminated when the final camper passed the doorway of the destination; duration was measured to the nearest second. Following each session, the intervention specialists calculated the walking speed by dividing the distance between each building in feet by the duration of the transition in seconds. Distance was measured using a contractors measuring wheel from the doorway of each activity to the nearest inch.

A camp intervention specialist independently measured the distance between buildings before intervention procedures began and wrote the corresponding distance on a marked data sheet. Distance between buildings ranged from 237 ft 4 in to 2257 ft 10 in. During all phases of the study, the intervention specialists independently measured the duration in seconds and recorded all data on a corresponding data sheet. No other camper outcomes were collected.

Interobserver Agreement

Two intervention specialists and their supervisor recorded the duration of transition throughout intervention procedures. Two intervention specialists independently recorded duration data across 35.7% of all sessions (13.3% of baseline sessions and 61.5% of intervention sessions). Interobserver agreement (IOA) on distance in feet

was independently collected by a second intervention specialist and reported for the same sessions in which IOA was measured for transition duration. The initial distance between buildings was measured prior to intervention procedures whereas the secondary measurement was collected after-the-fact so that IOA on distance can be reported for the same sessions in which duration data were reported. IOA for both duration and distance was calculated by dividing the smaller value by the larger value and then multiplying by 100. IOA for duration and distance were high with low variability (M = 98.9%, range = 91.7–100%; M = 96.9%, range = 91.8–99.8%, respectively).

Treatment Integrity

A seven-item treatment integrity checklist (see supplemental materials) was used by the intervention specialists to measure the steps complete during each transition during the intervention. Each step must be completed accurately in the order prescribed to be marked as correct. Treatment integrity was calculated across the intervention by dividing the steps complete by seven and multiplying the resulting value by 100. Treatment integrity was collected for 53.8% of intervention sessions. Overall, treatment integrity was high across observed sessions with an average of 98% treatment integrity (range = 85.7–100%). Treatment integrity was at 100% for all but one session where the intervention specialist did not observe the staff member recite the rules of the intervention prior to starting the timer.

Social Validity

Following the end of the intervention, the supervisor administered the Behavior Intervention Rating Scale (BIRS; Elliott & Treuting, 1991) to the camp counselors who worked with the participating campers. The BIRS contained 24 questions measured on a Likert-scale measuring the perceived acceptability, the intervention's effectiveness, and the length of time to effectiveness for the intervention. Camp counselors rated each item on a scale from strongly disagree to strongly agree which correspond to a value of one and six, respectively. The items for each scale were converted to the numerical value and an average was computed for each scale.

Procedures

An ABAB design was used to assess the effectiveness of the interdependent group contingency with visual feedback for increasing walking speed for youth with disabilities at a residential summer camp. A bunk of campers was referred for intervention on their walking speed on day five of the camp program. The bunk of seven participants were one unit for the purpose of this study. Phase changes alternated by day; thus, the intervention was four days in total duration. Each day consisted of six to eight eligible transitions where the entire bunk would transition independently between activities. The daily activities were similar yet there was some variability to the distance for each transition. The study could not be extended further due to

the short duration of the program; campers went home the day after the intervention ended.

Baseline

During the baseline phase, the camp counselors conducted all transitions as they normally would (i.e., "business as usual"). A staff member stood in front of the group of campers at the end of the previous activity, stated that it was time to leave, and stated what the next destination was for their group. The camp counselors and campers then walked from the doorway of that activity space directly to the next activity space, without stopping. The camp counselors briefly prompted the campers to walk together as a group, but no additional prompts were provided. The intervention specialist discretely collected the transition duration, in seconds; the intervention specialist did not disclose the duration to the campers or camp counselors.

Group Contingency

The goal is to decrease the total duration campers walk between activities and thus increase the transition speed of the group. Following baseline, the intervention specialist calculated the goal criteria for transition duration to increase the speed by 10% from baseline. This was calculated by multiplying the average speed from baseline by 1.1 to obtain the goal. A 10% goal was selected as that resulted in a moderate increase in walking speed for trail walking. The intervention specialist then calculated the transition duration required to achieve that goal speed for each activity transition (i.e., distance/speed = duration). As the duration between activities varied, the specific duration for each transition corresponded to the time required to meet the speed goal.

Prior to each transition, a camp staff member reviewed the expectations for the transition with the campers. They stated; "We are about to play a game. Your bunk will earn a prize when we beat the clock to our next activity. The entire bunk must work together in order to receive a prize. If by the end of the day you beat the clock 6 times, you get a prize. Either the whole bunk gets the reward, or no one gets a reward." The staff member then confirmed all campers are present, told the group the time required to beat for this transition and showed the campers the timer. The staff member began the timer and said "go". Upon arrival at the destination, the staff member stopped the timer, told the campers if they met the goal, and provided vocal performance feedback (e.g., "you all walked so quickly to the activity—great work!"). Throughout the transition, the counselor held the timer for the campers to see as they were walking to the next activity; the campers could continuously see the time remaining to achieve the goal. Upon arriving at the end of the transition, the counselor held up the token board. The entire group must complete the transition faster than the goal criteria to receive a star on the board. If they met the goal, the staff member placed a star on the token board while providing performance feedback. If the bunk did not meet the goal, the counselor stated, "you did not beat the clock this time. Next time, you can walk a little faster to beat the clock and earn a star."

At the end of the day, if the token board was filled, the staff member praised the group of campers, and distribute one piece of candy to each camper. At the beginning of the camp session, camp counselors asked the campers what are some preferred snacks that the group would like to earn. Candy (i.e., Air Heads) was selected because this was a preferred edible item for the group, as reported by camper and camp counselors, and candy was restricted throughout the summer camp program, and thus perceived as a special treat. All campers received the same type of candy.

Results

Figure 1 represents the walking speed for the group of campers across conditions. During baseline, there was an initial increasing trend, with a decrease for the final two transitions. The final transitions of the day were at the same level as the first session ($M = 3.1$ ft/s; *range* = 2.5–3.8 ft/s). Thus, the goal during intervention was set at 3.5 ft/s; that corresponds to a hiking pace of approximately 25 min per mile. Upon implementation of the group contingency and visual feedback intervention, there was an immediate increase in level. There was an increasing trend initially; however, the day ended with a decreasing trend. All intervention transitions were above the goal, and the campers earned the prize at the end of the day ($M = 5.1$ ft/s; *range* = 3.6–5.9 ft/s). All but the final intervention session was greater than all previous baseline sessions. Upon return to baseline, there was an immediate decrease in level ($M = 2.5$ ft/s; *range* = 1.6–3.3). There was some variability observed, with an increasing trend at the end of the return to baseline. There was

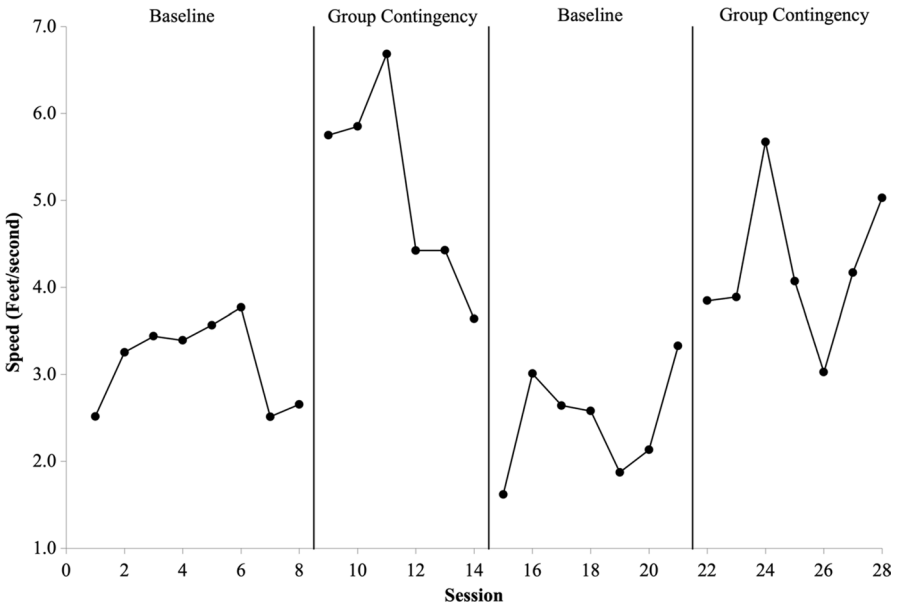

Fig. 1 Walking Speed in feet per second across conditions

no overlap between the first intervention phase and return to baseline. Upon final implementation of the intervention, there was an increase in level, with considerable variability across sessions (M = 4.2; range = 3.0–5.7 ft/s). The campers surpassed the speed goal for all but one session; however, they still obtained the goal of exceeding the goal for six transitions in the day.

Figure 2 represents the duration and distance for each transition separated by condition. Each transition is represented by a point on the scatterplot with baseline sessions represented by the open square, and group contingency intervention sessions represented by the filled in circle. Although the transition distance varied both within and between phases, there is a clear difference in level between baseline and group contingency sessions. As distance increased, there was a corresponding increase in duration of the transition; however, the intervention sessions maintained a faster speed, as represented by the lower trend line during the group contingency sessions.

Camp counselors completed the social validity questionnaire upon completion of the second intervention phase. Camp counselors rated the intervention as highly acceptable with an average rating of 5.3 out of six (*range* = 5.2–5.5). Thus, on average, the camp counselors rated questions regarding the intervention acceptability between *agree* and *strongly agree*. The camp counselors rated the intervention effectiveness and time to effect both slightly lower ($M = 4.4$, *range* = 4.0–4.7 and $M = 4.8$, *range* = 4.5–5.0, respectively); however, on average, camp counselors *agree* that this intervention was effective and they quickly observed the intervention effectiveness.

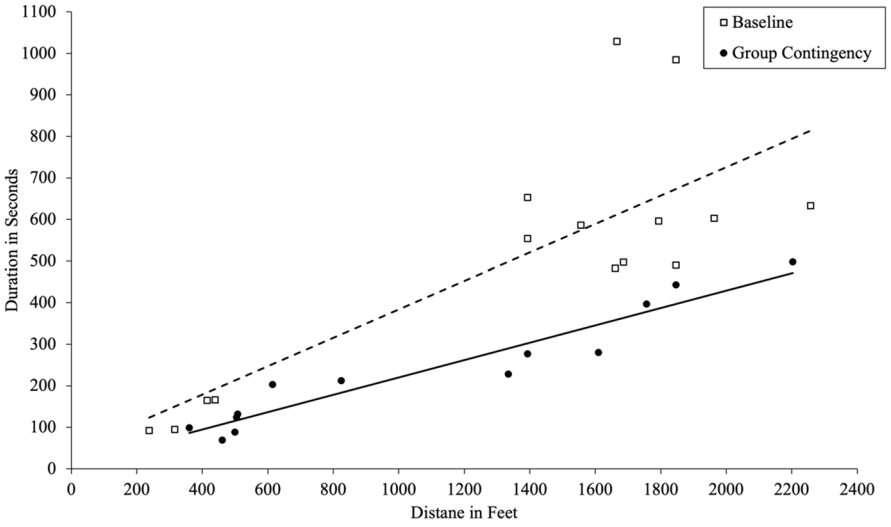

Fig. 2 Scatterplot of duration and distance across conditions. Note: Dotted line represents the trend line for baseline transitions and the solid line represents the trend line for group contingency transitions

Discussion

This study showed that this interdependent group contingency with visual feedback was a low cost and feasible intervention to implement in a residential summer camp setting to increase walking speeds between activities. Previous research has demonstrated that similarly structured interventions (e.g., *timely transitions game*) were effective in reducing the duration of transitions (Campbell & Skinner, 2004), increasing percent of children ready to begin a lesson on time (Hawkins et al., 2015), and decreasing disruptive behavior (VanMaaren et al., 2020). Due to the changes in distance between activities, this study needed to measure speed, rather than simply transition duration. When adapted to measure walking speed in an outdoor context, there was an immediate change in level, and increase in average walking speed during intervention compared to baseline performance. The average walking speed across both baseline phases was 2.8 ft/s whereas the average walking speed during intervention increased to 4.7 ft/s. This intervention required minimum resources and was able to rapidly increase transition speed to an acceptable level. Camp counselors who implemented the intervention found the intervention to be highly acceptable and agreed that the intervention was effective and took little time to demonstrate a change in behavior.

Summer camp environment is a highly relevant setting for behavior intervention, and future research should continue in this domain. Limited behavior interventions have been studied in this recreational context; however, youth with disabilities are often in need of support during school holidays (Koegel et al., 2019). While many summer programs have recreational goals, disruptive behavior may interfere with having fun and fully experiencing the summer camp program. Thus, more information is needed about applying efficient, effective interventions within this setting to support both children and the staff. This intervention required minimal financial investments and resulted in a marked time savings. Campers walked approximately two miles per day outside on the trails between activities and the increase in average speed resulted in a clinically significant decrease in transition time throughout the day. This group saved an estimated 24.6 min time walking between activity spaces throughout a day. In other words, the campers spent 2.9 h more per week in activity spaces rather than walking between activities.

This further required minimal materials to implement with fidelity. The materials were estimated to cost under $20 USD to conduct the intervention where in some cases, this may not result in any additional costs to conduct this intervention. The primary material was a timer to display the transition time, and some small candies as a backup reinforcer. Alternatively, interventionists may already have a stopwatch or can download a free app on a smartphone to use in the same purpose. Small candies were used as reinforcers for this study as candy was not otherwise available and was reported by the campers to be highly valuable; there are also a variety of free or low-cost reinforcer alternatives that may be able to be used instead to lower the costs further. The greater expense in this study was the data collection materials—if the transition distance is held constant, or the distance is already known, there may be no additional expenses to implement this group contingency.

For ease of intervention implementation, data were collected on the total duration of transition for the group, and the transition goal was presented as a time in duration for the group to beat. Thus, the duration was different across each activity transition as the distance varied; the goal speed was held constant. The time recorded was for the group, as the intervention criteria required all members of the group to complete the transition faster than the goal stated. While this made for a low-effort data collection procedure, the group speed had to be calculated after-the-fact. This also resulted in individual participant data to not be collected. Future research should record data by participant and evaluate other outcomes such as disruptive behavior and other behaviors of concern. This could also include vocal statements of blame toward others or examples of cooperative behavior. Both of which sometimes occur in interdependent group contingencies (Davies & Witte, 2000) but were not feasible within this study. That would also allow for greater detail in describing the population for whom this is most effective.

This study used a rapid evaluation of the intervention using an ABAB design. Phase changes decisions were by day and decided prior to study implementation. Therefore, the experimental procedures were conducted over four days. Future research should evaluate this intervention across groups to determine if these procedures are applicable across multiple groups of participants, and if the change in walking speed will maintain over longer periods of intervention. The decision to change intervention phases by day was due to ease of implementation for the staff and campers; the procedures would remain consistent for the entire day. Future evaluations should use visual analysis to make phase changes based on stable responding. That change in future research may also better account for potential post-reinforcement pause, as the token exchange for the backup reinforcer was delivered at the end of each phase. A future replication of this intervention should better account for the durability of intervention effect, by either extending the intervention to have multiple replications of the token exchange for the backup reinforcer or provide a small reinforcer following each transition that meets the criteria.

Based on the current evaluation, it is unclear if all intervention steps were required. Future researchers should also consider a component analysis to determine if the rules, visual feedback, tokens and backup reinforcers are necessary to maintain the effect found in this study. It is unclear if the visual prompt in the form of the timer provided a significant additional benefit. If some components are deemed unnecessary to demonstrate a comparable effect that may result in a lower cost and easier to implement intervention than what was demonstrated in this study. Although an unstructured group preference interview was conducted, no structured preference assessment was conducted; future research may use a preference assessment to verify the reinforcer used in the intervention would be of value to the participating campers.

In conclusion, this study demonstrated the effectiveness of an interdependent group contingency with visual feedback to increase speed walking during transitions between activities at a residential summer camp for children with disabilities. Using a reversal design, the group of campers increased their speed walking during the intervention, returned to baseline levels upon withdrawal of the intervention, and then increased their speed once again during the replication of the intervention

effects. The camp counselors reported this intervention to be acceptable and effective for addressing slow transitions between activities at the outdoor recreational setting. This strategy is a low cost, and low effort strategy to support effective transitions for a group of participants that could be applied to schools, afterschool programs and other recreational settings where groups of participants must move between activities together.

Funding Open Access funding enabled and organized by CAUL and its Member Institutions.

Declarations

Conflict of interest The author declares no conflict of interest.

Ethical Approval This article does not contain any studies with animals performed by any of the authors; all procedures with human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and comparable ethical standards.

Informed consent Informed consent was obtained in accordance with the institutional research committee standards.

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