Video Self-Modeling for a Student with Dravet Syndrome: an Intervention Involving Parents During Covid-19 Pandemic in Italy

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Case Report

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Abstract

Video-modeling instruction (VMI) offers several advantages in increased efficiency, control over stimuli presentation, and logistical factors. These characteristics seem to be critical in helping families of individuals with developmental disabilities during the restriction due to the Covid-19 global pandemic in Italy. The purpose of this study was to investigate the effects of video self-modeling (VSM) on three different behaviors of a 12-year-old boy with Dravet syndrome. The boy's mother was instructed to use VMI through the use of role-playing and performance feedback to implement the procedure directly. A multiple baseline design across behaviors was used. The dependent variable was the number of correct responses for each behavior. Results showed that the procedure was effective in increasing the performance of the participant. Considerations were made related to the potential that a telehealth intervention could have in efficiency, sustainability, and parents' involvement during and after the health emergency.

Introduction

The Covid 19 global pandemic has necessitated a change in how rehabilitation services for people with disabilities are delivered. Telehealth interventions can be a way to help contain the spread of the virus, especially for the services that involve close contact between user and therapist, as in the case of Applied Behavior Analysis (ABA) (Cox et al., 2020). While working on this text, the restrictions are slowly decreasing, but the need remains to redesign more effective ways of helping the most vulnerable population members. This need is incredibly real for all those living with severe conditions, for whom the return to normality seems even more delayed than the rest of the population.

In Italy, a state of emergency was declared on 11 March 2020. Service providers for individuals with special educational needs have changed how they provide services after the lockdown to provide families with new resources. The delivery of interventions based on ABA has undergone changes and integrations. In Italy, ABA has not reached a status of similar discipline to that of the United States. There are no training programs for undergraduate students and a few training programs for Italian universities (Cihon et al., 2018). Services that provide ABA interventions for people with autism and intellectual disability are not recognized as essential health services. For these reasons, the variation in the way interventions are provided, influenced by the spread of Covid-19, has not always been linear and precise within the Italian territory's services. Therefore, professionals have started to evaluate the feasibility and opportunity of a transition, at least temporarily, towards telehealth services to provide behavior analysis services. The therapist provides instructions to the client through the use of videoconferencing systems (Rodriguez, 2020).

This study aims to describe an intervention conducted in online mode for Andrew, a boy with Dravet syndrome (DS). DS is characterized by frequent, prolonged seizures, developmental delays, speech disorders, and motor and orthopedic problems (Villas et al., 2017). This intervention was part of more comprehensive intervention. The intervention aimed to help Andrew's family manage family routines in a

moment of particular difficulty, starting from assessing skills and risk analysis in the home environment. The intervention package consisted of a structured interview with parents, followed by parents' supervision to implement interventions in the most critical areas. During the interviews with parents, researchers investigated 3 main areas: assessment of preferences, risk assessment, and assessment of academic skills. The purpose of preference assessment was to identify acceptable activities and stimuli for Andrew; the risk assessment was to investigate possible types of problem behaviors emitted in the home environment. Academic skills assessment was to identify Andrew's skill levels to set the objectives of the intervention. Overall, the assessment aimed to collect all the information needed to design the most effective online intervention strategy.

The existing emergency suggested using high-tech solutions, as they aim to contribute to better results or to provide a more efficient or cost-effective outcome. When using a video-modeling instruction (VMI) strategy, the goal is to provide a means to model behaviors otherwise not easily modeled in vivo (or at least not modeled repeatedly). The reasons for using VMI are several. Its use is often linked to logistical factors rather than evidence of increased efficiency (Ayres et al., 2017). Moreover, this strategy can help the learner focusing on critical stimuli because the video can make them more salient by the educational devices used during its creation (Sherer et al., 2001). The therapist has more control over the presentation of stimuli in a video because it eliminates the natural environment's spontaneously occurring changes. The therapist can then make sure that parents who teach the same skill use the same model. This procedure can eliminate the risk of presenting different models for teaching the same task during instruction (Ayres et al., 2017). The opportunity to use rehabilitation services has decreased dramatically for families with disabled children. Therefore, they have to take on essential roles in supporting and managing their children, often without being regularly trained in delivering specialized interventions based on ABA. For this reason, the use of the video modeling strategy can be useful in increasing fidelity in the delivery of education by paraprofessionals who have little or no training in discrete evidence presentation (DTT), also showing a high level of social validity (Cardinal et al., 2017). This strategy has also proven effective in reducing the need for a behavioral analyst during initial training and reducing the cost of parents' interventions in the home setting (Barboza et al., 2019).

The literature reported various ways of using video-modeling (Park et al., 2019). Some describe using video modeling to teach academic skills (Burton et al., 2013; Creech-Galloway et al., 2013; Kellems et al., 2016). Among these, video self-modeling (VSM) is an application in which the individual must observe himself while accurately performing the target behavior (Dowrick, 1999). VSM is a specific form of VMI, in which the individual has the opportunity to see himself as a competent model (Mason et al., 2016). Self-observation has three main advantages: it clarifies how to perform a given skill at its best, strengthens beliefs in one's abilities (Bandura, 1997), and is a means to discriminate between positive or negative behaviors consequences (Skinner, 1953).

Burton et al. (2013) assessed the effects of using VSM on acquiring mathematical skills for 4 adolescents with autism and intellectual disability. Participants had to watch a video of themselves solving mathematical problems. The study results showed a functional relationship between the use of

VSM and the performance of mathematical skills. Marcus and Wilder (2009) used the VSM strategy to teach 3 participants to identify the alphabet letters. The results of this study showed that all participants achieved the criteria of mastery for the new skill.

In this study, the researchers implemented an online intervention using a VSM strategy for presenting DTT during parental rehabilitation sessions for Andrew, a boy with Dravet's Syndrome. The described procedure's objective was to improve academic performance in weak areas following the assessment of the skills measured through a structured interview given to parents.

Method

Participant and Setting

The participant in this study was Andrew, a 12-year-old boy with Dravet syndrome. Andrew had severe psychomotor retardation and needed constant supervision by the referring adults due to frequent seizures.

He was able to produce 5-word sentences, mainly used to request activities or objects he liked. Andrew attended the first class of lower secondary schools in Italy. During his school years, Andrew had learned to name numbers up to 30 correctly and place them in ascending order up to number 20. However, he was not able to order them in descending order. Andrew was able to name all the components of a face but could not position them correctly. As far as reading is concerned, he could name all the alphabet letters and read 2-letter syllables correctly. However, he was not able to read bi-syllabic words independently. Andrew was selected to participate in this study because the family requested specialist support to continue school activities and behavioral management interrupted due to the health emergency lockdown. The setting was the study of Andrew's home, a table, two chairs, and a desktop computer. Materials that the mother used for school activities were on the table: notebooks, stationery, colors, and sheets.

Experimental Design and Data Collection

For this study, the researchers used a multiple baseline across behaviors experimental design (Cooper et al., 2007). The researchers conducted measurements on the selected skills following an interview conducted with parents during the first remote coaching meetings, specifically concerning the items investigating the academic areas where Andrew encountered the most significant difficulties. The parents reported persistent difficulties in mathematical learning, reading, and spatial placement of stimuli. Specifically, the measurements concerned the following skills:

- (a) order numbers in descending sequence; each test involved the correct positioning of a number, for example, positioning the number 18 before 19;
- (b) position eyes, nose, mouth, and ears on the oval of the face;

(c) reading bi-syllabic flat words.

Each baseline and intervention session included the presentation of 5 trials, during which the experimenter measured the number of correct and incorrect answers given by the participant. The experimenter recorded the trials' results and counted the total number of correct answers emitted by Andrew for each request submitted during each session. For (a), each measurement referred to the positioning of a single number in descending order: the participant, who was sitting at the table with a flashcard on which was printed a number placed in front of him, was asked to position the number that came before the flashcard, selecting from a field of three flashcards that he had available. For (b) each request was related to the positioning of a part of the face: on the table in front of the participant was placed an oval representing the shape of the face; each measurement was related to the positioning of a flashcard representing a part of the face in its correct position on the oval (mouth, nose, eyes, left ear and right ear). For (c), each measurement was referred to the reading of a bi-syllabic word printed on a flashcard, formed by the consonant, vowel, consonant, vowel sequence (e.g.casa, dito, sole).

Interobserver agreement

Researchers video-recorded all phases of the study. In Baseline and VSM phases, the experimenter (first author) and a second observer (second author) independently viewed 50% of the recordings of the trials submitted to Andrew. The two coders discussed the procedures before viewing the recordings to reach acceptable levels of agreement. The interobserver agreement was then calculated on discrete trials by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. The percentage of agreements in the VSM phase was 100%, while for the baseline phase, the percentage of agreements was 94%.

Treatment Fidelity

To evaluate the fidelity to the treatment, an observer (second author) viewed 40% of the trials conducted during the VSM phase, measuring the DTT's correct presentation. Table 1 shows the checklist used. The accuracy in the presentation of the tests was 100%. IOA has not been calculated to assess treatment integrity.

Independent Discrete Trials Presentation

Get the student's attention before presenting the antecedent.

Present faultless antecedents, including written or vocal stimuli.

Wait 5 s for the student to respond.

For correct answers, present reinforcement immediately.

For wrong answers, do not use prompts and move on to the next trial.

Table 1. Check-list used to evaluate fidelity to the treatment.

Materials

Hardware e software. An online meeting software (Skype) was used for all phases of this study. The experimenter, connected via a laptop with an integrated video camera, while the mother was connected via a desktop computer to which an external video camera was connected. The mother's computer was located in the working position where Andrew carries out academic activities. The recordings made were exported to an external hard drive to ensure the privacy of the participants. For the editing of the videos, software dedicated to multimedia content management and organization was used. For the presentation of the videos used in the video modeling phase, the mother used the computer. Before the start of the study, the investigator developed a checklist with recommendations for the implementation of interventions in telehealth mode, which included: verification of the recommendations provided by the Ministry of Health for the conduct of this type of intervention; training on the use of the software; analysis of the actions to be conducted to ensure the privacy of participants. The checklist can be requested by contacting the first author.

Interview. The interview administered to parents consisted of 45 items divided into 3 main areas: (1) assessment of preferences, (2) risk assessment, (3) assessment of academic skills. The authors used a modified version of the Vineland Adaptive Behavior Scale (Sparrow, Cicchetti, & Saulnier, 2016), to identify the areas to focus on the telehealth intervention.

Numbers, faces, and words. The materials used were: a series of 6x9 cm flashcards on which the study's stimuli were printed. For (a): numbers from 1 to 10 for the videos' preparation and 10 to 19 for the baseline and intervention sessions. The experimenter created two copies for each type of number, both handwritten and using computer program fonts. For (b): 10 sets of stimuli, each consisting of a sheet of paper representing the oval of the face and flashcards were representing eyes, ears, nose, and mouth. For the video preparation, the experimenter used 3 sets handwritten; he used 7 sets taken from people's photographs for baseline and VSM phases. For (c): 40 flashcards on which were printed 20 bisyllabic words composed of flat open syllables. All the words used had the same level of difficulty. The words were written in capital letters, both using a video writing program and by hand. The experimenter used 3 words for the video's preparation phase, while for the baseline and VSM phases, he used 17 words. During baseline and VSM phases, the experimenter presented the same numbers of trials for each stimulus, for each variable in question.

Video. The experimenter, remotely connected through a video conferencing app, recorded the work sessions, during which the mother presented the requests related to the skills in question, modeling Andrew's behavior with the necessary prompt level: the mother had to submit the verbal request (e.g., "Where does the nose go?"), wait 3 seconds and indicate the correct answer. If Andrew gave the correct answer, then the mother would reinforce her son's behavior with verbal praise (e.g. "Bravo!"). If Andrew did not give the correct answer, then the mother physically guided her son to give the correct answer. At the

end of the procedure, the mother reinforced her son's response with verbal praise. The hierarchy of prompts used served to minimize the number of trials presented during the video preparation phase. This procedure was used for requests related to each skill measured. In this phase, 9 requests were submitted for (a), 15 requests for (b), and 3 requests for (c).

During this phase, the experimenter provided descriptive feedback to the mother about the requests' presentation, the prompt level, and the consequences. Starting from the raw video, the experimenter edited 3 videos for each of the skills in question: the videos showed the presentation of the request, the correct behavior, and the correct consequence for its delivery provided by the mother. All the prompts used were removed from the final version of the videos used during the training.

All the videos showed the mother and Andrew sitting at the table next to each other. In the videos made to teach Andrew to order the numbers in the sequence, 10 flashcards representing the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 were on the table. The mother introduced the activity, saying, "Now we will put these numbers in order starting from the biggest one." Then she placed a flashcard in front of Andrew and asked: "What comes before 10?"; the video then showed Andrew while emitting the correct answer, i.e., placing the flashcard representing the correct number next to the one previously placed in front of him, choosing from 3 flashcards placed in front of it. Finally, the mother presented verbal praise (e.g., "Good job!").

In the video made to teach Andrew to correctly position the eyes, ears, nose, and mouth on the face's oval, a sheet of paper representing a handwritten person's face and the flashcards representing the components to be positioned were on the table. The mother introduced the activity by saying, "Now we will place all the parts on the face." Afterward, the mother presented the requests related to the task to be performed: "Where does the nose go?"; the video continued showing Andrew positioning the stimulus indicated by the mother. Finally, the mother presented verbal praise. In the video made to teach Andrew to make a textual response, the mother presented Andrew with a flashcard written with a flat bi-syllabic word. The mother then presented the request, saying, "What does it say?". The video continued showing Andrew reading the first syllable, the second syllable, and finally, the complete word, followed by his mother's verbal praise.

The videos were recorded at the end of the baseline phase and lasted about 1 minute each. The intervention phase began one week after the end of the baseline phases for each skill in question. During this phase, the mother presented Andrew with a video for each session, making sure to alternate the videos between sessions. She never presented the same video for two consecutive sessions.

Procedure

Interview

During the first parent coaching meeting, the researchers presented a structured interview with parents. The interview, given verbally, was composed of open-ended questions. The experimenter transcribed the answers of the parents using the file on which the questions were reported. The duration of the interview

was about two hours. The answers collected were used to design the VSM's intervention. The strategy to be implemented in the home environment was designed using the information collected; the questions presented during the interview made it possible to identify the video modeling strategy and identify the academic areas where Andrew showed the most significant difficulties. The assessment of preferences aimed to identify Andrew's favorite activities showed, among others, preferences for watching cartoons, movies, and videos depicting Andrew during significant moments spent with his parents and relatives. Andrew spent part of his free time watching these videos on his computer. VSM's strategy was selected to engage in the most lacking skills from the results collected during the interview. During the VSM phase, Andrew watched with pleasure the videos that saw himself completing the trials presented by his mother. From the section of the interview that was going to investigate the issue of behavior challenging to manage, it emerged that in the presence of requests related to schoolwork performance, Andrew tended to avoid the task, moving away from the workstation. As far as academic skills evaluation was concerned, researchers asked the family members which areas encountered the most significant difficulties during the school activities. Overall, the main difficulties that emerged were related to the presentation of academic requests on tasks of great difficulty for Andrew in mathematical learning, reading, and spatial placement of stimuli. Table 2 shows the items administered that revealed the main critical areas and Andrew's preferences.

Preferences assessment
Which functional items or activities are of interest to the child?
Which are the dysfunctional items or activities of interest to the child?
Risk assessment
Does the child exhibit behavior that's difficult to manage? If so, when?
Academic Skills Assessment
<i>Number Skills</i>
Can the child place the numbers 0 to 20 on the number line?
<i>Spatial placement of stimuli</i>
Is the child able to place on an oval representing a face all its components?
<i>Reading</i>
Can the child read flat, bi-syllabic words?

Table 2. Extract from the interview used reporting the items that revealed the main areas of concern

Baseline

During the baseline phase, the mother submitted requests for the tasks measured using discrete independent trials; first, she got her son's attention, then presented the request. If Andrew answered correctly, she reinforced the answer. If Andrew did not give the correct answer, she would not correct and submit the next request. The stimuli used in the baseline phase were also used in the learning verification phase after watching the videos.

Role-playing and performance feedback

Before starting with VSM, the mother was instructed to implement it through a few online role-playing and performance feedback sessions. First, the experimenter plays the mother's role and the mother the boy's role, then they exchanged. At the end of each session of role-playing, descriptive feedback was delivered on the correct performance. Corrective feedback was delivered, specifying what was not performed correctly.

VSM

VSM sessions were conducted in the home studio. The mother was sitting at the table with Andrew. During the instruction phase, the mother showed the recording of a trial of the skill in question, using for each session one of the three videos related to the skill. At the end of the vision, she continued with other activities, such as coloring a drawing. After 10 minutes, the learning was verified: the mother presented the task previously observed on the video, using the same materials used during the baseline phase. As for positioning the numbers in the correct order, the mother presented flashcards with various number sequences (e.g., 15-16-17-18-19-20 or 11-12-13-14-15-16) and asked her son to order them in decreasing sequence.

After watching the video showing the sequence to correctly place all its handwritten components (eyes, nose, mouth, and ears) on a face, the mother presented her son with photographs representing real stimuli, asking him to place them in the correct order. Regarding the reading of flat words, the mother presented different flat words than those shown in the videos. For each trial, if Andrew answered correctly, then the mother would reinforce the answer by using social praise ("You did great!"), while if the child answered incorrectly or did not answer, she would not provide any correction and continue with the planned activities.

Results And Discussion

Figure 1 shows the results in the baseline and intervention phases for the measured skills. Specifically, the left panel shows the results of the baseline measurements. To (a) order numbers in sequence, (b) place eyes, nose, mouth, and ears on the oval of the face, and (c) read flat whisper words, the values are 0 for the 4 measurement sessions conducted for each skill. The right panel of the figure shows instead the results related to the intervention phase: for (a), the response range varies between 4 to 5 correct answers,

with a stable trend; for (b), the range varies between 4 to 5, with a stable trend; for (c), the response range varies between 3 and 5, with ascending trend.

The visual analysis of Figure 1 shows that the baseline phase's data points are divided from those of the intervention phase and that their range is mutually exclusive for all experimental conditions. Furthermore, the data points of the intervention phase show higher values than those of the baseline phase. The response values trends for the first two measured behaviors are stable, while the third behavior is ascending.

This study wanted to investigate the effects of an intervention conducted in a global health emergency, thus proposing a replicable intervention model for professionals called to conduct rehabilitation interventions in similar cases. The results obtained support the procedure's effectiveness, especially concerning its social validity, corroborating what Cardinal et al. reported (2017). Parents anecdotally reported that they observed significant changes in Andrew's behavior during work on academic skills. They also reported that they participated with pleasure in the study. This study contributes to expanding research on the use of VSM to teach academic skills for a new population of students, i.e., adolescents with genetic syndromes. Therefore, future research could be related to using this strategy with students with similar characteristics to Andrew.

We would also emphasize the potential that such an intervention offers: a telehealth intervention could be economically sustainable for families once the health emergency returns; moreover, greater involvement of families could also have positive feedback on personal well-being. Observing children's progress firsthand can give them more positive perceptions about their children and themselves, thus increasing their level of self-esteem.

The procedure used has proven effective for teaching at home: it was part of a more comprehensive intervention program for Andrew. The current health emergency made it necessary to reschedule its activities; the family had also taken over the activities usually carried out at school and during rehabilitation therapies. During the first online coaching meetings, the parents' interview was useful in identifying Andrew's preferences and evaluating the academic skills measured in this study. The assessment of preferences allowed us to identify a functional and practical learning channel for Andrew. The implementation phase of the training shows that Andrew learned the proposed skills using the identified strategy.

Moreover, during the training phase through video-modeling, parents anecdotally reported that they had observed higher compliance levels than the case during the tasks' performance before implementing the intervention. He sat down and watched with interest the videos proposed to him. Before the beginning of the intervention in question, during schoolwork performance, Andrew often left the workstation and had to be brought back there to continue with the activities. Furthermore, the facial expression indexes observed anecdotally showed various well-being indicators during the training, such as smiles during the videos' presentation.

A final consideration is related to how the rehabilitation service is provided. This study reports a testimony: researchers used this mode to respond to a family's needs to manage an emergency in an unprecedented historical moment. For family welfare, it was, in fact, useful to deal with problems that would be difficult to deal with in a routine situation.

This study has some limitations. During the videos' preparation phase, part of the process was to get the participant to engage in academic skills. At the same time, the experimenters trained the mother in the use of prompting strategies. A possibility exists that this part of the study influenced and contributed to the participant's mastery of the skills. Also, Andrew recognized the stimuli presented even before starting this study (e.g., letters, numbers). These considerations weaken this study's internal validity, as it cannot be said with certainty that the intervention was effective in teaching Andrew new behaviors due to previous exposure to stimuli. However, there was a marked improvement in Andrew's performance when comparing baseline and intervention data from a clinical perspective.

The assessment method was indirect; the description of Andrew's ability was measured through the parents' description and not through direct measurement of the behavior. The baseline measurements were then conducted at the end of the assessment to verify the intervention's actual need. Therefore, future studies could investigate methods of evaluation that could systematically combine indirect and direct evaluation methods. A further limitation is the evaluation of social validity. The researchers collected anecdotal data. Future studies could use questionnaires or evaluation scales to assess the degree of social validity. A further limitation is that no IOA was calculated during the treatment integrity assessment phase.

In conclusion, despite the limitations reported, this modality of evaluation and intervention in close synergy with the family can increase the proposed interventions' effectiveness. Therefore, future research could deepen the skills assessment and risk analysis modalities through a remote supervision system. Such analyses and considerations could also help foster knowledge and disseminate ABA on the national territory.

Declarations

Compliance with Ethical Standards

Conflict of Interest. No authors have a conflict.

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

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

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Figures

Figure 1

Results in the baseline and intervention phases for the measured skills.