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Effectiveness of behavioral skills training on staff performance in a job training setting for high-functioning adolescents with autism spectrum disorders

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ABSTRACT

Few studies have focused on improving staff performance in naturalistic training settings for high-functioning adolescents with autism spectrum disorders. Behavioral skills training, consisting of group instruction and supervisory feedback, was used to improve staff performance on (a) providing positive reinforcement, (b) providing error correction, and (c) initiating opportunities for students to show the target response (i.e. asking for help). Also changes in students' target response and generalization of staff performance were evaluated. Data were collected in a multiple baseline design across three staff skills. There were improvements in all staff skills and changes in 'error correction' as a result of intervention were statistically significant. Improvements in staff skills were maintained over time. Effects of intervention on students' target responses and generalization of staff performance, however, were limited. Staff evaluated the intervention as effective and acceptable. Implications of the findings and suggestions for future research are discussed.

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1. Introduction

Applied behavior analysis (ABA) is considered best practices for teaching adaptive skills to individuals with autism spectrum disorders (ASD) (Callahan, Henson, & Cowan, 2008; Sheridan & Raffield, 2008; Simpson, 2005). ABA consists of a range of procedures such as task analysis, modelling, prompting, fading, shaping, reinforcement, self-monitoring, role-play, and feedback, and has shown to be effective in teaching adaptive skills to children with ASD (see Arick, Krug, Fullerton, Loos, & Falco, 2005). ABA procedures have also been effective in teaching adaptive skills to high-functioning adolescents with ASD, although the number of studies in this target group is still small. In one of these studies, Palmen, Didden, and Arts (2008) demonstrated that a group training consisting of prompt fading, feedback, and self-management was effective in improving question-asking during tutorial conversations in nine high-functioning adolescents with ASD.

An important issue in implementing ABA procedures in educational and care settings for persons with ASD is staff training. Shortcomings in staff performance may have negative consequences for the student's progress and may even strengthen inadequate student behaviors (Dib & Sturmey, 2007; Koegel, Russo, & Rincover, 1977). Studies have been published on improving accuracy of staff performance when teaching students with ASD. They have evaluated highly structured strategies with children on a one-to-one basis, such as discrete trial teaching (e.g. Dib & Sturmey, 2007; Koegel

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et al., 1977; LeBlanc, Ricciardi, & Luiselli, 2005; Sarakoff & Sturmey, 2004, 2007) and assessing stimulus preferences (Lavie & Sturmey, 2002). These studies show that behavioral skills training packages (BST), consisting of instruction, modelling, rehearsal and feedback, are effective in improving staff performance.

Several studies have focused on implementing more naturalistic teaching procedures. For example, Schepis, Reid, Ownbey, and Parsons (2001) used BST with four support staff members to embed their teaching within the existing activities of five children with intellectual disabilities, of whom two also had autism, in an inclusive preschool. BST was aimed at improving staff members' accuracy in identifying and creating teaching opportunities and in applying least-to-most prompting, error correction, and reinforcement in teaching two students. Improvements in staff members' teaching strategies were accompanied by improvements in children's adaptive functioning. BST was also used by Wood, Luiselli, and Harchik (2007) in four direct care staff members who were trained to conduct non-verbal communication instruction with a non-verbal 24-year-old man with ASD and intellectual disability. Staff training was conducted under natural conditions at the man's group home and was effective in improving accuracy of instruction for all staff members. Generalization across staff behaviors, however, was not assessed.

Staff training for improving adaptive skills in high-functioning adolescents with ASD is an under-researched topic. The present study evaluated the effectiveness of BST on staff performance in a job training setting for high-functioning adolescents with ASD. Its purpose was to improve staff's performance on: (a) providing positive reinforcement following a correct target response (i.e. 'Asking for help') by a student, (b) providing error correction following an incorrect target response, and (c) initiating opportunities for a student to show the target response. Changes in students' target response were also evaluated. We also assessed if BST resulted in generalization of staff performance to an untrained students' target response (i.e. 'Working on a task'). Finally, data were collected on the acceptability of BST.

2. Method

2.1. Setting and participants

The study was conducted in the training centre of a treatment facility for persons with ASD. The centre provides educational services such as social-, leisure-, and job-skills training to students with ASD. Students were adolescents with ASD who had a (WISC or WAIS) verbal IQ of at least 70. All students had a diagnosis of ASD as established by a licensed psychiatrist according to DSM-IV criteria.

Participants were 4 staff members of whom two were females. Their mean age was 46 years (range: 41–50 years) and their mean work experience at the job training setting was 7.9 years (range: 3–15 years). Each staff member trained a group of students (3 or 4) at least two times a week. Staff members and students participated on a voluntary basis and informed consent was obtained from each of them.

Staff members provided job training in a simulated work setting. A training session lasted 50 min. The purpose of the training was to improve students' job-related skills such as technical job-skills, on-task behavior, keeping appointments, and communicative skills such as asking for help and greeting. Students performed job-related tasks during gardening, office cleaning, and industrial work. During these tasks, teaching opportunities for students' target responses could be initiated by the student by displaying correct or incorrect target responses as well as by staff members by evoking target responses from students.

Staff training consisted of one group session and six individualized supervisory feedback sessions per staff skill (see Section 2.8). The group session was provided in a therapy room and supervisory feedback was given in the job training room where the staff member conducted his/her job training.

Two psychologists working at the training centre participated as supervisors. Two undergraduate university students majoring in psychology participated as observers. Data on staff performance were collected during staff's regular job training sessions.

2.2. Materials

During the group session, written instructions were used for explaining (a) content of the training, (b) components and implementation of the staff skill, and (c) task analysis of the students' target response 'Asking for help'. Also, videotaped simulated staff–student interactions were shown. A checklist was used to evaluate staff performance in videotaped staff–student interactions and in role-play exercises. The checklist provided behavioral definitions of the staff skill and space for evaluating staff performance as 'correct', 'incorrect/omitted', or 'no opportunity'.

During supervisory feedback, supervisors used a flowchart depicting guidelines for feedback (see Fig. 1) and a checklist containing their registrations of staff member's performance during the regular job training session.

2.3. Recording

For each staff member, data were collected during 30 min observation periods which were scheduled between the 5th and 50th min of a job training session. Starting points of the observation periods were chosen at random. At the beginning of each observation period the observer recorded how many students participated in the job training. Then, a continuous 20 s

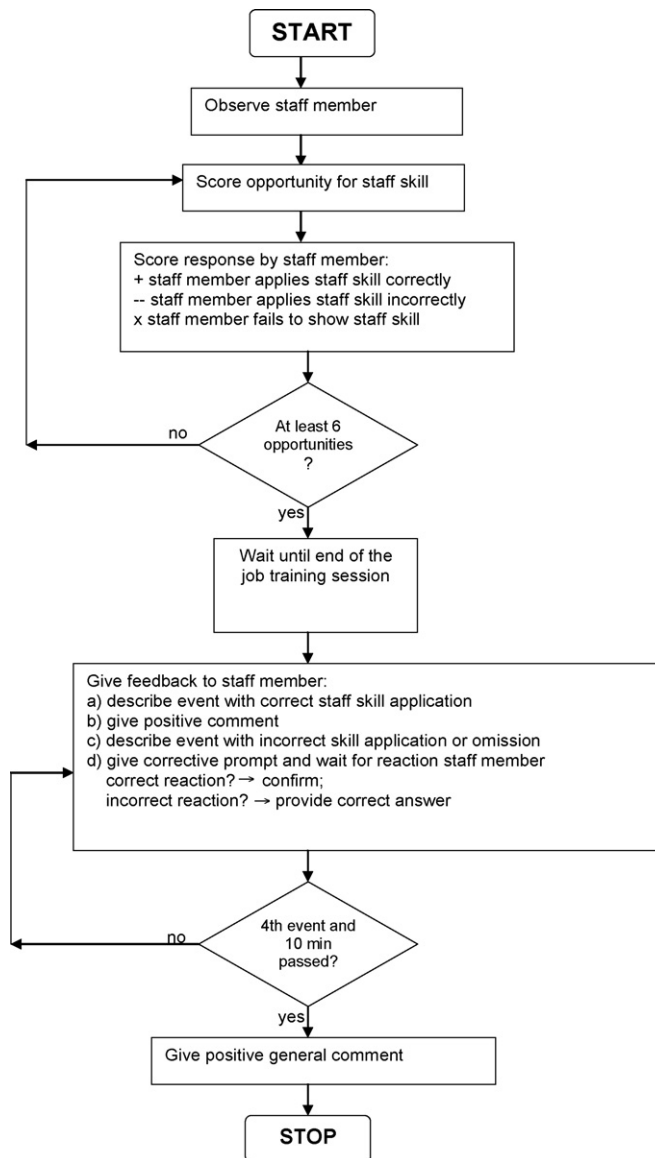


Fig. 1. Flowchart of the supervisory feedback procedure.

interval recording system was used to collect data on presence (+) or absence (–) of each of the following three categories: (a) correct question for help by a student (=opportunity for positive reinforcement), (b) incorrect question for help by a student (=opportunity for error correction), and (c) staff members' initiation of a question for help by a student (=opportunity for question for help).

If an opportunity was scored as present, it was subsequently recorded whether the staff member used that opportunity in a correct way, that is, whether he/she implemented reinforcement, error correction or response initiation correctly. If an opportunity was recorded during an interval but the scoring of staff member's use of the opportunity was not completed within that interval, scoring of the staff performance was completed in the next interval. Staff performance was recorded as correct if all the criteria of the staff skill were scored as present (+). Staff performance was recorded as incorrect if at least one of the criteria was scored as absent (–).

The observation categories were defined as follows:

Correct question for help by a student (opportunity positive reinforcement). This category was endorsed if a student asked for help in a correct way, that is: (a) student is at a distance of maximum 1.5 m from staff member, (b) student speaks in his or her customary voice (e.g. does not shout), (c) student makes contact with staff member (e.g. student calls name of staff member or touches him/her on shoulder), (d) staff member is not interacting with another person or is not otherwise occupied; if the staff member is occupied or interacting, student asks for permission to ask a question, (e) student's

question is related to his/her job task (e.g. “. . . , where can I find the screwdriver?”) and (h) question begins with an interrogative, such as ‘who’, ‘which’ or ‘where’.

Correct reinforcement following an opportunity for positive reinforcement. This category was endorsed if (a) staff member makes contact with student (e.g. calls name of student or looks at the student), (b) staff member provides a positive consequence (praise or other positive comment) following a correct question (e.g. ‘. . . , good question for help’, or ‘. . . , that was perfect, you asked me for help after I finished my conversation with. . .’), (c) consequence is given within 10 s after the correct question or, if the student has asked the question some time ago, staff member relates this comment to the correct question asked earlier (e.g. ‘. . . , 20 min ago you asked for a screwdriver by saying “Trainer, please could you help me by giving me a screwdriver”, I gave you this screwdriver, but I also want to let you know that you formulated your question in a perfect way; go on like this’), and (d) staff member answers question or gives the referent the student asked for.

Incorrect question for help by a student (opportunity error correction). This category was endorsed if the question for help by the student did not attain all criteria of a correct question (see *Correct question for help by a student*).

Correct error correction following an opportunity for error correction. This category was endorsed if (a) staff member makes contact with student, (b) staff member uses a prompt fading procedure to elicit a correct question for help; for example, if a student made an error by yelling the question (“Trainer, where do I find the scrubber”), staff member could use a silence cue or gesture prompt (e.g. waiting 5–10 s to enable the student to correct the question himself, or drop a hint by making a whisper sign); if this prompt was not effective, more assistance should be given, for example by using a verbal hint (e.g. ‘. . . . , there is something with your voice’), (c) prompt fading procedure was conducted within 10 s after the incorrect question, or staff member verbally relates the prompt fading procedure to the incorrect question asked earlier (. . . , 1 min ago you asked for a screwdriver by yelling your question, you can ask your question in a better way, how could you do that. . . ?), and (d) the prompt fading procedure results in a correct question.

Staff members’ initiation of a question for help (opportunity for a student to ask a question for help). This category was endorsed if a staff member prompts a student to initiate a question for help, by using a verbal hint (e.g. ‘. . . . , if you don’t know what kind of colour to use, what could you do to solve this problem?’), or instructing student to ask a question (e.g. ‘. . . , if you don’t know what kind of colour to use, you could ask me a question, let’s try . . .’), or using additional prompts (e.g. ‘. . . if you don’t know what kind of colour to use, you could ask me a question, let’s try, “trainer, could”’).

Correct initiation of a question for help. This category was endorsed if staff member’s initiation results in a correct or an incorrect question for help by the student.

2.4. Dependent measures

2.4.1. Staff performance

For each staff member, mean percentage *Correct reinforcements* was calculated by dividing the number of intervals with correct reinforcement by the number of intervals with an opportunity for reinforcement, multiplied by 100. This score reflects the proportion of the number of correctly applied reinforcements by staff members and number of opportunities for staff members to apply reinforcement.

Mean percentage *Correct error corrections* was calculated by dividing the number of intervals with correct error correction by the number of intervals with an opportunity for error correction, multiplied by 100. This score reflects the proportion of number of correctly applied error corrections by staff members and the number of opportunities for staff members to apply an error correction.

Mean percentage *Correct initiations* was calculated by dividing the number of intervals with correct initiation by the number of intervals with an opportunity for a question for help by a student, multiplied by 100. This score reflects the proportion of number of correctly applied initiations by staff members and number of opportunities for students to ask a question for help.

2.4.2. Student performance

The following measures were related to student performance: number of (a) correct, (b) incorrect, and (c) correct and incorrect questions for help asked per student and (d) response efficiency. The number of questions for help asked by each student were calculated by dividing the number of intervals with respectively correct, incorrect, and correct and incorrect questions by the number of students participating in the job training session.

Response efficiency was calculated by dividing the number of intervals with a correct question for help by the number of intervals with a correct or an incorrect question for help, multiplied by 100. This score reflects the proportion of number of correct questions and the total number of questions asked by students.

2.5. Generalization of staff performance

To assess whether generalization across student behaviors occurred, data were collected on staff’s application of *reinforcement*, *error correction* and *initiation* with respect to a second target response of students: ‘Working on a task’. During intervention, staff members did not receive feedback during their job training sessions on how to reinforce, correct or initiate

'Working on a task' by students. Generalization data were collected in the same way as the data regarding the target response 'Asking for help'.

The observation categories were defined as follows:

'On-task behavior' (opportunity positive reinforcement). This category was endorsed if a student who is working on a task shows one of the following behaviors: (a) student is engaged in the task as instructed by staff member, or (b) student is visually attending to the task activity or to the task instruction scripts, or (c) student is manipulating task materials appropriately.

Correct reinforcement 'on-task behavior'. Staff member gives reinforcement for students' on-task behavior in a correct way. This category was endorsed if (a) staff member makes contact with the student, (b) staff member provides positive consequences, praise or other positive comments following on-task behavior, and (c) staff member provides positive consequences contingent on 'on-task behavior' or, in stating a positive comment on on-task behavior shown earlier, staff member verbally relates this comment to the on-task behavior shown earlier.

'Off-task behavior' (opportunity response correction). This category was endorsed if a student who is working on a task shows behavior that does not attain one of the criteria of 'on-task behavior' (see 'on-task behavior').

Correct error correction 'off-task behavior'. Staff member applies error correction in a correct way. This category was endorsed if (a) staff member makes contact with the student, (b) staff member uses a prompt fading procedure to elicit 'on-task behavior' from the student, (c) staff member uses prompt fading contingent on 'off-task behavior', and (d) prompt fading results in 'on-task behavior'.

Staff members' initiation of 'working on a task' (opportunity for a student to start a task). This category was endorsed if a student has to start a new task and staff member prompts student to start a new task by using a verbal hint (e.g. '....., tell me which task do you want to do today?.....Ok, lets start'), or instructing the student to start a new task ('....., please paint the roof of this nest box in a green colour'), or using additional prompts ('.....please paint the roof with this colour, look ... – modelling the task –, go ahead').

Correct initiation of working on a task. This category was endorsed if staff member's initiation results in the student starting to work on a task.

Generalization data regarding staff performance were calculated in the same way as the dependent measures (see above).

2.6. Reliability of recording

During pre-baseline, a secondary observer received instruction on the observation categories and the recording system. During regular job training sessions, the secondary observer simultaneously but independently recorded at a distance of 1.5 m from the primary observer. Both observers used headphones which were connected to a mp3 player worn by the primary observer.

Interobserver agreement on occurrence (Mudford, Hogg, & Roberts, 1997) was assessed on an interval-by-interval basis and calculated by dividing the number of agreements by the number of agreements and disagreements, multiplied by 100. Collection of baseline data started after an interobserver agreement on occurrence of at least 80% was attained for each category.

During 15% of the sessions, reliability checks were conducted which were approximately equally distributed across participants and conditions. Mean reliability for all (i.e. 12) observation categories was 91% (range: 67–100%). Mean percentages of agreement on occurrence for the categories 'staff members' initiation of a question for help', 'correct initiation of a question for help' and 'staff members' initiation of working on a task' were somewhat lower, that is 75, 67, and 73, respectively. Mean percentages of agreement on occurrence for the other categories, however, were all above 90.

2.7. Design

Data were collected in a multiple baseline design across three staff skills (Kazdin, 2003). Pre-baseline lasted 8 weeks. Baseline conditions were in effect between 7 and 16 weeks. Intervention lasted 3–4 weeks, and post-intervention lasted 7 and 3 weeks for the first two staff skills. Follow-up data were collected 2 weeks after the intervention for the last staff skill (i.e. initiation).

2.8. Procedure

2.8.1. Pre-baseline

For each staff member, observers recorded data during at least 8 observation sessions to reduce reactivity for the presence of observers. No staff instruction or feedback was given nor did a supervisor approach staff member after a training session.

2.8.2. Baseline

During this phase no staff instruction or supervisory feedback was in effect. The number of recording sessions was 8, 14, and 20 for 'reinforcement', 'error correction' and 'initiation', respectively. Three weeks preceding the start of the intervention of a staff skill, the first author trained supervisors on procedures for recording and supervisory feedback. Supervisor training

consisted of three 45 min sessions and included verbal and written instruction on the definition of the targeted staff skill and on the feedback script, recording and evaluation of videotaped simulated staff-student interactions, modelling, role-play, and feedback. Two weeks preceding start of the intervention of the first staff skill, a supervisor was present during job training sessions. Immediately after a training session, the supervisor approached the staff member and held a conversation (its content was unrelated to staff performance) to control for increased supervisor attention during intervention.

2.8.3. Intervention

Intervention consisted of one 2-h group training session followed by six individual supervisory 10-min feedback sessions per staff skill. Data were collected after each feedback session and data were recorded during 6 observation sessions for each staff member.

2.8.3.1. Group training. The session consisted of (a) introduction, (b) instruction, (c) video evaluation, and (d) role-play, modelling and feedback.

(a) *Introduction.* Aim and content of the intervention was explained to staff members and students' primary (i.e. 'Asking for help') target response was defined.

(b) *Instruction.* Task analysis of the students' primary target response 'Asking for help' was reviewed and staff members discussed examples of the criteria of a correct target response. Then, the rationale of the staff skill was reviewed and staff members' experiences with the skill were discussed. Each staff member received a script with the criteria of the staff skill (see *Observation categories* of the staff skills).

(c) *Video evaluation.* Staff members were shown videotaped simulated staff-student interactions during job training. (Staff members and students who were depicted on the videotapes did not participate in the study.) Each interaction contained two elements: (a) student asks for help (in a correct or an incorrect way) or fails to ask for help, and (b) staff member responds. For example, in case of 'error correction': student: '... the hammer? (opportunity for error correction 'question for help'); staff member responds within 10 s: '... there is a hammer on the table' (staff member fails to provide error correction).

Trainer introduced a checklist to evaluate videotaped fragments and modelled the scoring and evaluation procedures thereby using several examples. Trainer prompted staff members by using a least-to most procedure to evaluate each component of the targeted staff skill. After this, all staff members simultaneously but independently scored eight videotaped fragments. Following each fragment, trainer provided feedback on staff members' evaluations. In case of an incorrect evaluation the trainer provided corrective feedback using written response criteria (see *Observation categories*).

(d) During *role-play, modelling and feedback*, each staff member took part in role-play exercises in which two staff members each played a different role (i.e. staff versus student). To promote generalization, four target responses (i.e. asking for help, on-task behavior, greeting, and consulting) by students were equally distributed across exercises. Roles of the student and staff member were (partially) described. Each role-play contained two elements: (a) student shows a correct or an incorrect target response, or shows no target response (=opportunity staff skill), and (b) staff member has to respond. For example, in case of the staff skill 'reinforcement': target response: 'Consulting'; role student: 'You are painting a nest box in a green colour; you think that it would be nice to paint the roof of the nest box in another green colour; you walk to your job trainer and you propose your idea to him/her "... I would like to ... what do you think of this idea?'" (correct consulting); role staff member: 'Student X approaches you and tells you something'. What do you do?..'. Following the role-play, the other staff members evaluated the role-play by scoring the presence or absence of each component of the targeted staff skill using the checklist (see Section 2.2). Then the trainer provided feedback. In case of an incorrect staff response, trainer modelled the correct staff skill and the role-play was repeated by the same two staff members.

2.8.3.2. Supervisory feedback. Six supervisory feedback sessions were conducted per staff member. Each feedback session lasted 10 min and was conducted immediately following the job training session in which supervisor collected data using the checklist of the targeted staff skill. During the job training session supervisors recorded at least six correct and incorrect applications of the staff skill that was targeted for intervention (see Fig. 1). Supervisor provided feedback using written response criteria of the targeted staff skill. The supervisory feedback (Arco, 2008) followed a 4-step script (see Fig. 1) consisting of (a) describing an event with a correct application of the staff skill, (b) praising the staff member for this correct staff skill, (c) describing an event with an incorrect application or omission of the staff skill, and (d) prompting staff member to avoid a future error or omission (e.g. reinforcement: '...can you tell me what you should do next time in case of a correct question ...'). If staff member failed to give an answer or gave an incorrect answer, supervisor provided the correct answer with help of the written criteria of the targeted staff skill. The feedback script was rehearsed for at least 4 observed events of the targeted staff skill. Finally, supervisor ended the feedback session with a positive comment about the job training session. At the end of the sixth feedback session, staff member was encouraged to continue applying the staff skill using the written instruction.

2.8.4. Post-intervention

Post-intervention was in effect for the first staff skill (i.e. reinforcement) and the second staff skill (i.e. error correction). Supervisory feedback was no longer given for that staff skill, but supervisory feedback was started for the new staff skill in intervention. Data were collected during 12 observation sessions for the first staff skill and during 6 observation sessions for the second staff skill.

2.8.5. Follow-up

During follow-up, staff members did not receive instruction and supervisory feedback sessions had been withdrawn for all staff skills. Data were recorded during 4 observation sessions for each staff member.

2.9. Acceptability

One week after the intervention for the last staff skill, data were collected to assess staff members' evaluation of the training procedure. A questionnaire was used that consisted of 15 questions regarding (a) acceptability of the content of the intervention, (b) efficacy of each of the intervention aspects, and (c) effectiveness of the intervention. Each question was rated on a 5-point Likert-type scale ranging from "1" (not at all) to "5" (very much).

3. Results

3.1. Staff performance

Fig. 2 shows the mean number of opportunities and mean percentage of staff's correct opportunities for 'reinforcement', 'error correction' and 'initiations' of questions for help across conditions. (No percentages were plotted for observation sessions in which no opportunities were observed.)

Mean percentages of *Correct reinforcement* and mean numbers of opportunities for reinforcement during baseline and intervention were 0% and 0.7%, and 3 and 4, respectively. During post-intervention, mean number of opportunities was 5 and mean correct reinforcement was between 0 and 31% of the opportunities (mean = 7%). Data show an increase in correct

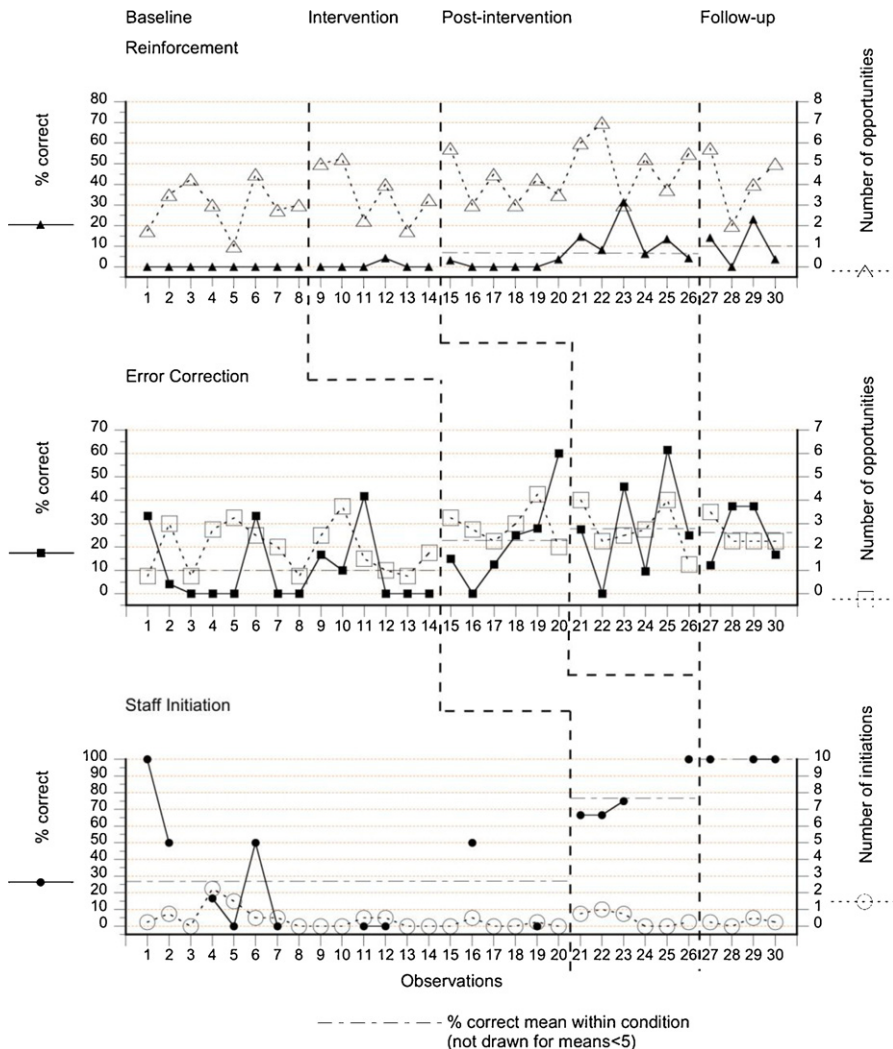


Fig. 2. Mean numbers of opportunities and mean percentages of correct opportunities for each staff skill, during each experimental condition.

reinforcement following session number 20. This may be the result of a generalization effect as intervention for the third staff skill (i.e. initiation) started after the 20th session. During follow-up, staff applied correct reinforcement on 0–23% of the opportunities. The increase in mean percentages was maintained (mean = 10%), although the number of opportunities decreased to intervention level (mean = 4).

For the staff skill *error correction*, there was an increase in mean percentage correct opportunities from 10 during baseline to 23 during the intervention condition. Mean number of opportunities per session was 2 during baseline and 3 during intervention. During post-intervention and follow-up, mean numbers of opportunities were the same as during intervention and percentages of correct opportunities showed a further slight increase, that is 28 and 26, respectively.

No *initiations* from staff were observed during 10 of the 20 baseline sessions. If staff initiated opportunities for students to ask a question for help, they emitted correct initiations between 0 and 100% of the opportunities, with a mean of 27%. During intervention, mean percentages increased to 77. If there was an opportunity for correct initiation during follow-up, it was applied correctly (mean = 100%). The mean number of opportunities initiated by staff was low during all conditions, that is less than 1.

To strengthen trends revealed above, data for correct opportunities for reinforcement and error correction were analysed using time data analysis (TIDA), a time series program that takes into account serial dependency between scores (Oud & Bendormacher, 1998). TIDA tests for changes in level and trend of the curve between adjacent experimental conditions. The difference in correct reinforcement between intervention and post-intervention failed to reach significance ($F(1,1) = 3.87$, $p = .14$). The increase in correct error correction was significant between baseline and intervention, $F(1,1) = 49.9$, $p = .01$, and between intervention and post-intervention, $F(1,1) = 10.26$, $p = .049$.

3.2. Student performance

Data on students' questions for help are presented in Fig. 3. Mean number of questions per student increased from baseline (mean = 1.5) to 2.7, 3.6, and 2.7 during intervention for reinforcement, error correction and initiation, respectively. Number of correct questions per student increased from 0.9 during baseline to 1.8, 2.1, and 1.8 during intervention for reinforcement, error correction and initiation, respectively. Response efficiency was highest (i.e. 66% and 65%) during intervention for the staff skills *reinforcement* and *initiation*, respectively. During the intervention for *error correction*, response efficiency decreased to baseline level (mean = 59%) as a result of a relatively higher percentage of incorrect questions. During follow-up, there was a slight decrease in mean number of questions asked per student (mean = 2.3), though means and response efficiency (mean = 63%) were still all above baseline level.

3.3. Generalization of staff performance

Data on staff's generalization skills of reinforcement, error correction, and initiations for students' *working on a task*, suggest that generalization occurred for *reinforcement*. During baseline, staff applied correct reinforcement for *on-task behavior* during 0–6% of the opportunities (mean = 3%). Means increased to 10 and 16 during intervention and post-intervention, respectively. During follow-up, percentages decreased to baseline level (mean = 4%). Results from TIDA, however, showed that the difference in means between baseline and intervention, and between intervention and post-intervention failed to reach statistical significance, $F(1,1) = 1.72$, $p = .28$, and $F(1,1) = 0.61$, $p = .49$, respectively. No increases were found for staff's application of correct error correction for students' off-task behavior, nor for staff's correct initiations for students' to work on a task.

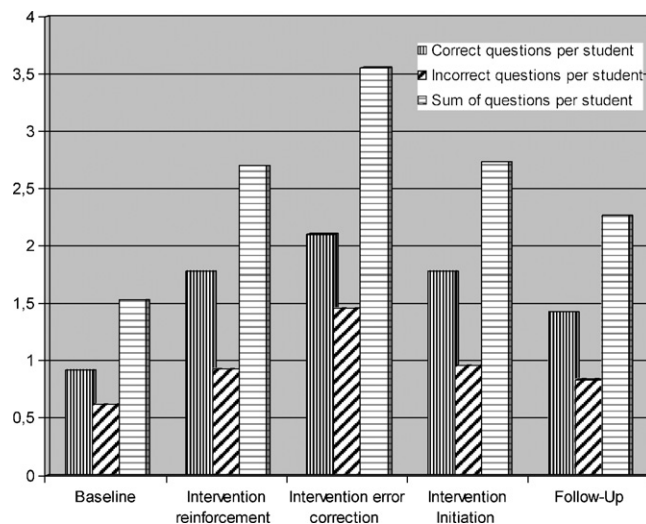


Fig. 3. Mean numbers of correct questions, incorrect questions, and sum of questions per student, per session, during each experimental condition.

3.4. Acceptability ratings

Staff rated the training package highly acceptable (mean = 4.3) and very important (mean = 4.5). Feedback was rated as most effective part of the training package (mean = 4.5). Group training was rated 4.1. Regarding the components of group training, instruction and role-play were rated as the most efficacious, with means of 4.2 and 4, respectively. Mean rating of video evaluation was lower, i.e. 3.5. Staff's mean ratings concerning effectiveness of the intervention for the three skills were 3.75 for reinforcement, 3.5 for error correction and 4 for initiations, respectively.

4. Discussion

The present study evaluated effectiveness of BST on staff performance during naturalistic job training for high-functioning adolescents with ASD. BST resulted in an improvement of staff performance during job training sessions, and these effects were maintained during follow-up. Data also showed an increase in response efficiency and correct target behavior (i.e. asking for help) by students. Staff did not generalize skills to an untrained students' second target behavior (i.e. working on a task).

Data showed an increase (though not statistically significant) in mean *correct positive reinforcement* only after the 20th session and halfway during post-intervention. A generalization effect may underlie this trend as at the same time (a) the level of correct responding increased at the end of the intervention condition for error correction and (b) intervention for the third staff skill (i.e. initiations) started.

In general, overall level of correct positive reinforcement is relatively low and the effect of BST on correctly applied reinforcement may seem disappointing. There were much more opportunities for reinforcement than correctly applied reinforcements. Staff commented that providing positive reinforcement following a student's correct question is 'artificial'; they believed that providing an answer to the student may already function as a natural reinforcer. Staff's beliefs about reinforcing student behavior may function as setting condition (Allen, 1999). Concerning providing answers to students' questions, observers and supervisors noted that staff members relatively often gave an answer following an incorrect question instead of providing error correction, which may have resulted in inadvertent reinforcement of incorrect questions. Staff was instructed to refrain from giving an answer to an incorrect question as part of the corrective feedback concerning error correction. Staff's opinions and beliefs concerning staff skills to be trained (e.g. providing positive reinforcement) should be addressed in future studies. Future studies also should address type and frequency of corrective feedback on providing positive reinforcement by staff during BST.

Generalization of staff's skills may have occurred as correct reinforcement for the students' second target skill (i.e. working on a task) increases (though not statistically significant) as a result of intervention. Surprisingly, percentages of correct reinforcement for students' on-task-behavior were higher than those for students' correct questions. Staff may believe that reinforcing on-task behavior is of more importance than reinforcing correct questions from students. Little is known about the influence of students' target behaviors on the probability in which they elicit responses from staff. This topic merits further exploration in future studies.

Successful teaching of adaptive skills not only requires a sufficient number of teaching opportunities, but also opportunities that are used correctly by staff. In naturalistic teaching situations, the number of teaching opportunities per session is relatively limited. In such a case, the correct use of opportunities becomes important. Although BST resulted in improved performance by staff, the overall level of correct responding by staff remained relatively low. Staff members were not required to meet any performance criterion before they discontinued the training. In most studies on implementing structured strategies on a one-to-one basis, staff training continues until staff has demonstrated competence, for example by showing 80% or 90% accuracy during two or more consecutive occasions (see, e.g. Arco & du Toit, 2006; Dib & Sturmey, 2007; Sarakoff & Sturmey, 2004). Although normative data on staff performance during naturalistic training situations are lacking, it is important to investigate effects of increasing the number of feedback sessions per week as well as the total number of feedback sessions needed to bring about desired and clinically significant changes.

Staff performance in behavioral treatments entails complex interactions such as prompting and providing consequences that continually change in response to client behaviors (Arco, 2008). Despite limitations of our study, findings of the time-limited BST package are promising and suggest that future research is warranted in improving staff performance in naturalistic teaching settings for high-functioning adolescents with ASD. Future research should focus on evaluating BST containing a larger number of sessions of supervisory feedback per week and across a variety of staff skills and types of students' target responses and whereby long term data are collected. Specific attention should be given to staffs' performance directed towards increasing the number of opportunities in which students' target responses can be elicited.

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