A Model of Support for Families of Children with Autism Living in the COVID-19

Lockdown: Lessons from Italy

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Abstract

Italy has been the European country most affected by the COVID-19 pandemic to date and has been in social lockdown for the longest period of time compared to other countries outside China. Almost overnight, Italian behavior analysts were faced with the challenge of setting up remotely whole-family systems aimed at maintaining adaptive skills and low levels of challenging behavior carried out solely by caregivers. Given these extraordinary circumstances, the protocols available from the applied behavior analytic, parent training, and autism literature did not appear fully to meet the need of parents having to be with their child under extreme levels of stress in a confined space with limited reinforcers for 24 hours a day, 7 days a week. To meet this unprecedented challenge, we developed a dynamic and holistic protocol that extended to the full day and that recognized the need for sustainable intervention delivered solely by parents who were often looking after more than one child. These practices are presented in this paper, together with a discussion of lessons we have learned thus far, which may be useful for behavior analysts working in other regions in which the effects of the pandemic are not yet fully realized. Although somewhat unorthodox, we include some parent comments at the end with the goal of sharing the parent perspective in real time as this pandemic unfolds across the world.

A Model of Support for Families During the COVID-19 Lockdown: Lessons from Italy

Editor's Note

This manuscript is being published on a highly expedited basis, as part of a series of emergency publications designed to help practitioners of applied behavior analysis take immediate action to adjust to and mitigate the COVID-19 crisis. This article was submitted on 4/5/20 and received final acceptance on 04/10/20. The journal would like to especially thank Julie Kornack and Courtney Tarbox for their expeditious reviews of the manuscript. It is important to note that this manuscript reports the approach taken by a particular group of clinicians operating under completely unprecedented circumstances in one of the hardest-hit regions of the world. There are many ways to use the science of applied behavior analysis to support families and neither the authors nor the journal suggest this is the only approach or the best approach. However, this approach produced positive results for this group of families and the editorial staff at the journal believes that the rest of the world of applied behavior analysis may benefit from learning from their experience. The views and strategies suggested by the articles in this series do not represent the positions of the Association for Behavior Analysis, International or Springer Nature.

Introduction

Before discussing responses to the pandemic, it may be helpful to say a few words about the Italian health system as it concerns intervention for autism based on Applied Behavior Analysis (ABA). Italy has a national health system with autism being recognized as a condition that falls under the care of the state. Education is free for all, and mainstream schooling is mandatory and therefore accessible by all children. There are no specialist schools. The delivery of therapeutic and educational services is regulated by registered professional bodies (i.e., psychologists, professional educators, speech and language therapists, neuro-rehabilitation technicians). ABA-based intervention is not formally

recognized by the Italian health authorities, nor is it routinely offered as part of the state autism provision, which typically includes one hour per week of psychomotor therapy, one hour per week of logotherapy (i.e., speech and language therapy), and school attendance with varying levels of one-to-one educational support. The profession of behavior analyst is not officially regulated. Despite the lack of formal governmental recognition of ABA intervention for autism and a corresponding professional body, the country has witnessed a steady increase in the number of professionals credentialed by the Behavior Analyst Certification Board (BACB) in the past ten years, verified course sequences, and state-funded health rehabilitation centers offering low-intensity (4 to 15 hours per week) ABA intervention. As a result of parental demand for ABA services, a considerable number of health professionals are enrolling in ABA masters programs and consequently incorporating ABA-based methods in their therapeutic practices for autism. Schools have also begun to open their doors to BACB-credentialed professionals to support the individualized education plans of their students. Nevertheless, ABA-based intervention remains largely privately funded by individual families and is, for the most part, carried out at home during the hours in which the child is not in school. At the time of this writing, the Italian authorities have yet to provide statewide guidelines or funding for the continuation of intervention (ABA and non-ABA) via telehealth for children with autism during the lockdown period. In some regions (e.g., Campania, Lombardy, Marche, Emilia Romagna), and with considerable variability, individual state-funded centers have begun to set up systems to provide intervention and parental support remotely.

The Present Crisis

Italy was one of the first European countries, together with Germany, France and Spain, to register the first cases of COVID-19 at the end of January 2020 and subsequently to impose movement restrictions on its citizens. For some weeks, it was the second country after

China with the largest number of COVID-19 cases. Presently surpassed by the USA and Spain, it currently registers the highest number of deaths related to COVID-19 (World Health Organization, 2020). On the January 31, 2020, the Italian government declared a state of national emergency and imposed the first social distancing restrictions February 24th, with a decree closing all schools and many commercial activities in the northern regions (Lombardy and Veneto). These restrictions were gradually expanded and eventually extended to the rest of the country, with the period of complete national lockdown commencing on the March 9th (Ministero della Salute, 2020). At the time of writing this paper, Italy continues to be in complete lockdown which includes home isolation, with outside movement restricted to one person per household and solely for the purpose of purchasing food or medicine. Deliveries to households are limited to essential goods. Outside physical activity is no longer permitted. However, if a child has a disability, she or he can be accompanied outside for brief walks, provided the parent carries a written certificate signed by a health professional attesting to the child's diagnosis and need to be outside.

Social distancing measures during the initial lockdown period were less restrictive and were expected to last for a couple of weeks. Although children had ceased going to school and most home sessions had been interrupted, ABA practitioners viewed this as a period similar to the summer holidays, where children spend long periods of time with grandparents and are essentially given free access to reinforcement, and parents are given a skeleton program of maintenance to prevent significant skill loss. Under usual circumstances, we would expect to see some increase in challenging behavior and some skill loss during the summer months, but not so significant that it could not be addressed within the first few weeks of resuming the typical school and home intervention schedule.

By the third week of the lockdown, it became clear that the isolation period would not only be extended to the rest of the country, but that measures would also become much more

restrictive. Thus, a different approach was required, especially because many parents (all family caregivers in the home referred to as "parent" hereafter, for brevity) reported that their child was no longer satisfied with the usual reinforcers; was becoming increasingly uncooperative; was engaging in high levels of stereotypy and problem behavior, likely due to being denied access to regular but now unavailable reinforcers (e.g., swimming, playground, extended car rides, cinema, ice-cream parlor, physical activity); was demanding high levels of undivided attention; and was becoming more difficult to direct to independent activities.

Parents also reported that they were struggling to reconcile the demands of distant-working required by their employer with the needs of round-the-clock sole care of their child with autism, of siblings, and of the household in the absence of any outside help. While some families lived in the countryside and had access to a privately owned garden (i.e., private yard), many families lived in a city apartment where time spent outside was either prohibited or substantially limited due to the closure of parks and the shared courtyards. Even those of us who are not psychologists saw clear early signs of mental health decline, as well as increasing marital conflict. While the latter problems were outside the scope of our practice as behavior analysts who are not also psychologists, referral to paid online psychotherapy or counseling, given the dire financial situation some families were experiencing, was not an option. Nonetheless, we believed that the tools of the science of behavior could be extended to the larger family context to alter the repertoires of all its members and to increase contact with positive reinforcement for all.

Because restrictions in Italy happened gradually, with families in the northern regions being in the first cohort, by the time families in the southern region were in lockdown, we had gathered sufficient data on the effects of the first three weeks of isolation with minimal structure and free reinforcement access. While for the northern families our work in the third week was focused on reducing the negative effects of two weeks of "free time," we were able

to implement strategies proactively with the southern families to minimize the negative outcomes we observed for the families in the first lockdown cohort.

Prior to the lockdown period, none of our children displayed severe or unmanageable levels of challenging behavior, and they all had effective behavior management plans in place. After the first two weeks of lockdown with limited structure and free reinforcement access, in some of our first cohort families we observed the following during our online meetings: high levels of escape from simple instructions, loss of independence and communication skills (appropriate mands), satiation (significant reduction in the time children spent with favorite items), increase in problematic interactions between parents and all children, and unmanageable levels of mands for attention (both appropriate and inappropriate). Parents reported to be struggling to find new things to entertain their child with autism and siblings. Sourcing novel toys or items to create new interests was not possible due to limited deliveries of non-essential items.

In the following sections, we describe the protocol that was shaped through the frequent interactions with parents during our online observations and discussions. Currently, as a group of professionals, we are serving approximately thirty families with this model. We were consulting with these families prior to lockdown and had been running home-based programs for at least six months. In the absence of published literature on interventions that require parents to engage with their child 24 hours per day, 7 days a week, in a confined space for a prolonged and undefined time period, we approached the problem inductively, altering what we did based on principles of learning, on what each individual situation required, and what the parent reported feeling able to do. The model developed was a systemic one, in which the client was no longer just the child in sessions working on educational targets, but, rather, the whole family in its unique context.

Risk Assessment

We began with an assessment of risk and an evaluation of each child's level of verbal functioning to establish the type of telehealth provision required (direct sessions or parent coaching) (see Ferguson, Craig, & Dounavi, 2019, for a review). The two main risks we aimed to mitigate were (a) parental burn-out and (b) increase in socially mediated challenging behavior of the child and siblings. We were less concerned with behavior maintained by automatic reinforcement, unless it was self-injurious. None of our children engaged in such behavior. The assessment was based on our history with the family, data from the child's pre-lockdown intervention, and direct contingency manipulation and observation via telehealth. For example, we asked the parent to leave their child with an activity while they talked to us, and we calculated how long the child was engaged without demanding parental attention.

The main items included in the risk assessment were: parental pre-lockdown level of instructional control and social engagement with their child, duration of child and siblings' ability to engage in solitary activities (either reinforcement or instructional, such as worksheets, chores, functional play), and parental tolerance of non-dangerous self-stimulation (e.g., flapping, noises, walking up and down, jumping on sofa). In addition, we considered the child's age, ability to engage in back-and-forth verbal interaction, the presence of siblings with a disability, and number of supportive adults always present (i.e., single parent, both parents at home, other family members).

Table 1. Risk assessment interview and observation form.

N	Questions	Responses		Comments
1	Is the parent a single parent?	Yes	No	
2	Is the parent alone most of the day?	Yes	No	
3	Is one of the two parents working from home?	Yes	No	
4	Are both parents working from home?	Yes	No	
5	Are there other supportive adults living in the household? Who?	Yes	No	
6	Are there siblings? How many?	Yes	No	
7	Does the sibling have a disability?	Yes	No	
8	Is the sibling attending online schooling?	Yes	No	
9	Is the sibling an infant or toddler?	Yes	No	
10	Can the sibling engage in solitary activities without demanding parental attention for one hour or longer?	Yes	No	
11	For half an hour?	Yes	No	
12	Is the child 2 to 5 years of age?	Yes	No	
13	Would the child be able to engage in direct sessions online?	Yes	No	
14	Does the child need constant supervision and instruction?	Yes	No	
15	Can the parent tolerate not intervening if the child engages in non-dangerous levels of self-stimulation?	Yes	No	
16	How long can the child spend by himself without requiring parental intervention (e.g., self-stimulation or tangible reinforcer)	Yes	No	
17	Can the child engage in an independent appropriate activity for 30 minutes without adult supervision?	Yes	No	
18	For 15 minutes?	Yes	No	
19	Is the parent able to interrupt the child from a reinforcing activity without problem behaviour?	Yes	No	
20	Does the child cooperate with simple instructions without problem behaviour?	Yes	No	

For each individual family, we assessed the risk as high, medium, or low. The highest risk families were ones with a single parent or a parent with limited instructional control, who was on their own most of the day with two young children, one of whom had autism. In the case of one family, the parent was on their own for most of the day with two adolescents with

autism, one who was minimally verbal and the other who was verbally interactive. Although this situation could have been considered high risk, in this specific case we considered it medium risk because the parent had excellent instructional control over both youngsters, who were both able to engage in solitary activities. As a general rule, the higher the risk, the higher the level of support we provided for the parent and the higher the daily structure.

Low-risk families included ones with both parents at home and willing to engage with the child and sibling. In some cases, parents took turns to be with both children, so that one parent could be free. Alternatively, each parent looked after one child and swapped children every few hours or every day. In these cases, it became crucial to ensure that both parents were involved in the care of the child and sibling, so that the burden of the household management did not fall solely on the primary caregiver (parent 1). To achieve involvement of both parents, provided they were both equally available, we worked separately with each one, setting up individual targets with each and developing a family schedule in which the time of each member was clearly specified.

Level of Verbal Functioning

We identified three main children's profiles of learner, in terms of their need for support and perceived amenability to direct sessions over telehealth:

1. Preschool-age children (n = 6); Children who had not yet started elementary school (up to age 7)

2. Minimally verbal: Children with limited adaptive, independent, and verbal skills (n = 16); and

3. Verbally interactive children (n = 8).

Together with the risk assessment, this classification determined the daily family structure we arranged, and the type and frequency of support we provided as professionals.

Verbally interactive children were defined as being able to discriminate *Wh* questions (tact and intraverbal), follow multiple-step instructions, self-administer tokens, self-manage interruption of reinforcement based on a timer, and not manifest challenging behavior in and out of sessions. Verbally interactive children were those who we predicted would be able to sustain a direct session with their ABA tutor (also commonly referred to as technician or therapist) via telehealth. While none of the tutors had ever delivered intervention in this manner, extensive training was not needed because of their experience with the program targets and familiarity with the child's home environment. For these families and tutors, contact with the ABA consultant (commonly referred to as supervisor) and/or lead tutor occurred once or twice per week to review targets, ensure that novel problem behavior was not emerging, and continue to provide support to the parents in managing the day.

Verbally interactive children received sessions in two formats. The first format involved the tutor remotely sharing the computer screen with the child, so what was once the table became the desktop computer. All visual stimuli were placed in individual electronic folders or PowerPoint presentations, and the child responded to the materials presented via the tutor's desktop. Tutors did not hold up cards to the screen as it was too cumbersome, and some tutors also did not have the relevant materials at home. The second format was implemented with adolescents who were working on producing written responses; in that case, it was the child who remotely shared his or her screen with the tutor. The data collection system for these children remained unaltered from the pre-lockdown period, as the only change was the medium of delivery. Most children received two 50-minute sessions per day.

For the two remaining profiles, preschool-age and minimally verbal, we implemented a parent coaching system (see Parsons, Cordier, Vaz, & Lee, 2017, for a review). The first telehealth session lasted up to three hours and was conducted by the team's ABA consultant, with the participation of both parents and the team's lead tutor. Subsequently, the consultant

or lead tutor met with the family every day during the first and second week and every other day during the third intervention week and thereafter. The protocol described below applies to families with preschool-age or minimally verbal children. The youngest child was 4 years old and had been receiving intervention for approximately six months. Most of our families had been running an ABA home-based program with the support of an ABA consultant and tutor/s for a minimum of two years and some for as long as 10 years.

Parents were not asked to take data, as this seemed unrealistic given how demanding their day was. Professionals collected data during the online coaching sessions on the following:

- Parental report of challenging behavior

- Parental report of their ability to maintain the agreed structure

- Direct measurements of children's adherence to parental instructions

- Direct measurement of challenging behavior during the coaching session, and

- Parents' procedural fidelity.

Parent Coaching System

Prior to the lockdown period, children had access to a range of environments, each associated with its unique set of stimuli, signaling a specific reinforcement contingency. For example, children had learned that at school or during home sessions, brief periods of reinforcement were provided contingent on engaging in instructional activities and exchanging tokens. Thus, children spent most of their learning time in school and in home sessions, where reinforcement access was regulated. For most of our children, the domestic context with parents signaled prolonged and often uninterrupted access to reinforcement in the evenings and weekends. While not ideal, prior to the lockdown period, we did not view this as a significant problem because in most of their daily contexts (e.g., school and home sessions) children were able to engage in educational activities appropriately. During

lockdown, however, the household became the only living context for all family members. This new set of circumstances created the need to institute an economic system that was sustainable, easy to implement for parents, and positively reinforcing for all members. The system also needed to promote the maintenance of adaptive skills and positive interactions, as well as allow for time off from interaction.

Structuring the Day

During the first consultation session with each family, we worked with parents on structuring the entire day for all children (the child with autism and sibling), dividing it in blocks of activities to meet primary needs (breakfast, morning snack, outside time, lunch, afternoon nap for the younger children, afternoon snack, afternoon outside time, bath, dinner). All times in between were considered dead times and, therefore, high-risk times that needed to be filled with contextually appropriate activities alternated with reinforcement intervals.

One important aspect in structuring the day was to decrease the number of waking hours to reduce the fatigue and behavioral irritability that occurred toward the latter part of the day. We achieved two periods of roughly comparable duration between the mornings and afternoons by pushing lunchtime from noon to 13:30-14:00 and bringing bedtime forward to no later than 21:00. As is fairly typical of Southern European countries, our children often went to bed around 22:30 prior to the lockdown. We worked with parents to manipulate the stimuli associated with the end of the day (e.g., supper, bath, pajamas, story) earlier than usual and in accordance with the recommendations for the optimal number of sleep hours for the child's chronological age (Hirshkowitz et al., 2015). Table 2 shows an example of a daily schedule for a family in which parent 1 was alone most of the day with a 5-year-old child with autism with limited independent and self-entertainment skills and a 3-year-old typically developing sibling.

Table 2. Example of a daily schedule of a parent alone most of the day with two young children.

	Child	Sibling	Parent 1	Parent 2
08:00 - 08:30	Wake up, washing, dressing	Wake up, washing, dressing	Child	Sibling
08:30 – 09:00	Breakfast	Breakfast	Both children	Unavailable
09:00 – 09:30	Adult-led activity	Adult-led activity with child or independent skill	Both children	Unavailable
09:30 – 10:00	Reinforcement	Reinforcement	Free	Unavailable
10:00 – 10:30	Adult-led activity	Adult-led activity with child or independent skill	Both children	Unavailable
10:30 – 11:00	Garden	Garden	Both children	Unavailable
11:00 – 11:30	Garden	Garden	Both children	Unavailable
11:30 – 12:00	Snack	Snack	Both children	Unavailable
12:00 – 12:30	Adult-led activity	Adult-led activity with child or independent skill	Both children	Unavailable
12:30 – 13:00	Reinforcement	Reinforcement	Free	Unavailable
13:00 – 13:30	Reinforcement	Meal preparation with parent 1	Meal preparation with sibling	Unavailable
13:30 – 14:00	Lunch	Lunch	Lunch	Unavailable
14:00 – 14:30	Chores with parent	Nap	Child	Unavailable
14:30 – 15:00	Reinforcement	Nap	Free	Unavailable
15:00 – 15:30	Independent skill teaching	Nap	Child	Unavailable
15:30 – 16:00	Reinforcement	Activity with parent	Sibling	Unavailable
16:30 – 17:00	Snack	Snack	Both children	Unavailable
17:00 – 17:30	Walk	Garden	Supervision	Walk with child 1
17:30 – 18:00	Walk	Reinforcement	Free	Walk with child 1
18:00 – 18:30	Reinforcement	Activity with parent 2	Free	Activity with Sibling
18:30 – 19:00	Activity with parent 2	Reinforcement	Free	Activity with child
19:00 – 19:30	Reinforcement	Meal preparation with parent	Meal preparation with sibling	Free
19:30 – 20:15	Meal	Meal	Meal	Meal
20:15 – 21:00	Bath, pyjamas, bedtime Parent 1	Bath, pyjamas, bedtime Parent 2	Child	Sibling

Choosing contextually appropriate activities. The day consisted of a rotation of contextually relevant activities or tasks for both the child and the sibling. We asked parents to identify one target per day in any of the activities, one-week objectives, and three-month objectives. We formulated the questions in this way: What would be helpful for you that your child learned? What do you want to teach your child today? What do you want to have taught your child in one week? When all this is over, what would you want your child to be

able to do? In one month? In three months? Parents chose from four types of activities

broadly defined as:

1. ***Independent activity*:** This encompassed any instructional activity the child could

   engage in without adult support (e.g., puzzles and shape sorters, worksheets, coloring,

   educational computer programs, domestic skills). Visual activity schedules were

   utilized where useful (McClannahan & Krantz, 1999).

2. ***Household chores*:** These included chores the parent felt they could carry out with

   their child, giving their child things to do. We asked parents to go to each room and

   list all the chores that needed doing in each room, however big or small. We asked

   parents to list every chore and not just the chores they thought their child could do or

   was already able to do. We wanted to identify objectives that were appropriate to the

   context and in which the parent was more likely to engage their child as they needed

   to be done anyway.

3. ***Table-top discrete trial teaching (DTT).*** We did not ask parents to run acquisition

   targets but only to maintain existing skills, with particular focus on clean responding

   without behavioral accessories (e.g., stereotypy). Although it would be desirable if

   children maintained specific skill targets in specific programs, our purpose for having

   parents run DTT was primarily to help ensure that the children maintained some

   contact with the DTT contingency of rapid and accurate responding.

4. ***Adult-led or shared activity (not DTT)*:** These included activities that required the

   parent to engage one or both children, in which responses could be more loosely

   defined. Examples of shared activities were completing simple crafts or making

   cookies. These were not necessarily reinforcing activities for the child with autism but

   often were reinforcing for the sibling. Parents were coached to divide their attention

   between the two children, shape appropriate attention mands, and provide attention

contingent on participation and engagement with the material. The targets for the

child with autism were simply to remain in the activity and engage in some relevant

responding.

We did not include Natural Environment Teaching (NET)-based activities in which

the parent had actively to manipulate the child's motivation and materials to evoke mands or

to generalize language targets. This was because parents reported that they found this type of

approach to be too effortful under these extreme circumstances. They reported they did not

wish to be in a position to have to follow their child's motivation and to have to signal when

that was no longer possible, risking the occurrence of challenging behavior. They also could

not risk having to say "No" to something their child requested because of lack of materials.

Although, in general, the daily structure centered on adult-led or shared activities alternated

with periods of solitary reinforcement, all parents learned to interact with their child and

sibling in a way that worked for them and maintained low rates of problem behavior. It is

important to note that previous research exists that supports remote training of parents in

NET procedures (Nefdt, Koegel, Singer, Gerber, 2010), so we are not suggesting that this

would not be a good approach for some families.

Setting up the Household Positive Reinforcement System

Two main reinforcement systems were implemented throughout children's waking

hours: a token-based economy and an activity-based economy. In the token-based system,

tokens were earned throughout the day and exchanged for preferred items. In the activity-

based system, engagement in a less-preferred activity (i.e., contextually appropriate activities)

produced access to a more preferred activity. Whether token-based or activity-based, the

common element in both procedures was a system in which contingent relations between

target behavior and preferred objects and activities was maintained, and reinforcers were

unavailable outside those particular settings. We aimed to help parents establish a closed

economy, meaning that engaging with parent-led reinforcement contingencies was the only way in which to access those reinforcers, which is known to generate higher levels of responding (Kodak, Lerman, & Call, 2007; Reed, Niileksela, & Kaplan, 2013). Because we had already witnessed in our northern families (first cohort) the negative impact of free and prolonged access to reinforcers on (i.e., loss of child skills and parental fatigue), we organized the household economic system so that reinforcement was accessible contingent on production of contextually appropriate behavior for all children. This included the siblings, if they were below the age of 10 and not involved in remote schooling.

The first step in closing the economy involved teaching parents to be able to limit access to all reinforcers for the child and siblings from every room of the household. Parents classified reinforcers in terms of "solitary" and "social" for all children. Solitary reinforcers were those that the child and sibling could consume on their own, and social reinforcers were those that required an adult and, where possible, were incorporated in the shared and adult-led activities. To help parents identify effective reinforcers, we accompanied them virtually through each room of the house and asked them to identify things their child liked or might like or items with which they had witnessed their child spend some time. Every item was removed and placed in boxes, inside wardrobes or bags or whatever container was available. In some cases, parents took pictures of the items to produce a reinforcer menu for the child (and sibling), while at other times they took the child to the "shop," the place where all reinforcers had been stored. Food treats were not available from the shop or the reinforcer menu; these were available at specific times during meals. The reasoning behind this was that food treats were items to be consumed rapidly, so the child was engaged for a very short period of time.

Our rationale in discontinuing noncontingent access to solitary toys and activities was that these items would hold their value and keep the children occupied longer. If the children

were therefore able to be engaged with preferred solitary activities, the parent could safely

have time off from the child and sibling. The secondary effect was to reduce escape-

maintained problem behavior for both the child and the parent. By engaging with children in

structured activities first, parents could access time to themselves and, as a result of

contingent reinforcement delivery, also gain greater instructional control. We wished to

create a mutually reinforcing situation for both the adults and the children, where parents

could experience success in delivering instructions and interacting with their child, given that

they would need to engage in this behavior daily in a confined space, over extended periods

of time without a break. Of course, discontinuing free access to reinforcers could also have

the effect of increasing motivating operations that evoke problem behavior, so it was critical

to support the children to be frequently successful in meeting the criteria for positive

reinforcement, and thereby continue earning reinforcement on a frequent basis.

Many parents implemented the new reinforcement contingencies effectively and the

children learned very quickly that reinforcers were only available after completion of

activities or upon meeting the token schedule requirements. Access to the reinforcer menu or

shop was not available at any other time. Child manding for these items when they were not

available reduced significantly. Because there were clear signals for reinforcement

availability, children stopped asking for these items at other times, preventing parents from

having to say "no," thus reducing the risk of challenging behavior. Children learned to mand

for items (and receive them) only when the reinforcer menu was presented or they were taken

to the shop. They used whichever communication modality (e.g., vocal, sign, pointing to the

item, or selection-based) had been achieved prior to the lockdown period. Given the level of

stress our parents were experiencing after several weeks of lockdown, the likelihood was

extremely high that they would reinforce problem behavior by providing the denied item to

interrupt contact with the aversive stimulation produced by the child. We wished to reduce

the risk by implementing the simplest possible system and not burdening the parent with having to teach their child to tolerate denial. We simply removed that risk by giving frequent but contingent access to those items.

Token Reinforcement System

The token system was implemented mainly for children who had limited verbal and nonverbal skills and required frequent contact with reinforcement to engage in parent-led activities and instructions. A token system had been in place for all such children prior to the lockdown period, either at school or during home-based sessions. Because we had always worked at home, all parents were familiar with the basic techniques; in fact, it was generally parents who manufactured the token boards, so the concept of a token economy system was not new to them. The fact that the system needed to be extended to the entire day *was* new and, in this sense, paralleled early applications of comprehensive token economy systems (Ayllon & Azrin, 1965, 1968; Phillips, 1968)

Our token schedules consisted of three interrelated components:

1. The token-production schedule (the schedule by which responses earn tokens),
2. The exchange-production schedule (the schedule by which exchange periods are earned), and
3. The token-exchange schedule (the schedule by which the tokens were cashed in for preferred items or activities) (see Hackenberg, 2018, for a review).

The initial token production schedule was set at fixed ratio (FR) 1, in which each target response (carrying out parent instruction within the activity proposed) produced a token to produce rapid acquisition. This was implemented throughout the day each time the parent gave an instruction. Fairly quickly, parents naturally moved to a variable ratio (VR) schedule, in which a variable number of responses was required to produce a token, and learned to adjust it based on the time of day or the difficulty of the task.

The exchange production schedule was fixed at FR 10, in which 10 tokens were needed to reach an exchange period. We did not make this variable as it would have been too difficult for the parents to manage. The token exchange schedule was FR 1 – handing over the token board – whereupon the parent presented the reinforcer menu or took their child to the shop to choose one item.

During the exchange period, only one item or activity was allowed at a time. If the child wished to change the activity, then tokens had to be earned again for the change to occur. Reinforcement duration varied according to parental need and what was established by the daily schedule. In general, there were two types of reinforcement duration: brief (between 1 and 5 minutes) or long (up to 30 minutes). If parents needed their child to be occupied for additional time, they still had to interrupt after 30 minutes of consumption, place the item back in the shop, run a quick token board, and then open the shop or present the reinforcement menu again.

Activity-Based Reinforcement System

The activity-based system was implemented when the parent had more than one child to look after, and it was extended to all siblings below the age of 10 if they were not involved in remote schooling. The system was based on creating half-hour blocks in which the parent was coached to engage the child and sibling in an adult-led or independent instructional activity for 30 minutes in order to produce 30 minutes of reinforcement time for all (the child, the sibling, and the parent).

Lessons learned

In the present paper, we have described a model of supporting Italian families during the past 6 weeks of lockdown. As professionals, we realized that this was one of the greatest challenges we would face in our careers. It soon became apparent, however, that the published literature and other tools upon which we typically rely were insufficient to deal

with the magnitude and urgency of the present crisis. Substantial previous research had been published on aspects of ABA service delivery via telehealth, but little or no previous research had evaluated systems for transferring entire ABA programs from in-person to telehealth overnight, especially in the context of families living under total lockdown. In the absence of specific guidelines, we relied on an inductive process dictated by the tradition of our science, adapted published protocols, and derived procedures from principles. The system we were called to develop needed to be comprehensive and efficient. It needed to recognize the complexity of each individual family dynamic and be, at the same time, simple, realistic, and sustainable to maintain parental engagement.

Some may find the almost-complete elimination of noncontingent reinforcement and the application of a token economy across all waking hours to be somewhat extreme. However, the primary problem reported to us by parents before making this change was a lack of structure and loss of child motivation due to continuous free access to reinforcers. By programming reinforcement contingent on active engagement with the household schedule, we empowered the parents to increase their child's motivation and provide clear direction for everyone involved. If the parents had not been effective in providing sufficient antecedent support in the form of prompting and setting task difficulty at an achievable level, then such a system could have resulted in inadequate access to positive reinforcement. However, with support from their ABA consultants, parents were successful in bringing order to their homes and helping their children to be calm, productive, engaged, and happy.

Despite the difficulties we are all experiencing, as both professionals and human beings, we have learned some valuable lessons which we hope will shape our ability to serve our families more effectively in the future. We have tremendous respect for the courage and dedicated shown by families we work with, who at a time of adversity and uncertain future, have remained focused on the present. Although parents realize that we are all learning as we

go, we have seen a level of parental engagement that we had not been able to generate

previously. Such change, while borne out of crisis, may have enduring positive effects. Our

task moving forward will be to maintain these novel repertoires under more positive

contingencies.

A Closing Note from Parents

We have not yet been able to analyze the data so far collected. We have included

ongoing assessment of social validity by asking parents to comment on their experiences so

far. We present three representative translated excerpts of parents' feedback:

"I thought it would be difficult to maintain the daily schedule of alternating instruction with

reinforcement, but it has been very successful. I have stuck to it, and it has been all very

natural and not too effortful. I am also very happy because I am able to spend time with my

two-year-old, who is also making progress. I am able to play more with him and to focus on

his speech. It's going well." (Vittoria and Luca, parents of B, a six-year-old girl with autism

and G, two-year-old boy)

"We received very simple and clear instructions - take away all reinforcers, engage him all

day in simple domestic chores, give him routines, give the reinforcers only after completing a

token board. We saw an immediate change, zero problem behavior, and collaboration from C.

If this situation had not happened, my husband and I would never have had such an enriched

experienced. Seeing C so calm and compliant is the biggest reinforcer." (Giada and Davide,

parents of C, nine-year-old boy with autism).

"The management of G became very difficult. All his routines and perception of time had

been disrupted. G, who was never interested in playing, became satiated with technology and

was constantly searching for food, becoming very anxious during mealtimes. Creating a

closed reinforcer economy and dividing the day in clear sequential moments as to not get to

the point of acute problem behavior and prevent boredom were essential. As parents, even in

the absence of tutors, we are able to manage our child calmly and maintain learned skills."

(Veronica and Giorgio, parents of G, seven-year-old boy with autism).

Research Ethics

This article does not contain research conducted with human subjects.

Conflicts of Interest

The authors declare no conflicts of interest.

References

Ayllon, T., & Azrin, N. H. (1965). The Measurement and Reinforcement of Behavior of

Psychotics. *Journal of the Experimental Analysis of Behavior*, *8*(6), 357–383.

https://doi.org/10.1901/jeab.1965.8-357

Ayllon, T., & Azrin, N. H. (1968). *The Token Economy: A motivational system for therapy*

and rehabilitation.

Ferguson, J., Craig, E. A., & Dounavi, K. (2019). Telehealth as a Model for Providing

Behaviour Analytic Interventions to Individuals with Autism Spectrum Disorder: A

Systematic Review. *Journal of Autism and Developmental Disorders*, *49*(2), 582–616.

https://doi.org/10.1007/s10803-018-3724-5

Hackenberg, T. D. (2018). Token reinforcement: Translational research and application.

Journal of Applied Behavior Analysis, *51*(2), 393–435. https://doi.org/10.1002/jaba.439

Hirshkowitz, M., Whiton, K., Albert, S. M., Alessi, C., Bruni, O., DonCarlos, L., … Ware, J.

C. (2015). National Sleep Foundation's updated sleep duration recommendations: final

report. *Sleep Health*, *1*(4), 233–243. https://doi.org/10.1016/J.SLEH.2015.10.004

Kodak, T., Lerman, D. C., & Call, N. (2007). Evaluating the Influence of Postsession

Reinforcement on Choice of Reinforcers. *Journal of Applied Behavior Analysis*, *40*(3),

515–527. https://doi.org/10.1901/jaba.2007.40-515

McClannahan, L. E., & Krantz, P. J. (1999). *Topics in autism. Activity schedules for children*

with autism: Teaching independent behavior. Woodbine House.

Nefdt, N., Koegel, R., Singer, G., & Gerber, M. (2010). The use of a self-directed learning

program to provide introductory training in pivotal response treatment to parents of

children with autism. *Journal of Positive Behavior Interventions*, *12*(1), 23-32.

Ministero della Salute. (2020). Coronavirus, le misure adottate dal Governo, provvedimenti

attualmente vigenti, approvati dal Governo in seguito all'emergenza sanitaria

internazionale. Retrieved April 5, 2020 from

http://www.governo.it/it/approfondimento/coronavirus/13968

Parsons, D., Cordier, R., Vaz, S., & Lee, H. C. (2017). Parent-Mediated Intervention Training

Delivered Remotely for Children With Autism Spectrum Disorder Living Outside of

Urban Areas: Systematic Review. *Journal of Medical Internet Research*, *19*(8), e198.

https://doi.org/10.2196/jmir.6651

Phillips, E. L. (1968). Achievement Place: token reinforcement procedures in a home-style

rehabilitation setting for "pre-delinquent" boys1. *Journal of Applied Behavior Analysis*,

1(3), 1311003. https://doi.org/10.1901/jaba.1968.1-213

Reed, D. D., Niileksela, C. R., & Kaplan, B. A. (2013). Behavioral Economics. *Behavior

Analysis in Practice*, *6*(1), 34–54. https://doi.org/10.1007/BF03391790

World Health Organization. (2020). Retrieved April 5, 2020, from

https://www.who.int/emergencies/diseases/novel-coronavirus-2019